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GPIs 2020 & 2021

25TH EAHP ANNIVERSARY CONGRESS

HOSPITAL PHARMACY 5.0 - THE FUTURE OF PATIENT CARE

23-28 March 2021

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GOOD PRACTICE INITIATIVES 2020

GOOD PRACTICE INITIATIVES 2020

Indicates GPI award nominee

The European Association of Hospital Pharmacists (EAHP) is collecting examples of good practice initiatives (GPIs).

The overall purpose of collecting and sharing GPIs is:

- to inspire and encourage fellow hospital pharmacists in other countries to strive for the next high standard in practice;
- to identify how colleague hospital pharmacists were able to overcome barriers and obstacles in order to make improvement happen; and,
- to give recognition to those who have completed successful new initiatives in hospital pharmacy service.

SECTION 1: INTRODUCTORY STATEMENTS AND GOVERNANCE

OPTIMISATION OF CANCER CARE PATHWAY OF SCHEDULED PATIENTS WHEN OUTSOURCING CHEMO SUPPLY

Authors: Charlotte Chatain, Orane Gleizes, Séverine Barbault-Foucher, Sophie Barthier, André Rieutord, Niccolo Curatolo

What was done?
The production of chemotherapy of our hospital will be outsourced by September 2019. This is going to lead to new constraints including anticipated production before patients are admitted to the clinical ward.

Why was it done?
The production of chemotherapy of our hospital will be outsourced by September 2019. This is going to lead to new constraints including anticipated production before patients are admitted to the clinical ward.

How was it done?
The clinical pathway of scheduled patients was mapped to describe each step and validated by all the concerned health professionals. Data were collected between October and December 2017 to monitor the percentage of anticipated orders by physicians for chemotherapy production (also called "OK production"). Critical steps and/or bottlenecks were identified. Brainstorming workshops were set to identify areas of improvement with pharmacists, physicians, nurses and secretaries. Finally, the proposals made were implemented.

What has been achieved?
Two critical steps have been identified in this pathway: the receipt of the biological test results by the secretary and the "OK production" given by the physician. It has been decided for the secretary to call patients 72 hours (instead of 24 hours) before to remind them to do their biological test in the medical laboratory. An electronic and standardised prescription with the specific date for the biological test has also been created. In addition, a follow-up form was completed by pharmacists to secure all the critical steps and remind secretaries when they had to call patients and remind physicians when they had to give the "OK production". Over a two months period, "OK production" given 24–48 hours before the admission increased from 18% to 40% (n= 15 patients).

What next?
These clinical pathway improvements allowed a better anticipation. The process-oriented approach used to identify solutions was very fruitful and led to collaborative solutions likely to be applied and accepted by both clinical ward and pharmacy. This method could be applied to improve other types of processes in our hospital.

Keywords | Oncology pharmacy, organisation of health services, organisational development.
Conflict of interest I have no potential conflict of interest to disclose.

ANTIMICROBIAL STEWARDSHIP: WHAT IF EVERYTHING IS ON YOUR SCREEN?

Authors: Marinos Petrongonas, Maria Fragiadaki, Eleni Rinaki, Leonidas Tzimis

What was done?
Hospital pharmacists (HPs) designed and developed software tools to support the antibiotic stewardship team's work. Particular developments were: a) A PC application (GrAD_calc), in Microsoft Excel, to calculate antimicrobial consumption, instead of ABC_calc tool. GrAD_calc takes advantage of the unique codes for each branded product and transforms aggregated data, provided by the Hospital Information System (HIS), into antibiotic consumption in DDDs/100 occupied bed-days. Results are presented in charts and figures, in a format that enables ease of comparative monitoring over time. b) Necessary indexes of the above calculator and documentation needed as justification for restricted antimicrobials dispensing have been integrated into the HIS; in result, data for national surveillance programme for antimicrobial consumption are automatically exported. Useful information for pre- and post-prescription review, like demographics, indication(s), co-morbidities, current and previous treatments, microbiology tests' results, susceptibility reports, is available and easily accessible to prescribers, HPs, and infection disease specialists.

Why was it done?
Implementation of antimicrobial stewardship programmes in hospitals is part of the national strategy to promote prudent use of antimicrobials. As HPs chair stewardship teams, they are responsible for assessing prescription and monitoring antimicrobial use. Designing and developing automated informative tools facilitates HPs in their role.

How was it done?
HPs created GrAD_calc on their own resources, while changes in HIS were made by ICT service provider, following technical specifications described by HPs. A number of technical problems have been resolved with the contribution of HPs.

What has been achieved?
• Monitoring of antimicrobial use by pharmacy is quicker and effortless. • Handwritten documentation included in restricted antimicrobials' prescriptions has been replaced by an electronic decision support system, as tool to improve antimicrobial prescribing and stewardship. • Useful information from patient's medical record is directly available to HPs and physicians, and facilitates hospital's policy for assessing antimicrobial prescriptions. • Data, like indication, medicine, dosage scheme, microbiology results and susceptibility reports, are recorded electronically and update patients' pharmaceutical records, permitting further use for pharmaco-epidemiology studies.

What next?
Next challenge is wide use of tools developed, to optimise pharmaceutical services provided and dispense restricted antibiotics only when accordingly justified. GrAD_calc is applicable in hospital setting and HIS's tool is incorporated and can be used by all regional hospitals.

Keywords | Antimicrobial stewardship, multidisciplinary team, technology implementation.
Conflict of interest I have no potential conflict of interest to disclose.

SOFTWARE TOOL DEVELOPMENT FOR THE ASSISTANCE OF HOSPITAL PHARMACISTS IN MEDICINES' SHORTAGES MANAGEMENT

Author: Eleni Rinaki, Marinos Petrongonas, Maria Fragiadaki, Leonidas Tzimis

What was done?
A new software module in Hospital Information System (HIS) for monitoring medicines' shortages (MSs) was conceived by hospital pharmacists (HPs), and it was designed, developed and integrated to the ICT system. This module helps HPs easily track which medicines were totally or partially substituted due to insufficient quantities and gives additional information (such as residual quantity of a medicine on prescription date, on inspection date, pending orders, known shortage) needed for managing MSs. In this tool, MSs and relevant information, such as causes, measures to re-stock and shortage's impact, can be entered, centrally managed and regularly reported.

Why was it done?
MSs are a frequent problem in our hospital. In a study carried out in 2018, we investigated reported shortages during one year and found that 56% of cases of unsatisfied wards' requests were due to failure of pharmacy's procedures to restore availability. In 70% of these cases, time to re-stock was more than 4 days and strong involvement of HPs in following up and taking measures was required. The purpose of this tool is to bring together all relevant information of shortages, aiming to improve hospital pharmacy's response as well as following-up MSs for further investigation or research.

How was it done?
Implementation of the module in ICT system was made at zero cost by the ICT service provider, following technical specifications designed by HPs. The final product was multi-checked by HPs during development and all technical problems have been resolved accordingly.

What has been achieved?
• Quick intervention of HPs to restore medicines availability is feasible. • We can now have precise and easier follow up, with less human resources required. • MSs are collected, registered and easily utilised to draw conclusions. • HPs' interventions to deal with MSs are easier to evaluate.

What next?
ICT tools' development is very important in facilitating hospital pharmacy's practice, especially when human recourses are restricted. These software modules can be easily incorporated in every HIS. Pharmacists are competent and should have a central role in designing such tools. We are planning to evaluate our new MSs management procedure; in the long run, incorporating in this tool a risk assessment algorithm will be an asset.

Keywords | Drug shortage, information transmission, technology implementation.
Conflict of interest I have no potential conflict of interest to disclose.

FOUR YEARS OF A REGIONAL MEDICINES OPTIMISATION INNOVATION CENTRE – WHAT HAS BEEN ACHIEVED?

Authors: Michael Scott, Glenda Fleming, Catherine Harrison

What was done?
A Regional Medicines Optimisation Innovation Centre (MOIC) was set up in 2015 by the Department of Health (DoH) in Northern Ireland as a key enabler for the Government policy document, namely the Medicines Optimisation Quality Framework.

Why was it done?
There is a wide recognition that there are significant issues with regard to the issue of medicines, such as the fact that 30–50% of medicines are not taken as required. Thus the DoH decided to set up MOIC as a vehicle to focus activities in order to address this issue and optimise medicines use.

How was it done?
The DoH requested the Northern Health and Social Care Trust to locate the centre within the Trust based on the fact that there had been a long standing academic practice centre with the School of Pharmacy at Queens University of Belfast. Barriers that had to be addressed were highlighting the regional nature of the centre, to get engagement with all sectors of the service and building relationships with other key organisations, including the private sector. Initial core funding was provided by the DoH.

What has been achieved?
MOIC has successfully evaluated improved systems with regard to hospital pharmacy such as doctor-light discharge (90 minutes faster), post-discharge telephone follow-up (30 day readmission rate reduced by 9.9%), and medicines optimisation in older people service in care home settings (reduced Emergency Department attendances and medicines costs). In addition MOIC has been successful in 3 EU funding bids relating to medicines optimisation and has published over 30 papers. It has also been accredited as a Statement Implementation Learning Collaborative Centre (SILCC) site and also a Centre of Excellence by the Spanish Hospital Pharmacists Association. MOIC has also successfully worked

with the private sector including pharmaceutical, device and technology companies. It has also been accredited as a knowledge provided by Invest NI.

What next?
MOIC has delivered on its key initial objectives, related to medicines optimisation with good collaborative work across health, academia and commercial organisations, in the UK and Europe. It will have a key role in meeting the WHO Global Challenge of reducing medication-related harm by 50% by 2023 for the region and further optimising medicines systems. This approach with government policy support could be relatively easily established in any other region.

Keywords | Medicines optimisation, research, hospital-home transition.
Conflict of interest I have no potential conflict of interest to disclose.

THE ADDITION OF A COST ANALYSIS CHANGES THE OUTCOME OF A TENDER

Author: Camilla Munk Mikkelsen

What was done?
Tenders are made on ATC-level 5, but clinically equivalent therapeutic areas are evaluated on ATC-level 4. The analogue competition is an important strategic tool when conducting tenders and elaborating national recommendations on therapeutic areas (TA). Since 2017 the evaluation of TA has been based on a clinical evaluation, an economic evaluation and a tender. Previously the call for tenders was based on clinical evidence only. To evaluate whether the addition of a cost analysis (CA) to a tender evaluation would alter the drug recommendation of TA, a re-evaluation of the processed TA, evaluated from October 2018 until October 2019, was made on multiple sclerosis, rheumatoid arthritis and severe asthma.

Why was it done?
Including a CA in the evaluation is time-consuming and I wanted to evaluate whether the obtained drug recommendation was different from the result we could have achieved without the inclusion of a CA. The CA process includes data collection from clinicians within resource consumption per drug, including the costs of time usage of physician, nurse and patient, transportation expenses, monitoring costs, blood tests, co-medicine, utensils, shipping and hospital facilities. When a CA is included it is possible to take the derived costs associated with treatment of different drug dispensing forms and specific costs of treatment with various analogue drugs into account to achieve a recommendation upon the lowest total price including the tender price and the derived costs associated with the treatment.

How was it done?
The drug recommendations on TA made in the period was re-evaluated. Results from the cases with multiple sclerosis, rheumatoid arthritis and severe asthma were evaluated on clinical evaluation, tender price and finally with or without the CA.

What has been achieved?
From October 2018 to October 2019 three TA have ended the evaluation process. The recommendation of severe asthma had a similar outcome regardless of the process used. For multiple sclerosis and rheumatoid arthritis, the CA altered the drug recommendations.

What next?
In order to balance resource consumption on performing CA and the economic impact on the outcome, the plan is to identify TA where it isn't meaningful to conduct a cost analysis. In all other areas a CA will be included in the standard procedures.

Keywords | Cost analysis, drug therapy outcomes, health economics
Conflict of interest I have no potential conflict of interest to disclose.

SECTION 2: SELECTION, PROCUREMENT AND DISTRIBUTION

HERA – A NEW TOOL FOR THE QUALITATIVE AND PHARMACOECONOMICAL EVALUATION OF GENERIC DRUG PRODUCTS BEFORE CHANGING BRANDS

Authors: Steffen Amann, Rudolf Bernard, Georg Berndt, Meike Bindemann, Myga Brakebusch, Jörg Brüggmann, Frank Dörje, Miriam Gyalrong-Steur, Anita Kellermann, Markus Müller, Elfriede Nusser-Rothermundt, Rainer Riedel, Eva Tydecks

What was done?
We developed an Excel-based tool for the qualitative and pharmacoeconomical evaluation of generics before changing brands (aut-idem substitution) in hospitals.

Why was it done?
Given rising cost-pressure and increasing numbers of supply shortages, changes between generics have become daily practice in hospital pharmacies. To ensure constant treatment quality and patient safety, the equivalence of a potential new product with the current one must be guaranteed before changing brands. So far there has been no transparent, standardised tool for the comparison of generics workable in everyday clinical practice. Developing such a tool was our project's aim.

How was it done?
A working-group of pharmacists from seven hospitals developed the "HERA" tool (HTA-evaluation of geneReric phArmaceuticals). Starting from a base version, 22 generic products were assessed with the tool during five evaluation rounds. Based on these results the instrument was gradually refined. Within HERA's Excel matrix a potentially to-be-used generic is compared with the current one. The economic evaluation is based on unit prices and prescription volumes, but also includes process costs associated with the product change. The assessment of pharmaceutical quality is based on 34 criteria from six areas (licensed uses, drug substance, dosage form and excipients, handling, safe design, packaging and storage). The objective quality evaluation is complemented by the assessment of hospital-specific features. Complex substitutions – e.g. associated with a handling change – require involvement of the medical staff using the product. The purchasing decision is taken based on the synopsis of pharmaceutical quality and economic evaluation.

What has been achieved?
The standardised evaluation of product differences before substitutions allows for the early identification of potential problems of brand changes and helps avoiding them for the benefit of patient safety. HERA also guarantees reproducibility and transparent, QM-compliant documentation of product changes. The pharmacies of our purchasing group now routinely use HERA for the assessment of generics before intended brand substitutions. Each evaluation is conducted in one pharmacy and shared with the others via data-cloud.

What next?
We have published a paper on HERA and presented it at the German Hospital Pharmacists congress in 2018. Our aim is to create a network of colleagues with shared access to all colleagues' HERA product evaluations to reduce the workload for the individual pharmacies.

Keywords | Error-avoiding strategies, generics, quality improvement
Conflict of interest I have no potential conflict of interest to disclose.

MANAGING MEDICINES SHORTAGES ON A NATIONAL LEVEL – A MULTIDISCIPLINARY COLLABORATION BETWEEN WHOLESALER, HOSPITAL PHARMACIES AND PATIENT SAFETY ORGANISATION IN DENMARK

Authors: Christine Dinsen-Andersen, Hanne Fischer, Anita Gorm Pedersen, Dagmar Bertelsen, Marianne Hald Clemmensen

What was done?
A National Task Force (NTF) for critical medicines shortages (CMS) have been established with the main objective to provide therapeutic and patient safety assessment of CMS on a national level. In addition to this the NTF takes considerations regarding the supply chain into account in the assessments.

Why was it done?
Before the NTF was established, each hospital pharmacy made their own assessments and solutions to CMS. This led to a lack of coordination in the national supply and knowledge sharing. As the number of CMS increased, a need for a coordinated national initiative became evident. The aim of the NTF is to secure better communication to healthcare professionals and to establish clearly defined rolls and responsibility in the supply chain from wholesaler to hospital pharmacy. Patient safety aspects should be included in all relevant steps of the process.

How was it done?
To secure national engagement, members of the task force were appointed according to a consensus between the hospital pharmacies in Denmark. The NTF includes participants from 3 hospital pharmacies, the national wholesaler for hospital pharmacies and a patient safety organization. Based on challenges of geographical dispersion and different local practices, an effort was put into: • securing a systematic work flow, for the group; • creating a digital platform with access for members from different organizations; • agreeing on when a medicine shortage is critical.

What has been achieved?
• Early intervention – resulting in opportune solutions. • Agility in allocation of remaining stock between hospital pharmacies. • Optimisation of choice of alternative treatment during period of shortage. • Secure supply of alternative drugs on national level. • Initiate agreement between physicians on choice of alternative on a national level. • Attention to patient safety challenges – preventing adverse events.

What next?
Joined forces have resulted in coordinated and optimised solutions to managing CMS, enabling the hospital pharmacies to secure patient safety. Hence the NTF shall continue its work. Having a national unit as NTF provides the basis for coordinated initiatives and for corporation with health and medicines authorities and market authorization holders.

Keywords | Drug shortage, error-avoiding strategies, patient safety.
Conflict of interest I have no potential conflict of interest to disclose.

DRUG SERIALISATION: ORGANIZATIONAL AND ECONOMICAL IMPACTS FOR HOSPITAL PHARMACIES

Authors: Quentin Hiver, Agathe Roger, Marine Egot, Ivan Vella, Marie-Hélène Tywoniuk

What was done?
Determining and evaluating, by feedback approach, the organisational and economical impacts of drug serialisation for a hospital pharmacy.

Why was it done?
Community and hospital pharmacists are required to apply the European directive on falsified medicines. In France, we are currently undergoing a transition phase for the progressive generalisation of serialisation. French pharmacies are more or less ahead of schedule for the implementation of decommissioning. In our pharmacy, the decommissioning has been operational since February 2019. After 8 months of practice, we are able to provide data as a basis for work and thinking.

How was it done?
• Step-by-step description of the supply chain after implementation of decommissioning. • Collection of the man-hours necessary for: decommissioning implementation, software training, routine decommissioning, problem solving. • Census of financial investments

What has been achieved?
After analysis of our supply chain, the reception stage appeared to be the most favorable for decommissioning, in terms of practicality, safety and traceability. Several steps have thus been added at reception: Identification of serialized boxes, manual scan, checking of the decommissioning report and the number of decommissioned boxes, printing of the report. The pharmaceutical time necessary for the decommissioning implementation has been estimated to up to 28 hours. The software training was made in small groups of 2–3 agents, requiring 9 minutes per agent on average. The decommissioning is currently requiring 17 minutes for 100 boxes. Over 8 months, the time necessary for the pharmacists to solve problems linked with serialisation (non-operational Hub, corrupted database, error message at decommissioning…) was estimated to up to 7 hours. The financial investment amounts to 17200 euros (software+ergonomic desk+man-hours at implementation).

What next?
The decommissioning itself doesn't have a major impact on the pharmacy's organization. But, ensuring a clear and safe supply chain, to identify which boxes must be decommissioned and which boxes can be dispensed, is time-consuming. It goes through a proper working environment with a forward supply chain and traceability tools. Moreover, the encountered problems were mainly due to computer failures, requiring a performing software with an efficient maintenance. We are currently working on improving the ergonomics of the workstation to avoid the risk of musculoskeletal disorders due to decommissioning.

Keywords | Dispensing, barcode verification, feedback.
Conflict of interest I have no potential conflict of interest to disclose.

JOINT PROCUREMENT: LEARNING FROM A PILOT OF JOINT PROCUREMENT OF OLDER PRODUCTS

Authors: Helle Pasgaard Rommelhoff, Lise Grove, Dorthe Bartels, Trine Ann Behnk, Lars Ole Madsen

What was done?
Three European countries decided to implement a joint procurement pilot in order to seek solutions for some of the supply issues in the three markets. This was a consequence of being a small volume market with potentially limited attractivity for suppliers of older products. An initial evaluation of synergies and discrepancies among the involved countries supported the understanding of how to jointly procure medicines for the hospital sector.

Why was it done?
To share learning from a pilot of procuring pharmaceuticals jointly across borders in three European countries as well as post-learning on planning and execution elements in order to have a successful joint procurement.

How was it done?
The visualised model of a product lifecycle was applied to understand where a pilot of joint procurement would support the supply issues of the older products. This led to a shared understanding between the countries on where the supply issues may occur and potential solutions. An evaluation of building the joint procurement process, which took approximately 2 years, is now available as a best practice with "Do's and Don'ts" for other countries with joint procurement interest. Criteria in the tenders announced were either price alone or in combination with. One of the tenders included a mandatory bid for all 3 markets, the rest of the tenders were mandatory for 2 of the markets with optional submission for the 3rd market. This was an outcome of hearings with suppliers. The feedback from the hearings was modifying the tender materials into a new proposal for suppliers. A political framework was signed between the countries to have a shared fundament to build on.

What has been achieved?
The final outcome of a joint procurement was evaluated. Evaluation of the submission and preparation part showed that the majority of joint tenders had an efficient competition on price with a representative amount of suppliers bidding. It also shown that it was vital to have collaboration and to listen to stakeholders in order to have a robust insight on what was possible for all involved parties. The thorough preparations supported the process and the final outcome. There was dual engagement between the stakeholders and transparency on the wish from countries to overcome barriers and conduct joint procurement to support supply issues.

What next?
Efficient and timely planning is crucial. Collaborations between the involved stakeholders are important. Mutual understanding of the interests and strategy is helpful in building a shared view on the problems and potential solutions. It is seen as essential, when planning joint procurement, to include logistic thinking already in the early tender planning phase.

Keywords | Drug shortage, pilot study, drug procurement.
Conflict of interest I have no potential conflict of interest to disclose.

ASSORTMENT COUNCIL SECURES THAT MEDICAL PRODUCT AND INFORMATION IS AVAILABLE TO NURSES, PHYSICIANS AND PHARMACISTS

Authors: Katja Heikkinen, Charlotta Vinterflod

What was done?
The hospital pharmacy in Region Västra Götaland, Sweden (VGR) established an assortment council (AC) that assists buyers of medical products within the region. By creating a defined assortment the goal was to direct healthcare professionals to order procured, recommended and cost-efficient medicines and enable structured availability monitoring.

Why was it done?
AC's mission is to secure that the right product and product information is available as well as in case of shortages assist with alternative products and information. Correct information is fundamental to achieve an effective and secure supply chain of medical products. This reduces time spent on ordering, delivery time is shortened and finding information is more efficient.

How was it done?
A counsel of pharmacists was formed to administer a defined assortment consisting of 95% of the most commonly used medical products. The availability is monitored daily and every disruption of supply is handled in a structured way. Alternative marketed or unlicensed medical products are identified and information about these are communicated through VGR's ordering system or by newsletters. If an equivalent product is available, it will be delivered automatically without the need for placing a new order. The AC also collaborates with the region's medical specialists and drug and therapeutics committee (DTC) when searching for alternatives.

What has been achieved?
Defined assortment has been reduced from 6000 products to approximately 3000. In 2018 in addition to the daily updated availability information, 14,300 orders out of 410,000 were automatically replaced with an equivalent product and 41 newsletters about shortages were published. Nurses get more time for patient care when shortages information is readily available, and replacement of equivalent products can be delivered automatically.

What next?
By implementing this way of working in other hospital regions or on a national level, caregivers would be able to free up resources and focus on patient care and at the same time be able to find quality assured information about shortages and alternatives in an efficient manner.

Keywords | Delivery performance, drug shortage, supply chain.
Conflict of interest I have no potential conflict of interest to disclose.

DEVELOPMENT OF A DYNAMIC STOCK MANAGEMENT TOOL: "ILIKECOMMANDS"

Authors: Tristan Ternel, Melinda Place, Berenice Gilloteau, Elodie Dechambenoit, Emeline Devos, Faten Abou-Daher, Anaelle Decoene, Thomas Queruau Lamerie, Frederique Danicourt

What was done?
Development of a dynamic stock management tool plugged into a computerised model (Excel©), to integrate all data needed for a stock forecast in terms of specialties, providers, therapeutic classes, last order date, supply disruptions, market, restocking

time, turnover, stock, orders, security threshold, average daily consumption, average time of supply, and delivery estimated time for all pharmaceutical products in hospital.

Why was it done?
The main purpose of developing this tool is the need to provide centralised product parameters through a unique summary screen that permits a regular monitoring of inventory, enabling us to identify the glitches before things get out of control, resolve issues the soonest to improve the stock control system (order threshold, market), maintaining compliance and documenting usage to prevent sudden shortages, in a harmonised way in order to reduce the time spent to order.

How was it done?
It's important to know how much you have from each product, and each dosage of the same product, through a dynamic database that's collecting all data (product code and average daily consumption) and highlighting the order quantity threshold. This reliable inventory is updated on a daily basis with data extracted from our economic and financial management coupled with Business Object©. Using specific formulas and filters, and referring to the decision flowchart, such data allow adjusting and optimising our stock management in real time.

What has been achieved?
First, this tool has allowed us to gather all required data and, subsequently, reduced the need to another application (such as NEWAC© and MAGH2©). Second, it has allowed us to understand the mechanism of order suggestions by displaying characteristics of some sectors (such as expensive products and chemotherapy). Moreover, it improved the management of supply disruptions by showing the solution of each disrupted product in a summary table, which results in significant time saving along the drug supply chain.

What next?
An organised supply chain, a fast response to overcome and handle sudden supply shortages, as well as a huge time saving are the main reasons to rely on this efficient system, which lead to an optimised and secure patient care. Moreover, it fits any computer software, and its application is very friendly to be used in every hospital pharmacy.

Keywords | Supply chain, procurement.
Conflict of interest I have no potential conflict of interest to disclose.

DEVELOPMENT OF AN INFORMATIC HAZARD VULNERABILITY ANALYSIS TOOL TO MINIMISE MEDICINES SHORTAGES

Authors: Daniele Leonardi Vinci, Enrica Di Martino, Rosario Giammona, Piera Polidori

What was done?
We created an informatic HVA Tool (HVAT) to assess the risk associated with medicine shortage.

Why was it done?
The 2018 Medicines Shortages Survey conducted by EAHP showed that 91% of responding pharmacists had experienced problems sourcing medicines, therefore it is important to use tools that identify early the shortage risk associated with each drug included in a hospital formulary in order to adopt appropriate countermeasures.

How was it done?
The HVAT created consists of an Excel spreadsheet subdivided into three macro areas: probability that the shortage will occur based on shortage in the last 2 years, magnitude factors which increase the risk of shortage, and mitigation factors which reduce it. A score was assigned to each item in each macro area. The score of the probability was: 1=no previous deficiency; 1.5=one deficiency; 2=two or more deficiencies. Magnitude was divided into: relevance of active substance (AS) (1= not life-saving and not High Risk Medicines (HRM); 2=not life-saving but HRM; 3=life-saving); budget impact (0=no alternative drug; 1=alternative drug costs equal to or less than the deficient one; 2=cost of the alternative drug higher than the deficient one but sustainable for all patients; 3=cost not sustainable for all patients); percentage of patients treated with the drug (1=less than 20%; 2=from 20% to 50%; 3=more than 50%). Mitigation factors were: therapeutic alternative (1=same AS and same route; 1.5=same AS and different route; 2=different AS and route not intravenous (IV); 2.5=different AS and route IV; 3=no alternative drug); stock available (1=for a month of autonomy; 2= autonomy between 1 week and one month; 3=autonomy less than 1 week); availability of the drug (1=drug available in EU; 2=drug available exclusively extra-EU; 3=drug not available).

What has been achieved?
The HVAT obtained allows us to calculate the value of the risk multiplying P by S, where P is the percentage of probability (value of probability obtained/2) and S is percentage of severity [(sum of values of magnitude obtained + sum of values of mitigation obtained)/18]. Based on the score obtained, drugs are classified as: low (<30%); medium (30–60%) and high (>60%) risk of shortage.

What next?
We will implement the HVAT in our hospital in order to reduce the impact of shortages.

Keywords | Drug shortage, supply chain, technology implementation.
Conflict of interest I have no potential conflict of interest to disclose

SECTION 3: PRODUCTION AND COMPOUNDING

INTEGRATION OF A ROBOT INTO THE EXISTING WORKFLOW OF THE CYTOSTATIC DRUGS DEPARTMENT IN A HOSPITAL PHARMACY

Authors: Swantje Eisend, Herwig Heindl, Karen Tiede, Sven Jirschitzka

What was done?
The implementation of robotic systems for aseptic compounding cytotoxic drugs requires a specific workflow organisation in the hospital pharmacy to ensure an optimal combination of manual and automated production as well as the effective use of the technology. Since 2017, the APOTECAchemo robot has been installed in the hospital pharmacy and one of the first objectives was to create an organisational structure that would allow successful integration of the system into the existing workflow of the cytostatic department.

Why was it done?
Definition of an organisational structure for the best implementation of APOTECAchemo technology in the UKSH hospital pharmacy workflow.

How was it done?
The pharmacy has carried out an analysis to identify the active substances that can best be transferred into automated

production based on 4 main points: • Pharmaceutical form of the active ingredients: liquid or powder; • Average of vials needed for the compounding of one preparation for each active ingredient; • Average of ml of medication required for the compounding of a preparation associated with each specific active ingredient; • Robot compounding speed. In addition, the pharmacy has also tried to identify the optimal organisation of personnel and daily workflow for the automated compounding. The effectiveness of these measures and the work organisation defined have been evaluated through an intensive compounding week in April 2018.

What has been achieved?
The analysis of the active substances and the data collected during the "Robotic Intensive Week" showed the following results: • 42% of the total production was operated by APOTECAchemo; • 87% of active ingredients was handled by APOTECAchemo; • average of 60 preparations per day (with an actual working time of 5 hours); - average of 12 preparations per hour.

What next?
The study shows that the planning and organisation of the workflow plays a central role in the implementation of a robot solution in a hospital pharmacy. Through the work carried out, the hospital pharmacy has successfully integrated automated and manual production.

Keywords | Individualised preparation.
Conflict of interest I have no potential conflict of interest to disclose.

TEMPERATURE AND RELATIVE HUMIDITY CONTROL IN THE PACKAGING ENCLOSURE OF SOLID ORAL DOSAGE FORMS

Authors: María Lourdes Recio Blázquez, José Manuel Martínez Sesmero, Lidia Ybáñez García, Gonzalo Hernando Llorente, María Molinero Muñoz

What was done?
A temperature (t) and relative humidity (RH) control system has been established in the enclosure where the solid oral dosage forms (SODFs) are packaged in unit doses.

Why was it done?
The purpose is to control two environmental conditions to guarantee the comfort of the workforce and the quality of the finished product quality. 519,321 SODFs have been repackaged in unit doses last year. The 8% of the SODFs come from multidose containers that have been exposed to environmental temperature and humidity during this process. Employees have been exposed to identical conditions.
How was it done?
Among the diversity of hygrometric sensors commercialised, a device equipped with a condenser was chosen. The operation is based on modifying the capacity when varying the dielectric constant of the medium, in this case, due to varying the amount of water contained in the air between the plates. - C = ε A / D - C: capacity value. - ε: dielectric constant. - A: area of the condenser plates. - D: distance between the condenser plates. The device also incorporates a temperature sensor. The t (ºC) and RH of each moment are shown, for visual inspection, on the device screen. The data obtained with certain time frequency can be stored on a Secure Digital memory card and be downloaded on a computer that has that program installed (on spreadsheet format) helping to obtain graphics as well.

What has been achieved?
The range of t (ºC) has remained stable between 26 and 24ºC for 6 months, with minimal variations from maximum 28.5ºC to minimum 23.4ºC. The UNE 100713: 2005 is met. RH has been below 45% during 68% of the days worked, which has favored the repackaging of the units affected by humidity but not the worker. The range of RH has varied between 56.3% and 23.6%, not complying with the UNE 100713: 2005 standard.

What next?
Metabolic rate, clothing insulation, air temperature, radiant temperature, air speed and humidity shall be addressed when defining conditions for acceptable thermal comfort. It would be helpful to regulate the commercialisation of multidose pharmaceutical specialties susceptible to deterioration when opening the package.

Keywords | Drug stability.
Conflict of interest I have no potential conflict of interest to disclose.

THE RISK MANAGEMENT OF THE PHARMACY PREPARATIONS IN THE HOSPITAL PHARMACIES

Author: Adriana Durcanska

What was done?
The quantitative risk assessment of the pharmacy preparations for stock in hospital pharmacies (HPs) in accordance with Resolution EDQM CM / Res (2016) 1; to specify the decision criteria for the risk assessment; the risk management of the pharmacy preparations for stock in the country; to design a check list of the risk assessment for extempore preparations.

Why was it done?
The quality and safety standards of pharmacy preparations are not harmonised throughout Europe. They fall under the national competencies of individual European countries.

How was it done?
Out of the total number of 53 hospital pharmacies contacted, 5 pharmacies sent a suitable file.

Tab. 1 – part List of preparations

	Preparation	Package (g/ks)	Pieces (year)	Venena/ Separanda / Inoxia	Sterility	No therap. effect	Supply (Int/Ext)	HP 1	HP 2	HP 3	HP 4	HP 5	HP 6
1	CREMOR CUM ACIDO LACTICO	60,5	20	I			I	x					
3	PASTA CUM OLEI IECORIS ASELLI	100	50	I			I	x					
		50	100	I			I				x		
		3000	15	I			I						x
8	SOLUTIO ARGENTI NITRATIS AQUASA	10,1	10	S			I	x					
60	Stylli phenobarbit. 0,01g	0,51	310	S			I		x				

Tab.2 - part Specified decision criteria for RA

Content of API	yes / no	
	yes	1
	no	0
1. Type of preparation/ dosage form		
parenteralia		5
dosage forms for digestive tract – no sterility (oral, sublingual, rectal)		3
topical preparations		1
5. Supply		
Externally		5
I:E ≈ 1:2		4
I:E ≈ 1:1		3
I:E ≈ 2:1		2
Internally		1

What has been achieved?
A total of 170 types of medicines are being prepared in HPs. One HP had the result of the risk ≥ 100 when preparing ophthalmic medicines. Annex A is a check list designed to assess the risk of extempore preparations.

Tab. 5 – part HP 3

Preparation	API	Supply	Preparat. process	Dos. form	Pharmacolog. effect	Production volume	Result
SOLUTIO IODI AQUOSA 100g	1	1	2	1	3	1	**6**
Suppositoria metronidazoli 500,0 mg 100pcs	1	1	2	3	3	1	**18**

What next?
The management is and will be forced to consider its introduction or to use another model: hospital - GMP / outsourcing / central pharmacy preparing and distributing. The aim of using the document in hospital pharmacies of the country.

Keywords | Active ingredient, national standards.
Conflict of interest I have no potential conflict of interest to disclose.

REPACKAGING OF INTRAVITREAL BEVACIZUMAB

Authors: Margherita Galassi, Chiara Della Costanza, Claudia Tirone, Elena Aliprandi, Ernesto Ruffino, Sara Bertoli, Eleonora Ferrari, Elisabetta Martinelli, Vito Ladisa

What was done?
We implemented a production process to repackage a drug to be used in treatments not covered by marketing authorisation. Bevacizumab was split into fractional doses for off-label intravitreal injections; the doses obtained were given to our hospitalised patients as therapy for uveal melanoma and provided to hospitals in our region as therapy for patients with age-related macular degeneration (AMD) and diabetic macular oedema.

Why was it done?
Intravitreal bevacizumab is refunded by National Health System for AMD and diabetic macular oedema but the splitting process must be carried out only by authorised pharmacies. Recently the established regional refund price was lowered to €55/dose that covers the costs of intravitreal bevacizumab but not the other authorised drugs ranibizumab and aflibercept. Our Centralized Pharmacy operated the repackaging of intravitreal bevacizumab for internal patients but we implemented a new process and a new procedure in order to provide doses to hospitals not equipped in performing sterile preparations.

How was it done?
The procedure for preparing intravitreal injections was reviewed to optimise traceability aspects of processing batches, individual doses of finished products and particularly to choose the most suitable packaging for transport to hospitals that will administer the drug. Further quality control to regional law was established on processes and finished product: environmental, instrumental, maintenance controls. All processes were validated in accordance with applicable regulations. Agreements related to prescription, purchase, conservation and transport of bevacizumab doses were signed with the hospitals that administer the drug.

What has been achieved?
The price refunded for a single intravitreal dose of an anti-VEGF (vascular endothelial growth factor) drug from August 1 2019 is €55, previously the price for each single dose of ranibizumab was €600. Considering that AMD therapy requires a monthly injection for about a year we can assume a standard average cost saving of €6540/patient.

What next?
AMD is the leading cause of blindness among populations over 50 years old. To provide treatments to all those affected by degenerative eye diseases in the next years, we must operate cost savings policies safeguarding patient security. The practice described is worthy of implementation in hospital realities.

Keywords | Drug packaging, aseptic preparation.
Conflict of interest I have no potential conflict of interest to disclose.

MICROBIOLOGICAL CLEANLINESS IN A CHEMOTHERAPY ROBOT DEPENDING ON DIFFERENT INTERVALS OF INTENSIVE CLEANING IN THE WORKING AREA

Authors: Jannik Almasi, Irene Krämer

What was done?
Automated preparation of ready-to-administer chemotherapy products with the APOTECAchemo® robot is well established in a number of pharmacy departments. One of the few disadvantages is the time-consuming, intensive cleaning and disinfection of the working area (clean room class A) by wiping with cleaning and disinfection solutions.

Why was it done?
Aim of the study was to evaluate if the microbiological cleanliness of the working area of APOTECAchemo® is affected by extending the interval of intensive cleaning from biweekly to monthly cleaning intervals.

How was it done?
Every two weeks (period 1: 07-12/2018) or every four weeks (period 2: 01-06/2019) all surfaces in the working area of APOTECAchemo® were wiped with ethanolic NaOH solution in order to inactivate or remove cytotoxic spillages. In a second work step all surfaces are disinfected by wiping with spore-free alcohol. The procedure lasts about one hour. The working area is at the end of each working session irradiated with UV light for 4 hours. Microbiological monitoring of the working area is done weekly in operation by passive air sampling (2 settle plates at predefined locations S1, S2) and surface sampling (3 contact plates at predefined locations O1, O2, O3) and colony-forming units (CFU) are counted after incubation. Results of the microbiological samples (CFU ± standard deviation) were compared for period 1 and 2. On average, 0 CFU (n=52) were detected (period 1) and 0.04±0.2 CFU (n=44) (period 2) on settle plates. During period 1 on average 0.04±0.19 CFU were found at O1, 0 CFU on O2, and 0.81 CFU±4.23 at O3 (n=27 each). During period 2, 0 CFU were detected at O1, O2 and 0.04±0.2 CFU at O3 (n=25 each). The extended interval for the intensive cleaning process did not affect the microbiological cleanliness. The CFU limits set for clean room class A were met.

What has been achieved?
Maintaining the daily cleaning procedure, the interval of intensive cleaning can be extended to one month without increasing the microbiological contamination risk and saving two hours of cleaning.

What next?
Monthly intensive cleaning will be attended by trending the microbiological results.

Keywords | Ready to administer, L01 – cytostatics, aseptic preparation.
Conflict of interest I have no potential conflict of interest to disclose

IMPLEMENTATION OF INTRAVITREAL TISSUE PLASMINOGEN ACTIVATOR INJECTION INTO PRACTICE

Authors: Liisa Eesmaa, Katrin Sõnajalg, Ülle Helena Meren

What was done?
Ophthalmologists contacted the pharmacy to work out a plan for emergent cases of patients with large submacular haemorrhage in the better seeing eye. The pharmacists worked out the logistically simplest, economical affordable solution to prepare the injection in a cleanroom setting.

Why was it done?
Intravitreal tissue plasminogen activator (tPA) injection is a guideline recommendation for patients with medium, large or thick submacular haemorrhage mainly due to exudative age-related macular degeneration (AMD). This treatment hasn´t been available: off-label use, rare demand, high price (generic unavailable, the cost uncovered by health insurance).

How was it done?
The pharmacy came up with two models: 1. Compound intravitreal injection (50 µg/dose) from Actilyse 50mg vial (€375) containing substance for intravenous infusion. The rest of the vial would possibly be used in the neurology department during the next 24 hours. The costs would be shared based on microgram use. 2. Use unregistered Actilyse cathflo 2mg vial. Application for permission and delivery would take up to 6 weeks and drug shortages would be usual. The price for 50 µg would be €65. For the first two patients the first model was used. It was logistically complicated for the neurology department as they needed to change their everyday practice. The second model has now been introduced into practice and used for another two cases. It is accepted by the doctors and pharmacists.

What has been achieved?
Four patients have received new treatment with intravitreal tPA in addition to the common practice of pneumatic displacement of the haemorrhage with intravitreal anti-VEGF (vascular endothelial growth factor) injections or intravitreal anti-VEGF monotherapy. The treatment was well tolerated by the patients with some benefit to visual function. The pharmacy is ready to prepare tPA injections during working days. The price of the injection is acceptable.

What next?
The University hospital became interested to start the same treatment. The second model was presented to their hospital pharmacy. Our ophthalmology department is now equipped to inject tPA into the subretinal space during vitrectomy to increase the efficacy of the procedure and improve patients' visual outcome.

Keywords | Aseptic preparation.
Conflict of interest I have no potential conflict of interest to disclose.

DIAZOXIDE 10MG/ML ORAL SUSPENSION AS A COST-EFFECTIVE ALTERNATIVE TO THE COMMERCIAL PREPARATION

Authors: Beatriz Sánchez Sanz, Iván González Barrios, Siria Pablos Bravo, Sara Ortiz Pérez, Cristian Rosas Espinoza, María Arrieta Loitegui, Francisco Martínez de La Torre, Dolores Canales Sigero, José Miguel Ferrari Piquero

What was done?
Diazoxide is the first line therapy in infants with hypoglycaemia due to hyperinsulinism. A formulation to facilitate the dosage in newborns has been developed due to the increasing demand at our hospital.

Why was it done?
The objective is the elaboration of a formulation as a cost-effective alternative to the diazoxide oral suspension not commercialised in Spain, to treat patients with hyperinsulinaemic hypoglycaemia.

How was it done?
To evaluate the solubility, a research on Pubmed was executed including terms such as "diazoxide AND solubility" and "tiazides AND solubility". To determine the stability, the agreement approved by the "Pharmacotechnics Group of the Spanish Society of Hospital Pharmacy" concerning the viability of the non-sterile oral formulations was reviewed. In terms of effectiveness, a retrospective observational study was conducted. Demographic and clinical (duration of the therapy and blood sugar levels 24 hours after first administration, sorted as "sensitive" if those levels were over 60mg/dL) variables were collected.

What has been achieved?
Carboxymethyl cellulose gel 1.5% (CMC) was evaluated as suspending agent, with adequate results. The steps to compounding the formulation of diazoxide 10mg/mL oral suspension were: 1. Four capsules of 25mg were opened and spread over a mortar. 2. 10ml of CMC was measured on a test tube. 3. CMC was added slowly over the powder while stirring the mixture to obtain a homogenized milky creamy. 4. Suspension was stored in an amber bottle. Following our stabilities studies and the lack of preservatives, an expiration date of seven days at ambient temperature was assigned. In our hospital, seven neonates (four males) aged 5.8±2.3 days have been treated with this oral suspension, for an average period of 28 days. Six of them were classified as "sensitive" with levels of 105±30mg/dL while one showed no improvement. Analysing the global expense, one pack of 100 capsules costs €21. Thus, 1 unit of our suspension 10mL cost €0.84 versus 1 bottle of 30mL (€473); the savings are remarkable.

What next?
The preparation constitutes a suitable alternative by using a simple and cheap technique since its introduction. In the future, full studies of stability must be designed to prolong its period of validity and monitor its security.

Keywords | Drug formulation, manufacturing, small scale production.
Conflict of interest I have no potential conflict of interest to disclose.

IMPROVING ANTIBIOTIC STEWARDSHIP AT A HOME HOSPITAL UNIT BY IMPLEMENTING THE PRODUCTION OF ELASTOMERIC PUMPS CONTAINING BENZYLPENICILLIN

Authors: Maria Rautamo, Niina Laihanen, Laura Lehtola

What was done?
The production unit at the hospital pharmacy began preparing elastomeric pumps containing benzylpenicillin for Helsinki city home hospital unit for the treatment of outpatients suffering from erysipelas. A pilot study was conducted in November 2018 before further implementation of the elastomeric pumps.

Why was it done?
Erysipelas was the most commonly treated infectious disease at the home hospital unit in 2015. Previously the standard treatment was broad-spectrum antibiotic cefuroxime three times daily. The infectious disease specialist wanted to improve the antibiotic stewardship by shifting from cefuroxime to a continuous infusion of narrow spectrum benzylpenicillin. The aim of the initiative was also to improve patient care and reduce the number of treatment visits and thus overall treatment costs.

How was it done?
A benzylpenicillin 10 million IU infusion solution was prepared and transferred to elastomeric pumps (Folfusor LV10, Baxter) in the production unit at the hospital pharmacy. The production method was developed by pharmacists at the hospital pharmacy in cooperation with Baxter and the formulation as well as stability

information was received from Baxter. The pilot study was planned and executed in cooperation with Helsinki city home hospital unit. The batch size of prepared elastomeric pumps was 7 pumps a week and the overall pilot period consisted of 5 weeks. A total of 8 patients were treated during this period. The opinions of nurses and patients about the use of elastomeric pumps were investigated through a questionnaire. The impact on treatment costs were also evaluated.

What has been achieved?
Elastomeric pumps containing benzylpenicillin have been implemented as a standard treatment for erysipelas at the home hospital unit. Cost savings from the pilot period of 5 weeks were 125 nurse visits corresponding to approximately 100 hours of work as well as 200 km of driving for nurses to patients' homes. The patients were very pleased with the elastomeric pumps and the fact that the pump had to be changed only once daily.

What next?
Production and delivery of elastomeric pumps containing benzylpenicillin has expanded to other home hospital units. The implementation of elastomeric pumps containing other active ingredients is under investigation.

Keywords | Optimisation of therapy, cost saving, aseptic preparation.
Conflict of interest | I have no potential conflict of interest to disclose.

PRODUCT DOSSIER AND RISK EVALUATION FOR EXTEMPORANEOUS PREPARATIONS KEEPS FOCUS ON PATIENTS

Authors: Mette Lethan, Marianne Lund Sørensen, Jakob Kronkvist Hoe, Heidi Waenerlund Poulsen, Louise Rasmussen Duckert

What was done?
A Product Dossier (PD) for extemporaneous preparations (EP) was established in our hospital pharmacy. They contain a risk evaluation and information about the specific value of the preparations, a demonstration that the active pharmaceutical ingredient(s) (API), excipients and containers meet relevant requirements, an evaluation of the stability of the product, and a description of the preparation process and analysis.

Why was it done?
On July 1st, 2016, an EU resolution caused a new national requirement to establish a PD for new as well as known EP's produced by the hospital pharmacy. PD's had to be established for 450 known products in our facilities.

How was it done?
To approach the task, an interdisciplinary project group was formed. It consisted of members from Quality Assurance/Control, Stability, Drug Information Center and Production. A formulation for a collaborative approach was established to ensure a high and uniform quality of the PDs. The information obtained included e.g. information and evaluation of API and excipients, ongoing stability studies, indication of the drug and alternative preparations. A few examples were concluded in the group to ensure a quality baseline of the PDs.

What has been achieved?
PDs for 150 products have been successfully implemented. In some cases the formulation regarding excipients was changed to better suit the patient group. In other cases, it was evaluated whether a drug registered in another country could better ensure patient safety. Based on stability data, storing of some products were changed. Collaboration across departments has enabled us to ensure compilations of PDs for our pharmaceutical stock preparations. Completing the PDs on existing products has ensured a pool of knowledge about our products collected in one document and accessible to all departments in the hospital pharmacy.

What next?
Through the interdisciplinary approach PDs ensure focus on the quality, safety and benefits for the patients. All existing EPs will be maintained and evaluated anytime there may be a change in production. For all new products a PD will be prepared according to the guidelines set up. Having the information in one document (PD) ensures that all departments can quickly obtain information needed to consistently maintain and evaluate product quality and thereby the specific value of our production.

Keywords | Compounding, drug formulation, product information.
Conflict of interest I have no potential conflict of interest to disclose

PUBLICATION OF THE FIRST TEXTS IN THE EUROPEAN PAEDIATRIC FORMULARY

Authors: Jane Francomb, Dirk Leutner

What was done?
The European Paediatric Formulary was launched at the end of 2019. It is a freely available online publication for pharmacists and clinicians that is intended to provide guidance on the use and preparation of standardised paediatric medicines of an appropriate quality when a suitable licensed medicinal product is not available. The first two monographs and two explanatory texts of the European Paediatric Formulary have now been published by the European Directorate for the Quality of Medicines & HealthCare (EDQM).

Why was it done?
Formularies for extemporaneous formulations of paediatric medicines of appropriate quality are currently available in some regions or countries, but no pan-European equivalent exists. Some formulations in use are not appropriate due to a lack of knowledge of best practices. The idea behind the new formulary is to collect, review and then select the most appropriate formulations currently used in Europe which meet today's requirements.

How was it done?
Criteria for selection and evaluation of formulations were developed by 2015. Since then the current work is carried out by the European Paediatric Formulary Working Party under the supervision of the European Pharmacopoeia Commission and the European Committee on Pharmaceuticals and Pharmaceutical Care (CD-P-PH). The EDQM provides the scientific secretariat. Monographs for development were prioritised based on patient need. Many formulations currently described in national formularies and other well-established formulations have been gathered from stakeholders throughout Europe. The information available for the most appropriate formulation was transferred into a common format with full quantitative composition details, extemporaneous preparation instructions, validated test methods for quality control and storage conditions.

What has been achieved?
Monographs for hydrochlorothiazide 0.5mg/mL oral solution and sotalol hydrochloride 20mg/mL oral solution were published at the end of 2019. These were accompanied by an introduction and general principles which describe the purpose and content of the European Paediatric Formulary.

What next?
Monographs for azathioprine oral suspension, chloral hydrate oral solution, furosemide oral solution, isoniazid oral solution, omeprazole oral suspension and ranitidine oral solution and a

monograph on an oral vehicle are currently under development. Further prioritised items will subsequently be added. Draft monographs for public consultation and final texts will be made available on https://paedform.edqm.eu.

Keywords | Compounding, drug formulation, small scale production.
Conflict of interest I have no potential conflict of interest to disclose.

EXPERIENCE IN THE PHARMACEUTICAL FORMULATION OF IMIQUIMOD SUPPOSITORIES FOR THE TREATMENT OF ANAL CONDYLOMATOSIS: A CASE STUDY

Authors: Maria Muros Ortega, Inmaculada Sanchez Martinez, Arantxa Andujar Mateos, Isabel Alarcon Fuentes, Franscisco Valiente Borrego, Angela Sanchez, Asuncion Sarabia, Antonia Rodriguez, Nuria Lucas Villa

What was done?
The aim of the study is to describe the formulation and results obtained after treatment with imiquimod suppositories manufactured by the Pharmacy Hospital Service.

Why was it done?
Condylomata acuminata or genital warts are produced by human papillomavirus (HPV). They are considered one of the most common sexually transmitted diseases that must be treated on an individual basis. Imiquimod increases the local immune response mediated by interferon and other cytokines; it is marketed as a 5% cream for topical administration 3 times a week, for a maximum of 16 weeks.

How was it done?
Suppositories of imiquimod 6.25mg were prepared from Aldara® 5% cream sachets; stearic mass was used as excipient to convey the active principle adding about 2.2g/suppository and molds of 2g for its preparation. The bain-marie was used for fusion and mixing the components. A sterile gauze was included to facilitate extraction if there was anal irritation. The established shelf life was 6 months between 2–8ºC. Suppositories were dispensed individually wrapped in aluminium foil and protected from light added a diptych of information to the patient.

What has been achieved?
The case of a 33-year-old male, HPV 6 positive, with anal condylomatosis and high-grade epithelial dysplasia, most of which had been resected and burned previously without satisfactory results. Imiquimod was added as an adjuvant treatment in suppositories for administration three days a week at night. Twelve suppositories were dispensed each month, and the duration of treatment was 2 months. During treatment the patient reported good tolerance, no itching, no pain in the area of administration. One month after finishing the treatment, no new macroscopic lesions were observed, nor recurrence of previous ones in anoscopic examination.

What next?
The contribution of the Pharmacy Service through the development of imiquimod suppositories has facilitated the achievement of early health results in a complex treatment pathology, allowing rectal administration through suppositories made from a specialty marketed in envelopes for topical use and reducing the duration of treatment to 8 weeks, with very good tolerance on the part of the patient. References: 1. Bastida C et al. Formulation of imiquimod suppositories for the treatment of intra-anal neoplasms by human papillomavirus. 57th SEFH Congress. 2. PNT elaboration of the Reina Sofía General University Hospital. 3. Lacey C et al. 2012 European guideline for the management of anogenital warts. J Eur Acad Dermatol Venereol 2013 Mar;27(3):e263-70. 4. AEPCC-Guide: Condylomata acuminata. AEPCC Publications, November 2015.

Keywords | Drug formulation, gastroenterology, sexual medicine.
Conflict of interest I have no potential conflict of interest to disclose.

DEVELOP A PROTOCOL TO PREPARE MAGISTRAL FORMULAS WHICH INCLUDE HAZARDOUS SUBSTANCES

Authors: Lucía Rubio, Mónica Montero

What was done?
Identify health problems involved in handling raw materials that we use in the preparation of magistral formulations. Define personal protective equipment and installations necessary for handling. Improve work safety of area's staff.

Why was it done?
Hospital Pharmacy Services staff may be exposed to hazardous substances, involving a risk to health. For this reason, is important to identify these substances and measures must be taken to ensure maximum safety for the staff at work. We decided to review the topic when we saw in the Technical Document on Prevention Measures for the Preparation and Administration of Dangerous Drugs, published by the by the National Institute for Safety and Hygiene at Work (INSHT), there are no specific recommendations for protection of raw materials used in magistral formulas; it only refers to dangerous drugs.

How was done?
We have to update raw materials discharged in 2018 in the Pharmacy Service.
The safety data sheets were reviewed in the National Institute for Occupational Safety and Health, paying special attention to dangerous identification and exposure controls/individual protection sections. In this database there is not all the information, so we have to use data sheets of our supplier.
We studied Regulation (EU) Nº 1272/2008 on classification, labelling and packaging of substances and mixtures to determined 3 variables: health dangerous, using hazard class like REPR B, MUTA 2 and STORE RE 1; personal protective equipment and installations must be used in handling of our raw materials.

What has been achieved?
We obtained a list of 20 raw materials. 40% of raw materials aren´t considered hazardous.
Of 60% that are classified as hazardous, they were divided into 2 levels: the first, with categories such as serious eye injuries, skin disorders, respiratory tract irritation or toxicity if swallowed; it includes 75% of raw materials. The second level, which includes the rest of products considered hazardous (25%), is associated with 3 categories: REPR B or possible carcinogenicity, that influence the fertility and development of the fetus; MUTA 2 or genetic defects, that are associated with germ cell or mutations; and STORE RE 1 that can cause damage to organs after prolonged or repeated exposure. For 40% of raw materials there are no specific recommendations about using personal protective equipment. With 60% it is recommended to use self-filtering masks for particles, protective gloves and glasses. For 16% of materials, protective clothing against chemicals is required too. In 65% of raw materials, no specific installation is required to handle them. However, for 25% it is recommended to have well-ventilated areas and with 10% a chemical smoke cabin.

What next?
Most of raw materials we use to make magistral formulations are considered hazardous according to Regulation (EU) nª1272/2008. For this reason, we developed a protocol that included individual protection measures and laboratory equipment necessary to handle such raw materials. So it is possible to normalise the preparation of magistral formulations guaranteeing the safety of the area's staff. We have devised a plan for review and update of the protocol, following current regulations.

Keywords | Preparation.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 4: CLINICAL PHARMACY SERVICES

DOES RECORDING OF MEDICATION HISTORY BY PHARMAECONOMIST IN THE EMERGENCY DEPARTMENT HAVE AN EFFECT AT OTHER HOSPITAL DEPARTMENTS?

Author: Maria Abrahamsen

What was done?
At hospitalisation, part of the routine is to record the patient's medicinal history. We implemented recording of medicinal history (MH) in the emergency department by a pharmaeconomist instead of by a doctor.

Why was it done?
The aim of the initiative was, among others, to study whether MH by a pharmaeconomist in the emergency department has positive effects in other departments. Since the majority of hospitalised patients are admitted through the emergency department it is expected that changes related to admission procedures affect other departments in the cases where patients are hospitalised. In theory recording of MH should be easy, due to the use of Shared Medication Record (FMK). FMK is an updated electronic medication list including all prescriptions filled at pharmacies within the last 2 years. In reality, often neither FMK nor the recorded MH is correct. MH recorded by pharmaeconomist or pharmacist is implemented in other emergency departments, but the effect in other hospital departments has yet to be documented.

How was it done?
The pharmaeconomist was present at the emergency department weekdays during daytime to record the MH of newly admitted patients. When the pharmaeconomists wasn't present the doctor recorded the MH. To evaluate the effect in other departments, data registered by pharmaeconomists at the department of geriatrics about medicinal changes, types of changes and number of patients with changes were used, combined with hospital data about the number of patients in the geriatric department at a given time. Data from 10 months before the initiative was compared with data from the 9 month test period.

What has been achieved?
At the department of geriatrics both the need for medicine changes due to inadequate MH and the number of patients with medicine changes related to inadequate MH was significantly reduced (p 0.05). The proportion of patients with changes was reduced from 43.7% to 36.9% and the number of changes per patient was reduced from 0.65 to 0.49. For both parameters the reduction is seen immediately after implementing MH by a pharmaeconomist in the emergency department. The reduction has released time for nurses, doctors and pharmaeconomists working outside the emergency department, though it isn't possible to quantify the amount of released time.

What next?
Incorporation of a specialised professional such as a pharmaeconomist early in a hospitalisation gives doctors, nurses and pharmaeconomists working outside the emergency department extra time for other tasks. The effect of the initiative depends on the procedures for admissions since it requires that most patients are admitted through one department at the hospital.

Keywords | Medication history.
Conflict of interest I have no potential conflict of interest to disclose.

IMPLEMENTATION OF PATIENT INTERVIEW IN CONNECTION WITH MEDICATION REVIEW IN AN INPATIENT PSYCHIATRIC WARD

Authors: Majken Nørskov Petersen, Dorthe Bonnerup, Louise Thorsen, Lona Louring Christrup, Sune Puggaard Vogt Straszek, Charlotte Olesen

How was it done?
The initiative took place in the Department of Affective Disorders, at Aarhus University Hospital, Denmark. Initially, the medication review was performed by hospital pharmacists without patient interview based only on medical records. We implemented a patient interview to give a more clinically relevant medication review. The interview included a structured questionnaire on typical side effects of antipsychotics.

Why was it done?
Medication review with patient interview provides the opportunity to clarify the patient's overall drug intake along with identifying the patient's experienced side effects. Medication review with patient interview we believe gives a more realistic picture of experienced drug related problems (DRP) and potentially DRP. This again makes the medication review more relevant and useful to the doctors.

How was it done?
The cost of a new workflow is always weighed against the outcome. We therefore planned and conducted a pilot study. The cost was measured as the time used for the patient interview and it was 17 minutes on average. We used DRP as the outcome. DRP is an accessible measure for the immediate outcome of a medication review. Sixteen medication reviews without patient interview were conducted and the same 16 patients were interviewed for a second medication review. Patient interview increased the number of identified DRP from 52 to 68. Due to the interview 28 new DRP were identified and 12 DRP found before the interview were withdrawn due to irrelevance.

What has been achieved?
Patient interview has been implemented in one of three inpatient psychiatric wards and in one of four outpatient clinics where the pharmacists conduct medication review. The structured questionnaire has been further developed and now includes common side effects caused by antipsychotics, antidepressants, benzodiazepines and mood stabilizers.

What next?
We still use the pilot study to show how medication review can be more relevant by using patient interview. The

hospital pharmacy in Aarhus works on several levels in order to implement medication review, preferably with patient interview.

Keywords | Medication review, patient involvement, psychiatry.
Conflict of interest | I have no potential conflict of interest to disclose.

SUCCESSFUL DEVELOPMENT OF A SHARED INFORMATION DATABASE FOR HOSPITAL PHARMACIES IN DENMARK – BENEFITING FROM AGILE PROJECT MANAGEMENT

Authors: Stine Ulsø, Hilde Omestad, Susanne Weng Rømer, Sisse Emilie Mejsner, Mads Nielsen, Jesper Heltoft-Christensen

What was done?
A new database was developed for documentation and quality assurance of drug related queries received by hospital pharmacies in Denmark. The information in the database is shared across all hospital pharmacies in Denmark and is an important tool for the Medicines Information Centers located there. Existing queries were transferred from the old to the new database.

Why was it done?
A working group was established consisting of three pharmacists and superusers from three different hospital pharmacies, one project manager employed by the sponsor (Amgros) and two developers employed by the new supplier (Progressive). The project was structured using monthly physical meetings and ad hoc video conference meetings. The work tasks in the development process were divided and carried out in two-week sprints by the developers and subsequently tested and validated by the pharmacists. All participants agreed to a periodic heavy workload and showed great flexibility. The close and frequent collaboration between all members affected the teamwork in a positive way, hence the group was motivated and managed to agree on common solutions and compromises despite different database usage and different locations.

How was it done?
A working group was established consisting of three pharmacists and superusers from three different hospital pharmacies, one project manager employed by the sponsor (Amgros) and two developers employed by the new supplier (Progressive). The project was structured using monthly physical meetings and ad hoc video conference meetings. The work tasks in the development process were divided and carried out in two-week sprints by the developers and subsequently tested and validated by the pharmacists. All participants agreed to a periodic heavy workload and showed great flexibility. The close and frequent collaboration between all members affected the teamwork in a positive way, hence the group was motivated and managed to agree on common solutions and compromises despite different database usage and different locations.

What has been achieved?
A new, stable and more intuitive database was developed in only 5 months due to the structured and flexible way of working and a close motivated teamwork. The database was taken into use from one day to another and quickly adapted. Since the development several hospital pharmacies have increased their use of the database. The amount of information shared nationally has improved.

What next?
The initiative resulted in a useful tool implemented within a short time. The way of working intensively and focused with physical meetings and video conferences made a good basis to succeed. Especially the sprint cycles can be used in different healthcare settings involving different projects.

Keywords | Databases, electronic documentation, management
Conflict of interest I have no potential conflict of interest to disclose.

MULTIDISCIPLINARY CAR-T TEAM

Authors: Margherita Galassi, Chiara Della Costanza, Claudia Tirone, Sara Bertoli, Ernesto Ruffino, Eleonora Ferrari, Elena Aliprandi, Vito Ladisa

What was done?
A multidisciplinary team (CAR-T team) was constituted for the management of CAR-T therapies (Chimeric Antigen Receptor T). The pharmacist was included in the team for the planning and organisational phase of the process.

Why was it done?
CAR-T cell therapies are a new advanced type of personalised immunotherapy against cancer. In the EU the authorised therapies are tisagenlecleucel and axicabtagene ciloleucel, both used in our centre as third line for the registered indication of diffuse large B-cell lymphoma. CAR-T therapies production and administration process consists of multiple stages: patient's leukapheresis, genetic engineering of lymphocytes, lymphodepleting chemotherapy (LC), CAR-T cell infusion, monitoring of the patient. Considering the complexity of the procedure and the observance of specific schedules, these therapies should be administered in highly specialised centres complying with specific organisational requirements, with disposal of an adequate multidisciplinary team.

How was it done?
The pharmacist is responsible for the approval of the physician's prescription, the LC preparation according to Good Manufacturing Practice (GMP), the LC distribution on scheduled time, the making available of treatments for supporting the patient until CAR-T infusion, and treatments after infusion for management of adverse events. At the arrival of the CAR-T product, the pharmacist is responsible for the check and release of it in good condition. The LC protocols foresee the administration of cyclophosphamide and fludarabine on the 5th, 4th and 3rd day before the CAR-T infusion, and are defined on the basis of the summary-of-product characteristics. The medications are provided locally and refunded by the national health system.

What has been achieved?
In our center 8 patients were treated with compassionate use of axicabtagene ciloleucel. The pharmacist's presence in the multidisciplinary team was advantageous because, through validation of the therapies and verification of dosages, they guarantee further security to the patients. The high-tech automated centralisation and computerisation of chemotherapies at our centre ensured quality and safety of the preparations.

W***hat next?***
The realisation of defined paths and codified proceedings, the respect of fundamental timings for the success of the process and the chemotherapy preparation centralisation could lead to increased investment, decisive for obtaining a high quality product and process level. The experience, now limited to haematology, could be used for future CAR-T applications.

Keywords | Multidisciplinary team, high risk medication.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLEMENTATION OF DRUG RECONCILIATION WITHIN THE DEPARTMENT OF PAEDIATRIC HEMATO-IMMUNOLOGY AT THE UNIVERSITY HOSPITAL CENTER ROBERT DEBRÉ

Authors: Marguerite Vaillant, Sophie Guilmin Crepon, Benoit Brethon, Julie Roupret-Serzec

What was done?
Formalise and integrate drug reconciliation (DR). Evaluate the feasibility of the project, the impact of DR on the safety of patient care and the satisfaction of patients and health professionals.

Why was it done?
In order to obtain a safe patient care pathway, we wish to implement proactive and/or retroactive DR for patients followed in the Hemato-Immunology Department of the University Hospital Center Robert Debre.

How was it done?
Prospective cohort study. The different steps are: identification of eligible patients, collection of information on the patient's drug history and ongoing treatments from the health partners involved in his or her care, entry drug reconciliation (EDR) during the entry pharmaceutical consultation, conciliation of exit drugs during the return pharmaceutical consultation, transmission of information to the local center and pharmacist or home hospitalisation, evaluation of stakeholder satisfaction and the impact of the intervention.

What has been achieved?
Thirty patients included between August and October 2019, or 30 conciliations performed. Concerning the EDR: all hospitalisation reports and previous prescriptions are consulted (100%), 6 EDR (20%) take place in pro-active mode, the average duration of an EDR is 43 minutes. Concerning the discharge drug reconciliation (DDR): 30 DDR (100%) take place in pro-active mode, the average duration of a DDR is 52 minutes, all prescriptions and intake plans are sent to community centres and pharmacists or home hospitalisation (100%). Of all the conciliations performed: 4 sources of information used by conciliation, 11 drugs prescribed on average per prescription, 8 intentional and 6 unintentional discrepancies identified by prescription. Concerning the evaluation of satisfaction: all community centres are satisfied (100%), 26 city professionals (87%), 21 hospital professionals (70%), 27 patients (90%).

What next?
In order to ensure that DR is permanently included in the service, a communication and information tool must be developed. This, made available to the entire team, will serve as a traceability support, decompartmentalise practices and improve patient care.

Keywords | Drug reconciliation, haematology, pediatric medicine.
Conflict of interest: I have no potential conflict of interest to disclose.

IMPLEMENTING A NEW PHARMACEUTICAL CARE PROCESS IN SURGERY

Authors: Sarah Poggio, Anne-Sylvie Dumenil, Sandrine Roy, Claire Henry

What was done?
We redesigned the pharmaceutical care process for programmed patient circuits in orthopaedic and visceral surgery by providing the "best possible medication history" (BPMH) in the patient's electronical medical record (EMR) before anaesthesia consultation (AC).

Why was it done?
BPMH on admission has been performed in these departments since 2011. An analysis of the process and prescriber use of BPMH highlighted an underutilisation; average consultation rate was 29.8%. The main reasons were the online publishing interval of the BMPH and competition with the AC report which also displays medication. A previous study showed a 70% rate of patients with unintended differences between BMPH and the AC report.

How was it done?
Due to a lack of coordination, we exchanged using surgery with anaesthesia schedules to select patients, thus improving prioritisation. We created support documents for students, describing how to conduct a phone interview in order to reassure unfamiliar patients, to gather useful data (GP, pharmacy, prescription) to produce a BPMH, to visit inpatients when admitted to confirm the BPMH's accuracy and to assess patient satisfaction with the process. We trained 6 students and presented our work at an anaesthetist staff meeting.

What has been achieved?
Among 195 patients included from June to October 2019, 70.2% BPMH before admission were successfully published online (137/195), 67 went through the complete care path (from home to discharging), 12 never came for AC and/or surgery, 58 were published but waiting for patient's admission and 58 failed. The reasons we failed to publish on time included inability to reach patients (31.6%), lack of sources (21.1%), time shortage before AC (17.6%), surgery cancellation (14.0%) and refusal (7.3%). 1.58 (±0.85) calls were needed to reach a patient, 13 BPMH required modification after admission (19%), and patient satisfaction on average was 5.11/6 when asked whether the call, the medication management during hospitalisation and the confirmation interview went well. Finally, the consultation rate of BMPH evolved from 29.8% in 2017 to 72% since we changed practices.

What next?
Implementing this new process in the care path streamlines information transfer between the different stakeholders (anaesthetists, surgeons, pharmacists) and provides a better integration of pharmaceutical care in surgery wards as an efficient support system for prescribers.

Keywords | Clinical pharmacy services, medication reconciliation, pharmaceutical care.
Conflict of interest I have no potential conflict of interest to disclose.

TOOL FOR INTERDISCIPLINARY COLLABORATION AND SHARED DECISION MAKING

Authors: Pernille Printzlau, Nanna Skyttegaard Mortensen, Signe Kristensen, Troels Bygum Knudsen, Nathalie King Otoo

What was done?
We made a tool to improve the interdisciplinary collaboration around medication reviews and to help the process of shared decision making. The tool categorises interventions suggested by the pharmacist in red-yellow-green boxes, indicating the order of the interventions recommended by the pharmacist.

Why was it done?
When the pharmacists make medication reviews it is often a long, detailed review with several interventions. A tool that would quickly give the physician an overview of the interventions suggested by the pharmacist was needed. Furthermore, a tool was needed in the process of shared decision making between the physician and the patient regarding the possibilities of deprescribing.

How was it done?
The tool was developed and tested by using the Model of Improvement. The physician stated that the tool gave him the needed overview and, in his experience, furthermore added value by visualising the interventions to the patient. Patients were interviewed after the consultation to evaluate how they perceived the tool and whether they felt involved in the decision making regarding their treatment and deprescribing.

What has been achieved?
A manageable and operationalisable tool for the physician to get a quick overview of the interventions suggested by the pharmacist. Furthermore, the tool visualises the interventions to the patient and supports the process of shared decision making during the consultation.

What next?
At our hospital we have clinical pharmacists making medication reviews at several different wards. The next step is to distribute the tool to pharmacists at other wards to strengthen the interdisciplinary collaboration and ensure the largest profit of the pharmacist's medication reviews. We are also working on developing a similar tool to categorise found side effects to help the physician when deprescribing.

Keywords | Medication review.
Conflict of interest | I have no potential conflict of interest to disclose.

SIMULATION CURVES MAY HELP TO ASSESS ANTIBIOTIC ORALISATION PROCEDURES

Authors: Andreas von Ameln-Mayerhofer, Martin Breuling, Ina Geist

What was done?
In order to achieve an improvement in antimicrobial prescriptions, we have addressed possible problems regarding oralisation of antibiotics. For this purpose, we graphically compared the simulated efficacy levels of parenteral and oral forms of beta-lactams.

Why was it done?
In the context of antibiotic stewardship, rapid oralisation of a parenteral antibiotic is recommended in many antibiotic stewardship guidelines. Such a sequence therapy is easy to implement if both application pathways lead to comparable efficacy levels at the site of infection. However, this does not apply to all anti-infectives, in particular some beta-lactam antibiotics represent a challenge in therapy. Additionally, the information about this topic is very sparse in the literature.

How was it done?
We programmed a computer based procedure that allows a simulation of plasma levels of antibiotics upon intravenous versus oral administration. Based on the obtained data and EUCAST-based MIC-distributions for a set of bacteria, we assessed the respective putative clinical actions.

What has been achieved?
Our simulations show that some oral beta-lactams do not reach the PK/PD condition of a sufficient therapy (fT>MHK) in the approved dosage. The simulations have been used for education seminars with physicians and partly led to an improvement in oralisation procedures. Additionally, an oralisation standard has been established.

What next?
Our next step is to develop a special prescription form for oral antibiotics which will enable us to control prescription behaviour even more effectively. We plan to monitor the prescription habits for anti-infectives more closely before and after establishing the prescription form.

Keywords | Antimicrobial stewardship, J01 - antibacterials for systemic use, pharmacokinetic.
Conflict of interest: I have no potential conflict of interest to disclose.

VANCOMYCIN CONTINUOUS INFUSION FOR PATIENTS ON ICU

Author: Marie Keane

What was done?
A protocol for the administration of vancomycin by continuous infusion was developed for patients on ICU, replacing the previous method of giving vancomycin by intermittent dosing; this was developed in consultation with the Anaesthetics and Microbiology Departments.

Why was it done?
In the ICU there was a lot of misunderstanding around the administration of vancomycin by intermittent dosing, particularly around the timing of pre-dose vancomycin levels and appropriate dose adjustment. It could take several days for a patient to reach the therapeutic range of vancomycin.

How was it done?
To develop a vancomycin continuous infusion dosing schedule for patients admitted to ICU, through a review of the available literature and with reference to vancomcyin continuous infusion protocols already established on ICUs in other hospitals. A proposal for administration of vancomycin continuous infusion needs to be included on the electronic clinical information system currently in use in the ICU. An IV drug monograph for vancomcyin by continuous infusion will be included in the ' Intravenous Medication Infusion Guidelines'; this will provide information on compatibility with other infusions if required. To recommend vancomycin continuous infusion in patients as agreed with the Anaesthetics and Microbiology Consultants at the daily ward review, this would require the patient to have a dedicated IV line.

What has been achieved?
A finalised version of the Vancomycin Continuous Infusion protocol has been developed in consultation with Anaesthetic and Microbiology Consultants. We have included additional information for patients on CRRT (continuous renal replacement therapy) that has been used in some patients on continuous vancomycin infusion. A standardised prescription for infusion of vancomycin is available on the electronic prescribing system. Vancomycin continuous infusion is now recommended for any patients requiring vancomycin therapy on the ICU.

What next?
We would propose to audit the number of patients on Vancomycin Continuous Infusion in the ICU, including time taken to reach therapeutic range, frequency of sampling and any other cost-saving initiatives perceived.

Keywords | J01 - antibacterials for systemic use, antimicrobial prescribing, intensive & critical care.
Conflict of interest I have no potential conflict of interest to disclose.

CAN THE CLINICAL PHARMACIST INCREASE HOSPITAL STAYS' PRICING?

Authors: Thibault Stala, Niels Martignene, Céline Monchy, Anne-Laure Lefebvre, Geoffrey Strobbe, Ali Hammoudi, Frédéric Feutry, Malgorzata Cucchi, Guillaume Marliot

What was done?
This work involves evaluating the ability of the clinical pharmacist to detect comorbidities related to certain treatments.

Why was it done?
In France, hospitalisations' reimbursement is linked to care severity. In this context, health care must be as comprehensive as possible on the comorbidities' registration. As part of prescription validation, the clinical pharmacist can easily highlight comorbidities associated with specific treatments, in order to improve their codification and consequently to better valorise hospital stays.

How was it done?
Six comorbidities, associated with the prescription of specific therapies, were chosen: - Dyskalaemia (potassium or polystyrene sulfonate prescriptions); - Neuropathic pain (NP) or anxio-depressive disorder (ADP) (amitriptyline, anafranil, pregabalin, gabapentin, duloxetine or capsaicin prescriptions); - Iron deficiency anaemia (IDA) (injectable iron prescriptions); - Hypovolaemia (HV) (ringer Lactate, serum albumin or gelatin prescriptions); - Hypercalcaemia (HC) (bisphosphonate and/or calcitonin prescriptions); - Severe infection (Inf) (linezolid, daptomycin, teicoplanin, aztreonam and carbapenem prescriptions). Retrospectively, all stays ending between 01/01/2019 and 31/03/2019, and containing at least one prescription of the previously mentioned therapies, were considered. Then, the medical records were analysed to verify the presence of the comorbidity corresponding to the prescribed drug(s). The coding was checked, otherwise, the comorbidity was added. Finally, the revaluation of the stays' cost has been estimated.

What has been achieved?
The number of stays by suspected comorbidity, based on prescribed treatments, is : - 175 dyskalaemia; - 231 NP or ADP; - 155 IDA; - 124 hypovolaemia; - 41 hypercalcaemia; - 16 severe infection hypovolaemia and severe infection were quickly set apart because of the difficulty to confirm these comorbidities with the only retrospective medical record information. No stay with IDA or hypercalcaemia has been revalorised. The price of a single stay with dyskalaemia has been increased, by €530. However, NP or ADP has increased the cost of 6 to 13 stays, resulting in a total revaluation of €6000 to €11,000.

What next?
The stays' remuneration is the hospitals' main source of income. This work makes it possible to quickly determine if the clinical pharmacist can bring added value in the field of hospital stays' pricing. The next step is the transition to forward looking. It would also be possible to assess other comorbidities.

Keywords | Impact clinical pharmacy, budget impact, cost control.
Conflict of interest | I have no potential conflict of interest to disclose.

BIOSIMILARS: LET'S START RUNNING

Authors: Beatriz Zurita Alonso, Marta Martí Navarro, Monica Estelrich, Alejandro Ballestero Corominas, Anna Badell Giralt, Diana Patricia Vera Rodríguez, Milagros Ricse Salcedo, Roxana Rubio Vargas

What was done?
The pharmacy service led the creation of a working group formed by rheumatologists, gastroenterologists, dermatologists and pharmacists to promote the use of biosimilar drugs in our hospital.

Why was it done?
The use of biosimilar drugs has been a breakthrough to improve the sustainability of the health system. Although since 2015 position papers have been published by some scientific societies, there is no clear consensus about the recommendation for a switch from the original drug to its biosimilar. The rate of biosimilar use in our country is one of the lowest in Europe.

How was it done?
The working group wrote a consensus document in which it was jointly decided to start all new biological treatments with biosimilars. In addition, it was decided that the prescribers would determine which patients were candidates for switch to a biosimilar based on clinical criteria. If the drug is administered subcutaneously, the pharmacist is responsible to explain the reason for the change and the management of the new device to the patient. In case of disagreement, the original is kept and communicated to the prescribing physician. If the drug is administered intravenously, it is the physician who informs the patient about the change.

What has been achieved?
From May 2019 to September 2019, 17 switches were made: 4 infliximab (66.7%), 9 adalimumab (10.1%) and 4 rituximab (80.0%). This measure led to an economic saving of €111,106.96 per year. Twenty new treatments with biosimilars were started: 1 with etanercept, 2 with infliximab, and 17 with adalimumab. This supposed an economic saving of €141,826.36/year if we compare with the cost of the original drug. The rate of antiTNF biosimilars increased from 33% to 48% in 5 months. None of the patients refused the use of a biosimilar. By now, all treatments maintain their effectiveness without safety issues. This optimisation of treatments will allow the hospital to treat a greater number of patients and invest in innovative treatments.

What next?
These results indicate a great opportunity to offer biological treatment to a higher number of patients every year. Therefore, our objective is to achieve the switch of remaining patients as it could generate an additional saving of €630,072.28 per year.

Keywords | Drug and therapeutic committee, optimisation of therapy, cost saving.
Conflict of interest | I have no potential conflict of interest to disclose.

OPTIMISING WORKFLOW AND MEDICATION IN THE ACUTE WARD – BETTER USE OF PHARMACISTS' SKILLS

Authors: Mia P von Hallas, Trine RH Andersen

What was done?
Through user surveys among the physicians in the Acute Ward, pharmacist tasks were adjusted to benefit the physician's high work flow. Before the survey, pharmacists performed medication reviews which were communicated to the physician. The adjusted pharmacist tasks on the ward includes medication history, reconciliation and transfer of the medication to the electronic medicine module (Epic), securing up-to-date medicine data during hospitalisation.

Why was it done?
Physicians in acute wards have limited time to see all patients. Time for medication history, reconciliation and review is limited, due to great patient turnover. The physicians did not consider the pharmacist medication review alone as a contribution to the workflow or to relieve the high workload.

How was it done?
A questionnaire was developed regarding four areas (Pharmacist competencies, Pharmacist tasks, Pharmacist medication review,

Multidisciplinary teamwork) and distributed among the physicians. Based on the anonymous responses, the pharmacists adjusted their tasks to include medication history, medication reconciliation and transfer of medication to Epic, complying with the suggestions in the questionnaire survey. Obstacles were low percentage of respondents (15/33 (45%) prior to the initiative and 12/39 (31 %) after), and the large replacement of junior physicians in the period between surveys.

What has been achieved?
Pharmacists feel more part of the multidisciplinary team and attitudes towards the pharmacist service among physicians has changed. A new survey after implementation of the new workflow showed that 73% found medication reconciliation was a pharmacist task, compared to 29% before. After implementation, 90% of physicians believed that pharmacists could do medication review (67% before intervention). The acknowledgement that pharmacists were able to transfer medication to Epic was increased from 20% to 90%. The attitude has changed from considering pharmacists as medication advisers to considering pharmacists as part of the multidisciplinary team in the ward.

What next?
The questionnaire survey will be repeated annually to continually improve the workflow and contribution of clinical pharmacist services to the heathcare professional team in the acute ward.

Keywords | Clinical pharmacy services, medication reconciliation, multidisciplinary team.
Conflict of interest | I have no potential conflict of interest to disclose.

ROUTE TO CLINICAL PHARMACY: THE EXCHANGE PROGRAMME EXPERIENCE

Authors:: Chiara Inserra, Antonio Solinas, Chiara Panciroli, Branden Nemecek, David Zimmerman, J.Douglas Bricker Piera Polidori

What was done?
Through international collaboration between Duquesne University School of Pharmacy in Pittsburgh (PA-USA) and the Italian Society of Hospital Pharmacy (SIFO) a clinical pharmacy exchange programme (EP) was established to provide clinical education to Italian pharmacists interested in advancing the profession. From 2010 to 2018, SIFO provided several grants to allow Italian hospital pharmacists (IHPs) to participate. In 2018, three IHPs from across Italy were selected for a 1 month experience to gain experience and insight into practices that they may use in their facilities.

Why was it done?
Successful implementation of clinical pharmacy services are associated with improved prescribing practices. SIFO includes clinical pharmacy in their mission to line up with Section 4 of the European Statement on Hospital Pharmacy and is striving for implementation through advanced trainings for IHPs. The aim of this EP was to provide real world clinical pharmacy training to IHPs.

How was it done?
The clinical training was created by Duquesne University to provide IHPs educational and first-hand clinical skills based on American clinical pharmacy practice and education. The training was individualised for IHPs' interests including didactics and practical training. Sessions to discuss IHPs' progress were conducted with the Dean and faculty of the programme.

What has been achieved?
IHPs had the chance to observe American pharmacy education and compare it to the Italian one. American university training was practical, well-coordinated with clinical activities, and based on a trustful teacher-student relationship. During practical training IHPs shadowed American Clinical Pharmacists (ACP) specialized in different areas: Infectious Disease, Cardiology, Oncology, Emergency Medicine, Internal Medicine, Community Pharmacy, Ambulatory Care. They were able to observe how ACPs validate prescriptions and are actively engaged in direct patient care, participating in bedside multidisciplinary rounds and making recommendations on therapies (drug interactions, dose adjustments, antibiotic selection). IHPs saw how technology investments, prioritisation of care, and availability of skilled personnel underlie American hospital pharmacy practice.

What next?
IHPs gained baseline clinical pharmacy skills to enhance care at their facilities; however, the widespread implementation of clinical pharmacy in Italy requires education reform, enhanced resources and integration of pharmacists within a multidisciplinary team. Implementation of small projects through collaboration with universities should be considered in the Italian hospital setting.

Keywords | Clinical pharmacy services, hospital pharmacy competencies, hospital pharmacy education
Conflict of interest I have no potential conflict of interest to disclose.

DESIGN OF AN ANTI-HAEMORRHAGIC AGENTS PROTOCOL FOR AN INTENSIVE CARE UNIT

Authors: Mercedes Gómez-Delgado, Marta Valera-Rubio, Margarita Carballo-Ruiz, José Luis Ortiz-Latorre, Isabel Moya-Carmona

What was done?
To define an emergency procedure that ensures correct management in cases of massive bleeding in an intensive care unit (ICU).

Why was it done?
Blood coagulation factors and their adequate use can be of particular importance in the treatment of massive haemorrhage, especially in the ICU. This initiative was taken in order to improve uptake and to avoid errors in the administration, which can be difficult in emergency situations.

How was it done?
The development of drug use protocols for emergency situations is a simple task that facilitates health workers to manage them. Prioritising the drugs to be included in a protocol by a previous survey in a multidisciplinary setting is important to consider the different points of view. We carried out a review of the pharmacy service to the ICU needs of antihaemorrhagic drugs. ICU staff (doctors and nurses) were informed to reach an agreement about eligible drugs for being included in the protocol. ICU staff requested the inclusion of four drugs in the protocol according to the prevalence of use and the difficulty of administration: human fibrinogen, tranexamic acid, eptacog alfa and human prothrombin complex. We created a protocol with four information sheets, one of each drug, made of schematic information about: 1. Physical location (fridge or room temperature, number of shelf) and minimum safety stock (3 units of human fibrinogen, 4 units of tranexamic acid and 3 units of human prothrombin complex). 2. Indications and dosage according to the clinical situation and the patient characteristics (dosage adjustment according to renal or hepatic impairment, weight or age when applicable). 3. Recommendations for intravenous administration (flow rate, bolus, loading dose, dilution, mixture stability).

What has been achieved?
Mapping the information and dividing it into sections is essential for its rapid understanding in a high-stress work environment. The implementation of this protocol was well embraced by all the staff involved, since it allowed a more efficient health care circuit for the ICU staff. It also optimises the consumption of this type of more monitored drugs.

What next?
We will monitor the compliance with this protocol, as well as possible updates that may be beneficial for a better understanding of the forms of administration.

Keywords | Medication-use system, shared decision making, ready to use.
Conflict of interest: I have no potential conflict of interest to disclose.

DEVELOPMENT OF GUIDELINES FOR SAFE HANDLING OF ONCOLYTIC VIRUSES

Authors: Faten Ahmad Díaz, Eugenia Serramontmany Morante, Carla Esteban Sánchez, Pablo Latorre García, Montserrat Carreres-Prieto, Javier Martínez Casanova

What was done?
Development of a standardised working procedure for the safe handling considerations, storage requirements, and modes of administration of oncolytic viruses (OV) in patients with cancer.

Why was it done?
Different critical points were detected: 1) some OV dose prescription depends on tumor size, 2) special storage conditions, 3) special safety measures related to preparation to prevent cross-contamination and technician exposure, 4) special transport conditions in a safety container, and 5) safe administration. The increasing number of clinical trials with OV combined with the identified critical points implies a better coordination between the different departments involved.

How was it done?
Different meetings were arranged with a multidisciplinary team to standardise procedures, in order to avoid errors: 1. The pharmacist validates the prescription volume reflected on the certified sheet according to the tumour size. Then, a pharmacy technician is authorised to remove the vials from the freezer to start the preparation. 2. Special –80ºC freezer is needed to preserve the OV. 3. According to the preventive medicine service, OV must be prepared in biological safety cabinet class II (BSC) with personal protective equipment. At the end of preparation, the BSC must be cleaned with the OV appropriate disinfectant and ventilated for 1 hour before restarting to work again. So, the OV preparation was established at 7 a.m. in order to avoid cross-contamination with the chemotherapy (first preparation in the day). 4. Safety transport must be considered, so OV is packaged in a special hermetic box. 5. The majority of the OV preparations are administered intralesionally at the radiology room so safe administration is needed to avoid the room contamination.

What has been achieved?
By using these procedures, it is possible to work with a single BSC, avoiding delays in the administration of other therapies while reducing the risk of mistakes.

What next?
These types of therapies represent a novel therapeutic modality: their preparation, administration and handling requirements differ from current therapies; pharmacists have an important role in developing new procedures to incorporate them into clinical practice. This protocol may be useful to other centres due to the lack of experience and standardised guidelines to work with this type of therapy.

Keywords | Multidisciplinary team, oncology pharmacy, cytostatic exposure.
Conflict of interest I have no potential conflict of interest to disclose.

DESIGN AND ELABORATION OF AN INTELLIGENT INTRAVENOUS INFUSION PUMPS GUIDE FOR THE INTENSIVE CARE UNIT

Authors: Marta Valera-Rubio, Maria Isabel Sierra-Torres, Elena Sánchez-Yañez, Jose Luis Ortiz-Latorre, Isabel Moya-Carmona

What was done?
We developed an updated guide on intravenous drug administration including infusion parameters for intelligent intravenous infusion pumps, so called "IV smarts pumps", used in the intensive care unit (ICU).

Why was it done?
Critically ill patients often require the administration of several intravenous drugs and that includes infusion pumps. New infusion pumps offer the ability to build a drug library within the infusion system itself. This allows intravenous infusion medication safety to be improved. Because of that, it is highly important to have an updated administration guide and an IV smarts pumps library for the everyday clinical practice. This guide was developed in order to help ICU staff to practice safe prescribing and managing of medicines and to reduce the incidence of adverse drug events and administration errors.

How was it done?
A database with the most important intravenous drugs used was created by a multidisciplinary working team (pharmacists, physicians and nurses). The drugs included were divided into therapeutic groups and were distributed among the participating members for the drug information review process. The therapeutics groups included were: sedatives, analgesics, antihypertensives, vasopressors, anti-arrhythmics and others such as insulin, heparin, etc. For each drug, a bibliographic research was conducted, gathering information from manufacturers, intravenous drugs databases (Uptodate®, Micromedex®, Stabilis®) and other hospital guidelines. The data collected included: drug name, lower and upper hard limit, default dilution, flow rate, default rate, rate upper soft and hard limit, bolus default, flow rate and volume upper limit, loading dose, duration, dilution volume, default, and lower and upper hard limit.

What has been achieved?
This guideline promotes, mainly, the safe use of drugs usually administered in critically ill patients, and is available for all the staff in this unit. Its elaboration has made it possible to avoid medication errors and to establish a narrower bound between the pharmacy service and the critical care unit, developing new partnerships which could lead to new projects.

What next?
We are still working on improving this guide, making it easier to understand and with a unified vocabulary. We will update it periodically in order to include new evidence and new drugs if necessary.

Keywords | Injection, drug safety, ICU.
Conflict of interest | I have no potential conflict of interest to disclose
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IMPLEMENTATION OF AN ASSISTED ELECTRONIC PRESCRIPTION SYSTEM IN A CRITICAL CARE UNIT

Authors: Marta Valera-Rubio, Rosario Mora-Santiago, Maria Isabel Sierra-Torres, Jose Luis Ortiz-Latorre, Isabel Moya-Carmona

What was done?
The intensive care unit (ICU) used a computerised physician order entry system different from all the hospital units. The pharmacy service, along with the ICU physicians and nurses, have tried to adapt

the special features of this unit to integrate it with the clinical decision prescription system that is official in the hospital.

Why was it done?
The existence of different prescription systems could lead to validation errors when the pharmacist responsible for the ICU is not available. Furthermore, ICU physicians could not benefit from all the advantages that the official prescription system included. The presence of a common integrated prescription system among all units allow the exchange of prescription drug information between the ICU and the rest of the units, in accord with the health situation of the patient. Moreover, with this new system they can have access to allergies, renal adjustment doses, recommended posologies, therapeutic exchanges, and pharmacy validation, among other items.

How was it done?
A multidisciplinary team formed by ICU staff (doctors and nurses) and pharmacists met to discuss the points that should be followed when implementing the new electronic prescription programme. In these working meetings, especially with physicians, we tried to agree on what and how the infusion protocols would be included in the new system, based on the infusion pumps guides made by both units. A pilot phase was established by the end of July 2019 to detect possible errors in the process of prescription, and mostly, when a patient changed from two units, from the ICU to another health care service and vice versa. All errors or discordances found were discussed between the pharmacist and the physician or the nurse, and in order to solve them we contacted the managers of the prescription system or we modified the parameters that are included in the system such as names of drugs, dosage guidelines, new nurses' orders, etc.

What has been achieved?
The implementation of this new system has been well embraced by the staff, since it allowed a more efficient and secure health care circuit for the patients. All physicians are now able to use this system while the other one is no longer used.

What next?
We will continue making formative sessions with both physicians and nurses, in order to solve all the doubts that can appear during the training period. We will update periodically the available data and make improvements in the programme configuration.

Keywords | Computer assisted prescribing (CPOE), drug safety, ICU.
Conflict of interest | I have no potential conflict of interest to disclose.

PHARMACEUTICAL INTERVENTIONS IN PARENTERAL NUTRITION: METHODOLOGY AND RESULTS

Authors: Teresa Cabeças, Sara Franco, Rita Oliveira, Maria Pereira

What was done?
Definition and implementation of action methodology, in a form of flow chart, for patients in need of parenteral nutrition (PN).

Why was it done?
PN is an alternative or complement in patients whose oral and/or enteral nutritional intake is inadequate/unsafe or whenever the digestive tract is not functioning or this route is contraindicated. Success in choosing the most appropriate PN depends on a specialised multidisciplinary team that can provide nutritional support that results in improved clinical outcomes and patient safety. With the decision flowchart (designed in January 2019), the hospital clinical pharmacist intervenes in the calculation of the patient's nutritional needs and, consequently, in the counselling of the most appropriate PN bag and clinical and biochemical monitoring of the patient.

How was it done?
Implementation of the following therapeutic decision methodology: 1. Validation of parenteral support nutritional option according to decision flowchart; 2. Filling out a patient's nutritional needs spreadsheet – anthropometric assessment; biochemical data; calculation of protein requirements; calculation of non-protein energy needs; calculation of total energy requirements; choosing the appropriate volume; validation of the route of administration; 3. Selection of the most suitable PN bag from the Hospital Formulary (preferably after ionic corrections); 4. PN bag suggestion to the prescribing physician; 5. Acceptance and alteration (or not) by the prescribing physician; 6. Clinical and biochemical monitoring of the patient; 7. Optimisation of nutritional therapy when applicable.

What has been achieved?
From January to August 2019 the Pharmaceutical Services intervened in all 21 PN prescriptions. In this universe, 15 were in the context of gastroenterology surgery, 5 due to infection and 1 due to non-gastrointestinal cancer disease. The intervention was not accepted in only 5 cases.

What next?
Clinical pharmacists play a key role in supporting the prescription of PN. The future is challenging, particularly in assessing patients' outcomes and quality of life, as well as the economic and financial dimension. It will also be essential to create a Clinical Nutrition Commission that covers PN, enteral and oral feeding.

Keywords | Shared decision making.
Conflict of interest | I have no potential conflict of interest to disclose.

CENTRALISED ONLINE REGISTRY FOR PATIENT WITH METASTATIC COLORECTAL CANCER TREATED WITH REGORAFENIB

Authors: Vanesa Alonso Castro, Beatriz López Centeno, Daniele Alioto, Angela Gil Martin, Ignacio Martin Casasempere, Maria Segura Bedmar, Ainhoa Aranguren Oyarzábal, Maria Jose Calvo Alcántara

What was done?
To describe the implementation of a centralised registry (CR) for all patients with metastatic colorectal cancer (mCRC) being treated with regorafenib in a Regional Health Service (RHS).

Why was it done?
The European Society for Medical Oncology (ESMO) has developed the ESMO-Magnitude of Clinical Benefit Scale (ESMO-MCBS) to assess the magnitude of clinical benefit for cancer medicines. In the CORRECT trial, regorafenib has an ESMO-MCBS score of 1 (questionable benefit). It is necessary to assess the effectiveness and safety of regorafenib treatment in real clinical practice.

How was it done?
A working team including oncologists, hospital pharmacists and RHS professionals developed the CR for patients with mCRC starting treatment with regorafenib in 2019. The variables selected were: age, sex, ECOG, primary tumour location, number of metastatic sites, presence of liver or brain metastases, RAS-mutation status, BRAF-mutation status, previous lines, follow-up variables (dose, type of response and adverse events), date and reason for withdrawal.

What has been achieved?
The CR is available for all professionals in the RHS in April 2019 and it is compulsory to include all patients starting treatment in 2019. Forty-nine patients were included (59.2% males). The median age was 68 years. The baseline characteristics of the patients were:

– 36.7% and 63.3% of patients had ECOG 0 and 1 respectively; – 79.4% had the primary tumour in the left colon; – 36.7% had 3 or more metastatic sites; – 71.4% and 2.0% had liver and brain metastases respectively; – RAS gene was mutated in 57.1% of patients and undetermined in 2.0%; – BRAF gene was mutated in 4.1% of the patients and undetermined in 34.7%; – in 65.3% of patients regorafenib was the fourth line or later therapy. With median treatment duration of 2.5 months, 42.9% of patients had discontinued treatment: 30.6% had progressive disease, 8.2% had adverse events and 4.1% had died.

What next?
The experience obtained with this registry has allowed us to know the use profile of this drug in all hospitals of RHS. A comprehensive assessment of the collected data and a longer follow-up period are necessary to assess the effectiveness and safety of regorafenib treatment in real clinical practice.

Keywords | Drug therapy outcomes.
Conflict of interest | I have no potential conflict of interest to disclose.

ONCOLOGY PHARMACISTS: EXPANDING OUTPATIENT SERVICE MODELS TO INCREASE PATIENT IMPACT AND SAFETY

Authors: Paul Firman, Karen Whitfield, Therese Hayes

What was done?
The oncology pharmacy team in a tertiary referral hospital with the assistance of activity-based funding commenced an outpatient clinic allowing patients an opportunity for medication reviews, appropriate counselling of oral chemotherapy and discussion of medication side effects which was a gap within the current service.

Why was it done?
The provision of outpatient oncology services by pharmacists is still limited, but this role is an emerging one. There is limited literature to date that suggests that pharmacists can add value while satisfying the needs of patients with cancer, addressing medication use and symptoms, and potentially generating revenue for the practice. The value that clinical pharmacists can bring to outpatient clinics other than oncology clinics has been highlighted extensively, providing added weight to the argument for incorporating these professionals into the cancer care model.

How was it done?
In consultation with pharmacy, medical, nursing and administrative staff a working party was formed to establish the outpatient pharmacy clinic. Factors including patient cohort, appointment scheduling, clinic room availability, referral methods, and key performance indicators were discussed. The group met monthly to discuss the progression of the clinic and any barriers.

What has been achieved?
Over the first 3 months (January – March 2019) 215 patients on an average of 7.5 medications were reviewed. Within the cohort 57% of the patients were taking high risk medications (known as PINCHA medications) and 37% received counselling on new medications. There were 37 medication interventions mostly involving drug–drug interactions and medication optimisation. For succession planning, pharmacist training has also occurred.

What next?
Outpatient oncology practice is a growing area of opportunity for pharmacists to provide clinical services as part of a multidisciplinary team. This is of benefit both to the multidisciplinary team and the patient, ensuring the best possible outcomes. With the growing complexity of oncology treatments, the pharmacist's role is vital to ensure quality use of medicines, safety and patient centred care. Training is currently being undertaken to expand the role and to ensure continuity of the service.

Keywords | Clinical pharmacy services, patient education, multidisciplinary team.
Conflict of interest I have no potential conflict of interest to disclose.

IMPACT OF PLANTS ON ANTICANCER DRUG METABOLISM: DEVELOPMENT OF A DATABASE TO FACILITATE THE PHARMACIST'S EXPERTISE

Authors: Anais Amar, Simon Clautrier, Morgane Giovanelli, Regine Chevrier

What was done?
Centralise information on plant metabolism on a single support by creating a database. Facilitate pharmacist's expertise about interactions between plants and anticancer drugs.

Why was it done?
The phytotherapy market has continued to grow for several years. However, in oncology, concomitant use of plants with oral or injectable chemotherapies can be harmful. Plants can interact with many cytochromes (CYP), impacting on the biotransformation and kinetics of drugs. While grapefruit or St John's wort are already recognised as interfering with many therapies, the impact of many plants remains unknown for healthcare professionals. Tools exist to evaluate their effects on drug metabolism, but the multiplication of sources delays and complicates the advice of pharmacists.

How was it done?
To create the database, it was necessary to establish an exhaustive list of plants. Three sources of information have been used:
- Inventory of phytotherapy products marketed in 4 drugstores
- Census of plants consumed by patients seen in pharmaceutical consultation (PC)
- Consultation of websites specialized in phytotherapy

Then, an Excel table has been developed:
- each line corresponds to a plant
- each column corresponds respectively to 17 CYP, a transport protein (Pgp), estrogen-like (EL) and antioxidant (AO) properties of the plant.

A colour code has been defined according to the inhibitory (yellow), inductive (blue), EL (purple) and AO (red) action of the plant. If there is no interaction, the box remains blank.
Plant effects data were collected from Hedrine®, Oncolien®, MSKCC, RX list and Drugs.com websites.

What has been achieved?
Finally, 174 plants have been accounted in drugstores, 82 were identified during PC and 129 found on websites. If 10% of plants have an EL action and 16% an AO effect, approximately 30% have inductive and/or inhibitory action of at least one CYP and/or PgP. Since the tool's creation: 91% of answers could be given immediately to patients compared to only 9% delayed (plants still unreferenced).

W***hat next?***
This database is an essential tool for answering questions from patients with anticancer drugs. It saves precious time and responsiveness during PC, but also during patient phone calls. However, critical work with divergent information between sources is to be expected. Currently, as a precaution, we don't recommend the use of plants subject to such a contradiction.

Keywords | Patient counselling, databases, drug-food interaction.
Conflict of interest | I have no potential conflict of interest to disclose.

DEFINING DOSAGE REGIMENS OF ERLOTINIB AND GEFITINIB IN NON-SMALL CELL LUNG CANCER PATIENTS USING MODELLING AND SIMULATION

Authors: Sofia Konstantinidou, Vangelis Karalis

What was done?
Population pharmacokinetic (PK) – pharmacodynamic (PD) modelling was utilised to simulate erlotinib and gefitinib dosage regimens for non-small cell lung cancer. In silico clinical trials with virtual patients, of several resistance levels, were simulated in order to optimise pharmacotherapy and get better therapeutic outcomes.

Why was it done?
Tyrosine kinase inhibitors (TKIs), like erlotinib and gefitinib, are widely used in anticancer therapy. However, after long term administration of TKIs, resistance is observed in the majority of patients. Thus, it is necessary to be able to define individualised dosage regimens for TKIs in cancer patients. Nowadays, modelling and simulation approaches represent the most powerful tool in the hands of clinical pharmacists towards precision medicine.

How was it done?
The utilised PK/PD model and average parameter values were obtained from the study of Eigenmann and colleagues. This model was fully validated using statistical criteria and goodness of fit plots. In order to simulate many possible conditions that may occur in clinical practice, several different values of erlotinib and gefitinib clearance, absorption rate, pharmacodynamic characteristics (like tumor volume), and resistance were assessed. In addition, several dosage schemes were simulated. The entire modelling work was performed in Monolix® 2019R1.

What has been achieved?
Concentration vs. time and effect vs. time plots for the virtual patients were simulated for a variety of conditions and tumour resistance levels. For both TKIs, decrease of body clearance led to higher plasma concentrations, as well as more intense and longer duration of the effect (i.e. tumour volume shrinkage). Enhanced drug effect on resistant cells resulted in a decrease in tumour volume. In addition, a variety of concentration-time profiles were simulated, making it possible to choose the best regimen for each patient.

What next?
In this study, the use of modelling techniques led to the simulation of many conditions of patients and adjustment of dosage regimens according to their needs. Wider application of in silico methods using virtual patients will allow the design of the most appropriate individualised dosage schemes tailored to the patients' requirements..

Keywords | Clinical pharmacy services, optimisation of therapy, safety profile.
Conflict of interest: I have no potential conflict of interest to disclose.

SECTION 5: PATIENT SAFETY AND QUALITY ASSURANCE

PARENTERAL NUTRITION: HOW TO PREVENT THE NEXT MISTAKE

Author: Saif Salah

What was done?
Recognise the mismatch between the electronic health record (EHR) instructions for delivery of parenteral nutrition (PN), against the actual delivery by the pharmacy according to prescription from PN staff and characterisation of these cases in terms of mismatching.

Why was it done?
In Carmel Medical Center, the infusion pack is delivered by a pharmacist according to the prescription given from PN staff, and afterwards the infusion instructions are recorded by one of the department physicians in the patient EHR. Recently there have been several mistakes that have been reported, which made it urgent to check matching between PN staff decision and the record of instructions in the EHR.

How was it done?
Issuing a report of the PN doses delivered by the electronic system called "UNIT-DOSE" in the pharmacy according to the name of patient and days of treatment of 2018 vs. electronic instructions that have been recorded by one of the department physicians in the "Kamelyon" system or "Meta Vision " The parameters examined were: type of solution, composition, volume, supplements-additives (electrolytes, vitamins, trace elements), infusion rate and method of infusion (central / peripheral). Infusion rate was examined separately as a follow-up by a nutritionist.

What has been achieved?
From our research, we found a significant difference between computerised recording of PN instructions and what the patient actually received. This is due to the separation between the hand-written prescription by the PN staff and the computerised instruction recording by the treatment team. This may constitute a danger to patients.

What next?
Examination and follow-up by the pharmacist is important for identifying and treating errors of this nature appropriately. Guidance sessions for the treating staff should be conducted in the different departments. The prescription must be matched by the PN staff to the computerised instruction by placing a prescription pattern. Set up protocols in the computerised system that guide the treatment staff in the department to record the correct instructions.

Keywords | Error-avoiding strategies.
Conflict of interest I have no potential conflict of interest to disclose.

THE IMPACT OF AN ELECTRONIC ALERT IN PREVENTING DUPLICATE ANTICOAGULANT PRESCRIBING

Authors: Alison Brown, Gillian Cavell, Nikita Dogra, Cate Whittlesea

What was done?
A 'duplicate anticoagulant alert' (Anticoagulant MLM) was implemented within our electronic prescribing system (EPMA) to alert prescribers if co-prescription of two or more anticoagulants was attempted, with the intention of preventing the completion of a potentially harmful prescription. We conducted a retrospective review of the impact of the Anticoagulant MLM on preventing co-prescription of low-molecular weight heparin (LMWH) and direct oral anticoagulants (DOACS).

Why was it done?
Anticoagulants are high-risk drugs. An NHS England Patient Safety Alert was published in 2015 highlighting harm from inappropriate co-prescription of anticoagulants1.

How was it done?
The study took place in a 950 bed UK acute teaching hospital. A report of all Anticoagulant MLM alerts generated for adult inpatients between 26th June 2017 and 8th October 2018 was extracted from EPMA. Data on drugs prescribed, alert acceptance or override and duplicate anticoagulant administration were collected. Where alerts were overridden, appropriateness of

the override was assessed by an anticoagulation specialist pharmacist. Ethics approval was not needed.

What has been achieved?
The Anticoagulant MLM triggered on 894 occasions; 113 in response to attempted prescription of a LMWH for a patient already prescribed a DOAC. 65 of 113 alerts were overridden (duplicate prescription completed). 48 alerts were accepted (duplicate prescription avoided). Of the 65 overridden alerts, consecutive doses of both anticoagulants were scheduled appropriately. No duplicate doses were administered in 44 cases (44/65, 67.7%). 15 duplicate prescriptions were either cancelled before administration or not administered concurrently (15/65, 23.1%). Duplicate doses were administered against 6 prescriptions (6/65, 9.2%), on 3 occasions. No patient harm was identified. The alert prevented inappropriate co-prescription of anticoagulants to 48 patients. Overrides were justified in 44 cases. Anticoagulants were correctly prescribed for 92/113 (81.4%) patients. It was outside the scope of this project to investigate why alerts were overridden. 'Alert fatigue'2 and alert frequency3 are recognised factors limiting the effectiveness of electronic alerts in changing a planned course of action.

What next?
The alert remains in place as a barrier to error. Further work is needed to identify reasons for anticoagulant alert overrides.

Keywords | Prescription appropriateness, electronic prescribing system, error-avoiding strategies.
Conflict of interest | I have no potential conflict of interest to disclose.

VENOUS THROMBOEMBOLISM PREVENTION MEASURES FOR WOMEN IN PREGNANCY AND THE PUERPERIUM

Authors: Sheena Patel, Sima Purohit, Jennifer Hanna

What was done?
Venous thromboembolism (VTE) prevention measures introduced and embedded for women in pregnancy and the puerperium, with an aim to reduce potentially preventable hospital-associated events.

Why was it done?
• VTE remains the leading cause of direct maternal death, with no evidence of a consistent decrease in mortality over the past 20 years. • Alongside changes in national guidelines, the maternity population and interventions are changing e.g. women giving birth are now older with more risk factors for thrombosis e.g. obesity. More interventions e.g. caesarean section are undertaken placing women at higher risk of VTE.
• VTE prevention measures were introduced in 2010, and nearly 10 years on further changes were implemented to reduce mortality and morbidity.

How was it done?
• Electronic VTE risk assessment introduced with mandatory alerts at relevant time-points e.g. at booking, on admission, post-delivery. • Simplification of the national VTE risk scoring system to ensure accurate completion of assessment and user-ability. • Clear hospital guidance on VTE prevention for pregnant women, including a pocket guide covering risk assessment and thromboprophylaxis. • Staff education on mechanical thromboprophylaxis for correct use and monitoring to avoid adverse effects. • VTE patient information leaflet covering signs and symptoms of VTE and when to seek urgent medical attention. • Introduction of a 'mum and baby' App with information during pregnancy and postpartum. • Root cause analysis performed on hospital associated VTE events, with shared learning of root causes and actions to prevent recurrence to multidisciplinary teams. • VTE education introduced in medical, midwifery and pharmacy staff training programmes, with regular updates in the maternity risk newsletter.

What has been achieved?
• Over 95% of women with VTE risk assessments on admission, with weekly and monthly performance reports for local monitoring. • Pharmacy staff perform quarterly audits on appropriate thromboprophylaxis; 97% inpatients received pharmacological thromboprophylaxis, and 88% inpatients were wearing anti-embolism stockings. • Pre-printed VTE management plan in maternity documentation to assist with transfer of care. • Development of an 'app' to provide patient information. • Patients counselled on anticoagulant therapy to support medication compliance. • VTE education embedded in training programmes. • VTE ward rounds for ongoing stewardship.

What next?
• Staff engagement to embed VTE prevention measures in practice. • Increasing patient education on VTE prevention. • Robust and sustainable interventions improving patient outcomes.

Keywords | Quality improvement, risk assessment, antithrombotic therapy.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLEMENTATION OF A MEDICATION SAFETY AGENDA AT TWO HOSPITAL SITES IN RESPONSE TO WORLD HEALTH ORGANISATION (WHO) PATIENT SAFETY CHALLENGE 'MEDICATION WITHOUT HARM'

Authors: Meenal Patel, Sheena Patel, Peta Longstaff

What was done?
A local medication safety agenda implemented across two hospital sites in response to World Health Organisation (WHO) patient safety challenge 'Medication without Harm'.

Why was it done?
• Initiative introduced and on-going since 2017. • To increase and embed medication safety awareness. • To address under-reporting of medication-related incidents, with feedback. • To embed medication safety in education programmes and clinical practice.

How was it done?
• Medication safety group (MSG) introduced with local strategy, involving junior medical staff for frontline feedback. • Medication safety metrics changed to allow benchmarking with peers as per NHS Improvement's Model Hospital data. • 'Plan, Do, Study, Act' model applied to improve transfer of care from hospital to rehabilitation unit following external incidents. • Monthly analysis of incidents with harm, exploring reasons for under-reporting. • Optimisation of incident reporting system to improve staff feedback following investigations • Near miss error log introduced in pharmacy with shared learning. • Mitigation of medication-related risks e.g. medications safe storage action plan. • Medication safety bulletins, patient safety newsletters and top tips guide introduced covering focal themes. • 'Safe prescribing' mandatory induction training for junior doctors to support prescribing of high risk medicines and compliance to patient safety alerts. • Hospital-wide education on lessons learnt from incidents. • Medication safety resources for staff to access. • Nursing quality round on medication safety. • Electronic missed doses real-time report developed to tackle omitted/delayed critical medication doses. • Medication safety awareness (MSA) week held to increase awareness on focal themes.

What has been achieved?
• Multidisciplinary MSG with assurance on meeting WHO global challenge. • Monthly analysis of medication safety data

to allow learning, collaboration and benchmarking against peers. • Positive staff feedback on bulletins/newsletters with staff involvement/engagement. • Training programmes embedded with safe prescribing education. • Improved hospital safety metrics: Following MSA week, a 5% and 21% increase in medication-related incident reporting occurred at each site which has been sustained. Reporting rates doubled at one site following success of MSA week. • In 2018-19, local target achieved for reported medication-related incidents per 100,000 finished consultant episodes and medication-related incidents with harm.

What next?
• Collaborative multidisciplinary working raising the profile of pharmacists acting as medication safety officers. • Implementing medication safety measures from NHS Patient Safety Strategy 2019. • Initiatives for safer culture, safer systems and safer patients.

Keywords | Education, high risk medication, error-avoiding strategies
Conflict of interest | I have no potential conflict of interest to disclose.

THE IMPACT OF A WARD SATELLITE PHARMACY ON CLINICAL PHARMACY SERVICES AND POTENTIAL COST BENEFIET

Authors: Thewodros Leka, Iun Grayston, Mashal Kamran, Biljana Markovic

What was done?
The Pharmacy department made a successful business case to the Hospital executives to open a Satellite pharmacy to serve 4 surgical wards. The proposal was to recruit a dedicated clinical pharmacist and Medicines Management Technician, and set-up a dispensing satellite pharmacy.

Why was it done?
The Carter report recommended that about 80% of hospital pharmacist time should be spent on the wards to provide clinical pharmacy services. However, in our hospital's surgical specialty at the time of this report, it was found that only 33% of pharmacist's time was spent on clinical pharmacy services. This had a negative impact on: • rate of medication errors and near misses; • supply of critical medicines; • pharmacist participation in productive ward rounds; • timely discharge of patients home.

How was it done?
The business case indicated that if funded, the new satellite pharmacy team would: • improve clinical pharmacy key performance indicators; • improve patient safety; • deliver a potential cost benefit. Funding limitation was an obstacle and we have to convince the board.

What has been achieved?
We achieved 60–90% improvement in the objectives set in the business case as illustrated in Table 1 and 2. The pharmacy team won the annual quality improvement award of 2018. Table 1: Clinical Pharmacy Service improvement Clinical pharmacy services Service rate pre-satellite pharmacy Service rate post satellite pharmacy % of service improvement Medication errors 16/month 6/month 63% Pharmacist interventions 20/month 80/month 75% Pharmacist participation in ward round 6/month 50/month 88% Time to dispense discharge summaries 90 minutes/discharge summary 20 minutes/discharge summary 77% Number of patients counselled 15/month 75/month 80% Pharmacist available in the ward 1.5 hrs/day 7.5 hrs/day 80% Time taken to supply critical medicines 1 hour 5 minutes 91% Table 2: Potential Cost-benefit savings achieved Activities Cost-benefit savings/year (€) Reducing length of stay of patients €17,000 Reducing repeat dispensing €16,000 Effective use of nursing time €11,000 Reducing prescribing errors €103,000 Total Savings €147,000.

What next?
• Weekend working. • Service improvements can be transferred to acute medical units and downstream medical wards. Reference Carter report.

Keywords | Interventions, medication error, quality improvement
Conflict of interest I have no potential conflict of interest to disclose.

PHARMACEUTICAL ALGORITHMS TO PERFORM MEDICATION PHARMACEUTICAL ANALYSIS

Authors: Arnaud Potier, Béatrice Demoré, Alexandre Dony, Emmanuelle Divoux, Emmanuelle Boschetti, Laure-Anne Arnoux, Cédric Dupont, Jean-Christophe Calvo, David Piney, Virginie Chopard, Nathalie Cretin, Edith Dufay

What was done?
A computerised clinical pharmacy tool is integrated into the health information system of our group of hospitals (5000 beds) to promote efficiency of pharmaceutical analysis in order to improve patient safety. Pharmaceutical algorithms (PA) are conceptualised to improve drug related problems (DRP) detection and their resolution through pharmaceutical intervention (PI) according to a defined conduct to be held: anamnesis of subjective and objective elements of appreciation, DRP characterisation and PI transmission. Pharmaceutical analysis is performed by the use of PharmaClass® (Keenturtle). This software has been interfaced with 5 health data flow of two health facilities (1000 of the 2000 beds were tested): identity and patient flow, medication data, laboratory results examination, medical history, physiological constants. PA are partially encoded as rules in Pharmaclass® that issues alerts analysed by a pharmacist.

Why was it done?
Drug iatrogenia costs global health systems $52 billion annually. The third global patient safety challenge aims at reducing the global burden of iatrogenic medication-related harm by 50% within 5 years [1]. Pharmaceutical analysis is a fundamental activity, a regulatory obligation in many countries but remains a challenge. This practice is highly variable. A graphic definition of the target pharmaceutical analysis has been formalised in December 2017 which sets the basis for its digitalisation, effectively implemented since January 2019. The aim is to build a corpus of the most relevant PA to facilitate clinical pharmacist practice.

How was it done?
Health data are lacking of semantic interoperability which Pharmaclass® aims at overcoming from electronical health record (EHR) queries in real time. A corpus of PA has been structured integrating the conduct to be held. PA were created by modelling the pharmaceutical experiment with the thread of criticality. PA were validated by consensus.

What has been achieved?
80 PA were encoded into Pharmaclass®: 40 are targeting serious adverse drug events. 1516 alerts were analysed and 539 PI transmitted during the 9-month test period.

What next?
This practice is applicable to any pharmaceutical analysis that uses data from an EHR. Clinical pharmacy societies should host and take care of updating corpus of PA. Its educational interest should be exploited. A European interest group for artificial intelligence in clinical pharmacy is being created.

Keywords | Drug related problem, pharmacy interventions (PI), computerised medical record.
Conflict of interest: I have no potential conflict of interest to disclose.

SAFE PRESCRIBING METRICS FOR HOSPITAL PHARMACY

Authors: Oran Quinn, Anna Marzec

What was done?
A quality improvement initiative to resolve issues with prescribing medications dosed by weight. Nursing staff were identified as 'gate-keepers' who could refuse to administer medication inappropriately prescribed. Identification, agreement, education and feedback were necessary to change prescribing practice and support nursing staff. Hospital doctors were required to calculate and prescribe the total dose to be given. Feedback was given by monthly bulletin.

Why was it done?
Errors of miscalculation, doses inappropriate for renal function and at extremes of weight were reported when doses of medication were written as 'mg/kg' without stating the dose to be given e.g. gentamicin 5mg/kg, vancomycin 15mg/kg and enoxaparin 1.5mg/kg.

How was it done?
Support from key stakeholders was sought to endorse the initiative. Verbal and written education was given to nursing, medical and pharmacy staff to implement the initiative on an agreed date. Refusal to administer medication unsafely prescribed was key to successful implementation. Patient's weight was not always available and additional equipment was provided to overcome this problem. The risk of withholding treatment was considered and an escalating referral process was recommended contacting the Senior House Officer, then Registrar and ultimately the patients Consultant to avoid lengthy delays to patient treatment. Nurses felt supported in refusing to administer medication.

What has been achieved?
A point prevalence study of all inpatients was carried out monthly to ascertain the level of compliance Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 % of patients with total dose prescribed correctly 67.0 86.7 96.7 100.0 100.0 88.9 87.5. Results showed overall improvement from March to August and full compliance in May and June. Success was achieved through a multidisciplinary approach involving all key stakeholders, a forcing function and support from and for front line staff.

What next?
This initiative has been further developed to become 'Monthly Safe Prescribing Metrics'. Other prescribing metrics such as using 'iu' dosing for insulin, prescribing appropriately for patients at extremes of weight and using the abbreviation 'mcg' for medications dosed in 'micrograms' were included. Initiatives to improve all metrics are ongoing. Safe prescribing metrics could help to positively influence prescribing culture in other healthcare settings.

Keywords | Drug dosage errors, error-avoiding strategies, quality improvement.
Conflict of interest I have no potential conflict of interest to disclose.

A QUALITY IMPROVEMENT PROJECT ON HEPARIN INFUSION SAFETY IN AN ACUTE TEACHING HOSPITAL

Authors: Anthony Hackett, Alice Oborne, Emma Ritchie, Caroline Broadbent, Rebecca Chanda, Karen Breen
What was done?
A Trust-wide electronic prescribing and medicines administration (EPMA) system was implemented in 2015. Complex infusions, e.g. unfractionated heparin (UFH) infusions, remained on paper due to EPMA functionality limitations. The complex infusion function was added into later EPMA upgrades. A multidisciplinary team (MDT) involving nursing, medical and pharmacy staff working within anticoagulation, EPMA and medication safety sought to design UFH infusions in EPMA.

Why was it done?
Anticoagulants such as UFH are recognised as high risk drugs. UFH requires frequent monitoring of the activated partial thromboplastic time ratio (APTTr), ensuring therapeutic anticoagulation and minimising adverse effects. UFH infusions and the APTTr were recorded using a paper based system. Incident reporting identified by the paper system resulted in inappropriate monitoring and management of UFH infusions, and dose omissions which could have resulted in harm.

How was it done?
Baseline audit (Paper-March 2016): Patients prescribed UFH infusions (n=14) were identified using SharePoint (e-reporting) by searching for the UFH infusion placeholder. Performance was measured against eight audit standards.
Re-audit (EPMA-March 2019): Patients prescribed UFH infusions (n=26) were identified using SharePoint by searching for those prescribed a UFH infusion on EPMA. Performance was measured against the same eight audit standards.
Chi square applied to results to test for statistical significance.
Incident rate per prescription: The Datix system was searched to identify heparin incidents reported during the data collection periods.

What has been achieved?
Audit standard 2016 audit v 2019 audit
1-Baseline APTTr checked before starting infusion 93% v 100%, p=0.1
2-Received correct loading dose of heparin based on APTTr 79% v 96%, p=0.07
3-APTTr checked 6 hours after infusion started 72% v 100%, p<0.05
4-APTTr checked 6 hours after infusion titrations 86% v 96%, p=0.2
5-APTTr in target range within 24 hours 50% v 70%, p=0.2
6-APTTr checked 24 hourly after 2 consecutive APTTr's in range 100% v 100%=no change
7-Patient receives a medical review 24 hrly 65% v 100%, p<0.05
8-Heparin syringe and giving set changed 24 hrly 65% v 100%, p<0.05

UFH related incidents reduced from one incident per 1.6 infusions, to one incident per 6.5 infusions following the implementation of an EPMA system.
UFH incidents as a proportion of all anticoagulant incidents reduced from 43% (March-2016) to 20% (March-2019).

What next?
Electronic solution's for high-risk, complex infusions such as heparin prescribing and monitoring improved care, quality and safety. Further high-risk infusions such as insulin are being developed.

Keywords | Electronic prescribing system, error-avoiding strategies, high risk medication.
Conflict of interest | I have no potential conflict of interest to disclose.

PATIENT-CENTRED CARE IN ATRIAL FIBRILLATION: AN INTEGRATED MANAGEMENT APPROACH

Authors: Virginia Silvari, Suzanne McCarthy, Gerry Allen

What was done?
The atrial fibrillation (AF) clinic was established in a tertiary referral hospital. The clinic is led by a hospital pharmacist (HP), with expertise in cardiology and anticoagulation, and an advanced nurse practitioner

(ANP) specialised in electrophysiology. Cardiologists' input is available when required. In line with AF guidelines of the European Society of Cardiology (ESC), patients attending the clinic receive full stroke risk assessment and are presented with different treatment options by the Multidisciplinary Team (MDT). These options include heart rate/ rhythm control and stroke prevention and where appropriate DC-cardioversion. Patient's preferences guide management of the treatment.

Why was it done?
Before its establishment, patients were referred by primary and secondary care physicians to a general cardiology clinic, often resulting in delay of the initial assessment and/or commencement of treatment for AF by the ANP. The HP had no involvement in this care pathway. The AF clinic has shortened the referral pathway for patients; physicians now refer patients directly to the clinic. The HP is responsible for medication optimisation; counselling and education whilst clinicians can focus on clinical examinations, diagnostics and analysis of tests results.

How was it done?
Stakeholder engagement was essential in establishing the clinic and planning meetings were used to ensure seamless delivery of the service. Analysis of the process showed that the critical path (bottleneck) was access to diagnostics on the same day of attendance of the patient to the clinic. Therefore, the clinic was established on a day where the cardiac-physiology department had sufficient resources to accommodate the clinic. It was also necessary to ensure allocated time for the ANP and HP to deliver the service.

What has been achieved?
The HP has improved patient safety by conducting medication reviews, in particular optimisation of anticoagulants according to patients' preferences (warfarin versus direct oral anticoagulants) and their characteristics such as renal functions, body weight and age. HP also provides to the patients a one-to-one counselling session on their medications (focus on anticoagulants), adherence, drug interactions and side effects.

What next?
Having seen the benefits of this AF clinic and the holistic service it delivers, it is recommended that hospitals establish an AF clinic to provide optimum treatment and prevent AF-related complications.

Keywords | Pharmaceutical care.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLANTATION OF A COMMUNICATION CIRCUIT OF ALERTS AND SAFETY NOTES RELATED TO DRUGS FROM THE PHARMACY DEPARTMENT

Authors: Ignacio García Giménez, Natalia Martín Fernández, Olalla Montero Pérez, Ernesto Sánchez Gómez, Isabel María Carrión Madroñal

What was done?
A communication circuit of alerts and safety notes related to drugs coming from the "Agencia Española de Medicamentos y Productos Sanitarios (AEMPS)".

Why was it done?
The aim is to implement a protocol to follow when these safety notes/ alerts are released from the AEMPS. It comprehends the reception of the information, its registration and its communication, when needed, to the rest of the healthcare professionals.

How was it done?
At the reception of an alert from the AEMPS, the first step is to check if the drug has been acquired by the Pharmacy, and then act in accordance with the recommendations, informing the Departments in which the medication had been dispensed. If a drug must be retired and a stock break is generated, the healthcare professionals must be informed as well. Security notes from the AEMPS are published in the local hospital website, where the documents sent by the AEMPS can be found. If this medication is included in the Pharmacotherapeutic guide, a notification is shown when it is prescribed. Finally, all alerts and security notes, with the pharmacist intervention, are registered in a database.

What has been achieved?
Since the implementation of the circuit, 14 alerts and 9 security notes were sent from the AEMPS in a period of 6 months. No interventions regarding the alerts were needed. Healthcare professionals were informed when the security notes were released, pointing to the patients at risk, the precautions required and the alternative therapies available.

What next?
To incorporate it as an indicator of quality of care within the procedures performed by the pharmacy department and detect areas of improvement.

Keywords | Pharmacy interventions (PI), patient safety, improvement action.
Conflict of interest | I have no potential conflict of interest to disclose.

THE OPIOID WORKING GROUP: AN INTERDISCIPLINARY WORKING GROUP TO IMPROVE THE CORRECT PRESCRIPTION AND APPLICATION OF OPIOIDS IN THE HOSPITAL SETTING

Authors: Imke Willrodt, Delia Bornand, Jimena Ramos, Stojan Petkovic, Giulia Mohr, Anne Leuppi-Taegtmeyer

What was done?
The Opioid Working Group at the University Hospital Basel is an interdisciplinary working group including representatives from different professions (physicians, nurses, pharmacists) and departments (medical, surgery, gynaecology, emergency, pain therapy, palliative care, pharmacology and toxicology, patient safety and information technology).

Why was it done?
Due to critical incidents involving opioids reported internally at the University Hospital Basel in 2018, there was an urgent need to evaluate underlying reasons for these events. The Opioid AG was established with the aim to mitigate risks for the correct prescription and application of opioids, and therefore to improve patient safety.

How was it done?
The thorough analysis of root causes for the critical incidents revealed prescribing and application errors, such as non-observance of kidney failure, pharmacodynamic interactions of opioids with other prescribed drugs, inadvertent overdosing – in particular with liquid drug formulations, or patient mix-ups.

What has been achieved?
Consequently, the following steps are being taken to address these risks: 1. Optimisation of the prescribing software including opioid prescription templates, links to existing opioid unit conversion tables for liquid forms of diamorphine, morphine, hydrocodone and oxycodone (milligrams to millilitres) as well as clearer display of "as required" opioid prescriptions on the patients' electronic drug charts. 2. Preparation of Standard Medication Preparation

Schemes for nursing staff of the emergency department. 3. Development of an additional label (concentration, patient initials, date of reconstitution, date of expiry of reconstituted solution) for parenteral diamorphine. 4. Improvement in detailed written instructions for the correct preparation, labelling, application and disposal of intravenous and oral drugs (to include opioids). 5. Evaluation of a hospital opioid safety self-assessment tracking tool.

What next?
A comprehensive evaluation will take place, 6 months after the implementation of all measures. We will use the number of naloxone prescriptions on the wards as a key performance indicator to measure the success of this project. The reported critical incidents involving opioids will also be assessed before and after the implementation of all measures. This evaluation will help to identify open questions, potential gaps and further needs for improvement to be addressed by the interdisciplinary team.

Keywords | Administration, prescription appropriateness, patient safety.
Conflict of interest | I have a potential conflict of interest to disclose

SAFETY IMPROVEMENT IN PAEDIATRICS: ASSISTED PRESCRIPTION OF INTRAVENOUS MIXTURES

Authors: Iván Maray Mateos, Miguel Alaguero Calero, Adrián Rodriguez Ferreras, Cristina Calzón Blanco, Cristina Álvarez Asteinza, Lucía Velasco Roces, Ana Lozano Blazquez

What was done?
Development of an assisted prescription system of intravenous mixtures adapted to paediatric patients in which both the drug dose and the diluent volume are automatically calculated according to the patient's weight.

Why was it done?
Intravenous drugs in the paediatric population bring up additional issues than the usual in adults. In their prescription, not only does the dose have to be adapted to the patient's weight, the volume in which the drug is diluted must also be adapted to the reduced fluids requirement without jeopardising the stability of the mixture. In view of these facts, IV drug prescription in paediatrics implies a higher risk of medication errors. This new prescribing system simplifies prescription and reduces risks.

How was it done?
A literature review of drug dosing in paediatrics and their stability in different diluents was performed. For every drug the following parameters were considered: maximum dose in children (mg/kg), maximum concentration allowed (mg/ml), common doses and volumes in adults. Using these values, a system was built which calculated drug dose and diluent volume according to the patient's weight and the maximum concentration allowed for stability reasons. For safety and to ease the preparation, the diluent volume in millilitres was rounded up to the next 10. In order to avoid overdosing overweight or older paediatric patients, maximum dose and diluent volume were narrowed down to the usual quantities in adults. Ultimately, this system was integrated in the electronic prescription system. A protocol was created, named "drug name" IV mixture PEDIATRICS. So, by selecting this protocol in a specific patient, the target dose and the diluent volume are automatically calculated.

What has been achieved?
This system was implemented for 38 drugs. From July 2018 to April 2019, 910 IV mixtures have been prescribed from the following Anatomical Therapeutic Chemical (ATC) groups: A02 Drugs for acid related disorders (39), J01 Antibacterials for systemic use (287), J02 Antimycotics for systemic use (3), J05 Antivirals for systemic use (8), A04 Antiemetics and antinauseants (175), N02 Analgesics (395), N03 Antiepileptics (3).

What next?
This method could be implemented in other electronic prescription programmes. The system must be updated by the Pharmacy Department, introducing new drugs and constantly reviewing stability databases, posology regimens, and information regarding dilution of parenteral drugs.

Keywords | Medication error, databases, error-avoiding strategies.
Conflict of interest I have no potential conflict of interest to disclose.

PROCEDURE TO ENSURE CORRECT MEDICATION MANAGEMENT IN THE PERIOPERATIVE PROCESS

Authors: Noelia Vicente Oliveros, María Muñoz García, Álvaro Ruigomez Saiz, Montserrat Ferre Masferrer, Teresa Bermejo Vicedo, Eva Delgado Silveira, Lucía Quesada Muñoz, Ana María Alvarez-Diaz

What was done?
We designed and implemented a flow chart to ensure the patient compliance of anesthetist's medication recommendations prior to surgery. We designed a protocol for the perioperative medication management.

Why was it done?
An analysis of the indicators of the perioperative process reflected the need to improve their quality. One of the causes of scheduled surgery cancellation was the lack of the follow up of the anaesthetist's medication recommendations. Medications need to be carefully managed to prevent perioperative complications.

How was it done?
A multidisciplinary group was formed with the management of the hospital and representatives of all the services involved in the perioperative process. The group designed the flow chart of the process by consensus. Patients were candidates to enter in this process if they were on treatment with anticoagulant or 2 or more medications from the following groups: antiplatelet, antihypertensives, antidiabetics. A pharmacist called by phone three times (the day before, the day of medication change, and the day after) to the patient to ensure the compliance of anaesthetist recommendations. If there was a lack of compliance, the pharmacist contacted the surgeon who was in charge of deciding if the surgery procedure continued as scheduled. Moreover, the domiciliary medication of these patients were reconcilliated and recorded in their health record. Healthcare professionals could consult it during hospital stay. The group designed a protocol for the perioperative medication management with different medical specialists.

What has been achieved?
The project started in April 2019. The pharmacist called patients with scheduled surgery of lower limbs. A total of 31 patients benefited from the new flow chart. The pharmacist detected 38 medication errors; two involved errors concerning the suspension of anticoagulant drugs prior to surgery and four implied antihypertensive drugs. Once, it was necessary to contact the surgeon. In this case, the surgeon decided to continue with the surgery as schedule. Fifty-seven medications suffered a change in the period between the anaesthetic visit and the surgery, nine of them belonged to the monitored medication group.

W*hat next?*
The next steps are to spread the flow chart to other patients, to distribute the protocol among hospital healthcare professionals and to implement a procedure for the reintroduction of the modified medication.

Keywords | Chronic patient, error-avoiding strategies, process improvement.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLEMENTATION OF A MEDICATION RECONCILIATION PROGRAMME UPON DISCHARGE

Authors: José Marco-del Río, María Luisa Ibarra-Mira, Gregorio Romero-Candel, Ana Ramirez-Córcoles, Ana Valladolid-Walsh, Francisco Tomás Pagán-Nuñez

What was done?
A programme which includes every patient admitted into the Internal Medicine department. It consists of three steps: clarification of chronic medication that the patients are taking, we handle them and updated schedule of their drugs upon discharge and we check the coherence with the active prescriptions.

Why was it done?
Our main goal was to improve patient's safety, because we noticed that many patients did not take actually all the drugs that were prescribed by the physicians, and other times there were drugs that the patients were taking because they had an active prescription, but they were not supposed to. Additionally, we aimed to improve the drug-related information that the patients take home.

How was it done?
We interview the patients during the admission in order to clarify and update the chronic medication that they are taking. When a patient is about to be discharged, the nurses call us, so at this moment we talk to the physician to know what changes are going to be made on the medication. To coordinate with the physicians and nurses, we had two meetings in which we established the timing of the programme, so the patients don't have to wait too long for us. When we know the changes that the physician is going to make, we update the medication schedule to handle it to the patients or their family, and we explain to them the changes and how they should manage the new drugs. If any discrepancy or medication-related problem is detected, we talk to the physician to solve it.

What has been achieved?
In the last four months, we performed 180 discharges and we solved together with the physicians 20 discrepancies. Patients are now receiving more comprehensive information about their treatment.

What next?
To continue with the programme and broaden it to the rest of our hospital departments. Also we are working on a way of uploading our pharmacy schedules to the electronic medical record of the patients, so they can be available for every healthcare worker, which would improve even more the transitions of care.

Keywords | Patient education, patient safety, improvement action.
Conflict of interest I have no potential conflict of interest to disclose.

ENHANCING MEDICATION SAFETY BY IMPLEMENTING AND IMPROVING THE USE OF A SMART PUMP DRUG LIBRARY IN A TERTIARY HOSPITAL

Authors: Mohammed Almeziny, Maha Aljuhanei, Fahad Alkharji

What was done?
A smart pump was implemented in a tertiary hospital.

Why was it done?
Smart infusion pumps have been introduced to prevent medication errors and they have been widely adopted by healthcare. They incorporate safeguards such as soft and hard dosage limits.

How was it done?
A task group was formulated from all involved parties to cover all issues related to practice, and it involved nursing and pharmacy staff to overcome all obstacles that may face the project; in addition the information technology (IT) department was involved to determine the facilitation of all technical issues. At the beginning the group faced two main barriers: creating the initial drug library which was a significant amount of work for the pharmacy, then uploading the drug library. In addition, all these works were to be carried out manually by the medical engineering. The quantitative data available from the smart pump software were used to improve drug library use. The team started to collect feedback from and communicate feedback to direct care nurses about drug library usage via e-mail, staff meetings, a "whatsapp" group and one-on-one conversations. This included asking nurses why the drug library was not being used regularly. The most frequent responses included "The pump is hard to use," "The list doesn't have the medications I need and, "It's just easier to use the rate-based programming feature".

What has been achieved?
The pump library usage percentage for total infusions was raised from a baseline of 2.85% to 30.97% in the first week. After careful review by the nursing, pharmacy, and medical leadership, some changes to the library were made. These included standardising drug concentrations in the pump library and providing ongoing staff education as well as implementing the best practices cited in the ISMP's guidelines for the use of smart pumps; and running daily usage and weekly soft limit override reports from the pump library. Furthermore, a new category, "feeding", was added to pump library; finally all medications and plain fluids were added to the pump library.

What next?
A Bar-Code Medication Administration System is needed (BCMA), to ensure the right patient gets the correct drug, dose and route at the right time.

Keywords | Medication error.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPACT OF A MEDICATION REQUEST TOOL FROM THE NURSING ADMINISTRATION VIEW IN HOSPITALISATION

Authors: M. T. Barrera, O. Carrascosa, P. Madrid, A. Aguado, R. Martínez, N. Argüello, E. Cuellar, M. Vela, C. Jimenez, S. Payan, O. Sánchez

What was done?
This tool is part of "Safe Medication Administration in Hospitalization/ Avoid Interruptions" project. A "button" was included in the nursing administration view of the electronic prescription programme, which when activated automatically generates a request to the Pharmacy

Service for a dose of required medication. Hospital Information Systems were contacted for the design. All requests generated during the administration of medication were automatically received in Pharmacy Service. They were grouped by plant, listed, deducted from stock and dispensed at the agreed times.

Why was it done?
Lack of stock delays medication administration by nurses. This situation also generates hospital warden displacements to Pharmacy Service and telephone interruptions of Pharmacy technicians' work. The main aim was to amend stock lack management to improve patient security during medication preparation and administration. The secondary objectives were: reduce interruptions of other health professionals and automate warehouse exits, avoiding errors of manual updating of Pharmacy stock.

How was it done?
The tool was developed by Hospital Information Systems, in collaboration with nursing, and staff training was carried out for correct handling of the tool. Also, medication dispensing schedules were agreed with the hospital warden. 15 days before tool implementation, the Pharmacy Service analysed all medication requests made from hospitalisation. Data collected were: plant and shift requested, reason, existence of pattern, requested medication, requested units, notice to auxiliaries to collect medication. After the first week of implementation, the same assessment of requests was made during the same period to compare and evaluate the impact of this tool implementation.

What has been achieved?
When both periods were compared, prescribed medication requests decreased from 198 to 15, this difference being statistically significant (Fisher's exact test p=0.008). This difference meant significant reduction of interruptions in Pharmacy technicians' daily work. Requests reasons were lack of dose in 43.4% (n=95) of cases, immediate prescriptions in 29.2% (n=64) of cases and treatment change in 20.5% (n=45) of cases. 29.2% of all requested medications belonged to the antimicrobial and antiviral group. 62% (n=135) of the total requests were received in the morning shift. Hospital warden displacements were significantly reduced when comparing both periods from 102 to 3 (Chi square test, p=0.006). This meant a significant reduction in interruptions in hospital warden work. It has been possible to standardise and improve efficiently nursing management of medication stock lack.

What next?
The incidents technical improvement is pending, as well as training of new nursing staff. It is possible to implement this tool in all hospital units that have electronic prescription.

Keywords | Error-avoiding strategies.
Conflict of interest | I have no potential conflict of interest to disclose.

STANDARDISATION OF DILUTED POTASSIUM INTRAVENOUS SOLUTIONS IN NEONATAL CARE UNITS

Authors: Luis Pérez de Amezaga Tomás, María Magdalena Parera Pascual, Mónica Sanz Muñoz, Catalina March Frontera, Gonzalo González Morcillo, Alejandra Mandilego Garcia, Álvaro Medina Guerrero, Ana Filgueira Posse, Montserrat Vilanova Boltó

What was done?
Development of a protocol that standardises diluted potassium intravenous solutions for neonates (including those preterm over 28 weeks of gestation). This allowed us to remove concentrated potassium chloride (KCl) 2M from neonatal care units in our hospital. For this purpose, the hospital pharmacy centralised the preparation and distribution of KCl ready-to-use infusions.

Why was it done?
Administration of intravenous KCl produces hyperkalaemia and this can result in cardiac arrest and death. The Institute for Safe Medication Practices (ISMP) as well as other security agencies have recommended the withdrawal of KCl 2M from ward stock. This project was born as a response to these recommendations. We focused on a group of patients where these practices have not been extensively implemented. The aim of the protocol was to standardise the prescription, preparation, dispensation and administration of KCl to neonates in our hospital.

How was it done?
The elaboration of the protocol took place as follows: • A multidisciplinary team designed KCl ready-to-use solutions that met the requirements of the newborn: - Glucose 10% 250mL with 5 mEq KCl (20mEq/L solution) - Glucose 10% 250mL with 10 mEq KCl (40mEq/L solution). • The hospital pharmacy centralised the preparation of these solutions. A risk assessment was performed and determined an expiration date of 7 days. • These solutions were stocked at all neonatal care units: Intensive Care Unit, Hospitalized Paediatric Unit and Paediatric Emergency Unit. • Weekly, the hospital pharmacy distributes these solutions and disposes of the expired ones. • Only ready-to-use KCl solutions were able to prescribe at the electronic prescription programme. • A formation plan was implemented to train all the professionals involved in neonatal care.

What has been achieved?
The protocol was implemented in November 2016. Since then, 65 patients have been treated with 20mEq/L solution and only 1 patient with 40mEq/L solution. No remarkable imbalances in electrolytes have been detected resulting from the standardisation of the fluid therapy with KCl. Only 3 incidents have been registered. All of them were prescription errors (solution selection); they reached the patient but without damage.

What next?
Nowadays, we are developing a stability study of the KCl solutions in order to assess the appropriateness of the expiration date.

Keywords | Ready to use, high risk medication, error-avoiding strategies.
Conflict of interest | I have no potential conflict of interest to disclose.

A NOVEL CLOSED SYSTEM DRUG-TRANSFER DEVICE FOR ORAL DOSAGE FORM HELPING PATIENTS WHO CANNOT SWALLOW SOLIDS

Author: Salim Hadad

What was done?
CSTD – for oral dosage form new device of its kind, combines the act of crushing the various drugs, dissolve in liquid and give to a patient who cannot swallow for various reasons, that mechanically prohibits the transfer of environmental contaminants into the system and the escape of hazardous drug or vapor concentrations outside the system.

Why was it done?
It remains that new solutions to increasing the safety of handling Solid Dosage Form hazardous drugs have to be developed. Conceptually, through operating in a closed system, CSTDs should significantly reduce

the risks to pharmacists and nurses There are two main drawbacks of the known solutions: 1. The crushing and dilution of the solid dosage form medicine is done with an open vessel to the environment, such as a porcelain crater, which may cause the work environment to be contaminated with carcinogenic or teratogenic substances, that could expose and endanger the medical staff to hazardous substances in the course of their duties as providers of medical care. 2. The tools available today are reusable, requiring a thorough cleaning process between different materials (drugs), which can lead to cross-contamination between different doses of drugs, which are crushed one after the other with the same instrument.

How was it done?
We designed the device with 3D software (solid wark). It consists of a number of functional parts. The main ones are: a 20 ml barrel, a top part of which is a piston with a bottom basket loaded with the solid medicine; this part is sealed as a barrel from above. With the help of mechanical rotation, the drug breaks down into small particles that fall into the inner space of the barrel. Adding the liquid through a fluid port disposed on the bottom barrel which it is completely sealed. The removal of the liquid drug through a unique adapter which at its end is adapted to the gastric tube or oral administration to the patient,

What has been achieved?
1. The complete process of crushing and liquefying of the solid drugs is carried out under sealed conditions to the immediate environment and without fear of exposure to residues of toxic substances to the medical caregiver. 2. A one-time use system saves complex cleaning process. 3. There is no risk of cross-contamination between different drugs. 4. Saving personal protective equipment such as gloves, masks, lab coats clean rooms, etc. which is necessary for protection and for the safety of the caregiver team.

What next?
Applied research will be carried out by pharmacists and nurses to test the efficiency of the new device (as a basic prototype). These experiments will take various non-cytotoxic pills, will be dummy operations, in which the crushing and liquefying will be performed, and the solution or suspension will be transferred through the gastric tube, according to an approved research protocol.

Keywords | Administration, accident and emergency.
Conflict of interest I have no potential conflict of interest to disclose.

AN AUDIT OF DISCHARGE PRESCRIPTIONS FOR SURGICAL AND MEDICAL PATIENTS WITH A QUALITY IMPROVEMENT INITIATIVE

Authors: Eva Heffernan, Deirdre Smith, Avril Tierney, Louise McDonnell

What was done?
The aim of this project was to evaluate the current level of discrepancies on discharge prescriptions for surgical and medical patients and to ascertain if a quality improvement (QI) initiative can impact on the severity of medication error at the point of discharge.

Why was it done?
Transitions of care such as hospital discharge present an opportunity for medication error. Lapses in communication at this interface are common. For the next healthcare provider (HCP) to issue the correct medication safely and in a timely manner, the discharge prescription needs to bridge this communication gap. Prescribing errors are the most frequent subtype of medication errors and can be repeated systematically for prolonged periods. Detection of medication error using tools such as audit, learning from these errors and planning corrective action is essential to building safer healthcare systems. This study adapted the Health Information and Quality Authority (HIQA) national standard for patient discharge summaries to create a benchmark for discharge prescriptions in SVPH. A QI initiative targeting prescribers was developed. This was designed as a bundle intervention and was called the Discharge Prescription Education Bundle (DPEB).

How was it done?
Uncontrolled consecutive baseline and re-audit of discharge prescriptions on a 26-bed mixed medical and surgical ward. The baseline audit assessed 70 patients' discharge prescriptions. Deviations from the standard were termed discrepancies. Discrepancies were divided based on capacity to cause error (NCC-MERP Category A) and error occurred (NCC-MERP Category B-I). Discrepancies where an error occurred (NCC-MERP Category B-I) were reported using the in-house medication incident reporting (MIR) system and dually assessed by an independent panel and the project lead for potential to cause harm. The QI initiative was implemented and its impact assessed with a re-audit of 70 patients' discharge prescriptions.

What has been achieved?
The overall number of discrepancies reduced from 156 in the baseline to 59 in the re-audit ($p<0.05$). Overall compliance with the audit standards improved from 17.1% to 54.3% ($p <0.05$). In the baseline audit 22.8% (n=16) of patients had a discrepancy where an error occurred; this reduced to 2.65% (n=2) in the re-audit ($p<0.05$). The severity of errors reduced in the re-audit.

What next?
The QI initiative used was proactive not reactive. Use of the discharge education bundle was not restricted to pharmacy opening hours. This initiative was very low cost to implement. Following on from the successful results of this project one component of DPEB called the discharge prescription visual prompt is now preprinted on all SVPH discharge prescriptions as a reminder to prescribers.

Keywords | Discharge prescription, prescribing errors, quality improvement.
Conflict of interest: I have no potential conflict of interest to disclose.

BUILDING THE FOUNDATIONS OF A MEDICATION SAFETY PROGRAMME IN AN ACUTE HOSPITAL

Authors: Bernie Love, Tracy McFadden, Patrick Martin, Val Connolly, Deirdre Brennan, Michelle Griffin, Danielle Bracken, Siobhan Maguire, James Carr

What was done?
Connolly Hospital Blanchardstown launched a formal Medication Safety Programme in November 2017 by appointing a Medication Safety Facilitator and establishing a multidisciplinary Medication Safety Committee to promote and support the safe use of medications. The Medication Safety Committee undertook a number of activities to establish the programme in the hospital.

Why was it done?
Avoidable harm caused by medication is one of the most commonly reported adverse events in healthcare settings.

How was it done?
-An evidence-based literature review to define and guide the scope, breadth and direction of the programme. -A baseline in-depth analysis of locally reported medication incidents (2016/2017) on the National Incident Management System (NIMS) was conducted to identify initial targets for improvement. Analysis was undertaken

using NCC-MERP, a recognised and validated tool used specifically for medication incidents. -An annual work-plan, incorporating necessary elements of a medication safety programme, was devised by the committee defining goals for the year.

What has been achieved?
Safety Culture: • Prominent commitment from hospital management to medication safety. • Investigations into medication errors aligned to a just and fair systems approach. • Promotion and encouragement of medication safety reporting and learning with a Medication Safety Awareness Day. • Implementation of the 'Know, Check, Ask' campaign to enhance medication safety by empowering patients. Governance: • Organogram updated to reflect reporting relationship of new committee. • Medication Safety made standing item at Quality & Safety Executive meetings. • Annual report submitted to Hospital Executive Committee Measurement & Monitoring of medication incidents: • Quarterly report produced and disseminated to front-line staff tracking and trending medication incidents including narratives. • Performance indicators established for: -No. of incidents reported (2018 reporting increased by 32% over 2017); -Reporter of incidents; -Category of harm; -Stage of medication use process where incidents have occurred. Education & Training: • Regular face-to-face education sessions arranged with front-line staff. • Quarterly medication safety bulletin devised and disseminated, informed by audit findings and incident reports. • The successful Medication Safety Minute initiative from St James's Hospital was adopted and implemented, with content informed by local incidents. Development, Updating and Dissemination of PPPGs. • New IV drug administration guides (n=53) developed and updated. • Introduction of one-page 'Medicines Information Sheet' as quick reference guides for key topics. • DOAC prescription and administration guide developed and circulated. Audit: • Audit programme established informed by incident analysis, complaints and best-practice including introduction of an 'audit window' to gather hospital-wide data. Quality Improvement: • Informed by incident analysis, best-practice and audit findings, a number of moderate-high leverage quality improvement projects were initiated including removal of concentrated potassium from general clinical areas, introduction of an insulin & glucose monitoring record and introduction of an automated dispensing cabinet for out-of-hours access to medication.

What next?
The structural aspects established for the Medication Safety Programme have been successful in establishing a programme in the hospital and are reproducible by other centres. Work continues in Connolly Hospital to identify themes of incidents, audit of practice and implementation of quality improvement initiatives..

Keywords | Adverse drug events, medication error, quality standards.
Conflict of interest I have no potential conflict of interest to disclose.

CAPTURE DATA AND CONQUER CLOTS

Author: Karina Doherty

What was done?
An App was developed to collect data on venous thromboembolism (VTE) prophylaxis compliance across St Vincent's Private Hospital (SVPH).

Why was it done?
VTE is a collective term for blood clots usually in the legs or lungs. In Europe, there are 544,000 VTE-related deaths every year. VTE is responsible for more deaths than AIDS, breast cancer, prostate cancer and motor vehicle accidents combined. SVPH Pharmacy Department has been conducting annual Clinical Audits on VTE prophylaxis using a paper based system. However, the process was time consuming and limited the frequency of audit and the opportunities for identifying opportunities for improvement in compliance. SVPH has a high number of patients with high risk of VTE including Medical Oncology patients and Surgical patients. Compliance rates over preceding years were running at 75%; however, it is hoped to achieve a target of 90% compliance by 2020.

How was it done?
Different technologies were explored and an App developer was selected. Funding was sourced. Stakeholders were invited to get involved in the development team; this part was challenging and a lot of negotiations were had as to how the format of the App would be developed and carried forward. The next step when all the details had been finalised was launching the App.

What has been achieved?
Every month seven patients are randomly selected for audit and an auditor (in SVPH a pharmacist) inputs the data on the App which the lead auditor analysis. At SVPH compliance has increased from 75% prior to the app, to post implementation of the App where monthly VTE audits were conducted on all inpatient wards. The results are 92% compliance with VTE prophylaxis for 2018, and for 2019 up to Sept 2019 96% compliance.

What next?
It is hoped that this App will be a useful tool that will help SVPH and other hospitals to achieve a higher compliance with VTE prophylaxis guidelines and help prevent clots in patients. This App can be customised to individual hospital requirements. Technology has been shown to assist with clinical audit and will be used in various projects to make auditing easier and faster and therefore help healthcare workers to provide a better service to patients.

Keywords | Clinical pharmacy services, multidisciplinary team, information technology.
Conflict of interest | I have potential conflict of interest to disclose*.

* Sanofi assisted in the funding to develop the app.

ALGORITHM OF SAFE AND CORRECT PREPARATION OF CHEMOTHERAPY

Authors: Marijana Fortuna, Petra Tavčar, Jure Dolenc, Monika Sonc

What was done?
Cytostatics are carcinogenic, mutagenic and teratogenic drugs. Handling requires a number of organisational and technical systems. All products should be safely and accurately prepared with special care to ensure the highest possible product quality, correct dose, the right patient, the right medicine, the right carrier solutions and right administration, without microbiological and particle contamination. The prescription and preparation of cytostatic drugs must be closely monitored. The most important factor in achieving this is the constant training of pharmacists in pharmaceutical techniques.

Why was it done?
To support us in understanding our role in the preparation of chemotherapy products. To prevent the risk of harm to patients. Recognise prescribed error in pre-documented chemotherapy protocols.

How was it done?
This year started with monthly reviews and training in the following subjects by using a written algorithm. Risk to product: Drugs reconstitution negative pressure isolators, leakage/damage or defects of vials, particles, transport and storage. Risk to patient: Incorrect calculations, microbiological contamination, incorrect

administration, extravasation, incorrect administration route, incorrect labelling. Risk to operators: Contamination, toxicity, equipment, gloves, cleaning, occupational exposure. All checks have been made throughout the whole of preparation process, adhering to standard operating procedures (SOP-s).

What has been achieved?
We concluded that continuing education by using a writhen algorithm is useful practice. It helps prevent automatic work, remind us to check each step in process and know how to recognise errors in chemotherapy prescriptions and preparation. In 25 cases of prescribed chemotherapy, intervention of a pharmacist was required. In 5 cases of chemotherapy preparation, pharmaceutical techniques have detected a discrepancy in the prescribed therapy.

What next?
Regardless of experience at work, it is necessary to constantly repeat how to work properly, and awareness why we are doing this.

Keywords | Drug dosage errors, medication error, cytostatic preparations.
Conflict of interest | I have no potential conflict of interest to disclose.

PROTOCOL FOR THE ADMINISTRATION OF DANGEROUS DEPOT DRUGS IN SOCIAL HEALTH CENTRES: ONE YEAR LATER

Authors: Arantxa Andújar-Mateos, José Manuel del Moral-Sánchez, Inmaculada Sánchez-Martínez, Francisco Valiente-Borrego, María Muros-Ortega, Andrés Navarro-Ruiz

What was done?
The aim of our study is to determine the integration into clinical practice of a protocol for the administration of dangerous depot drugs in the social health field after a year has elapsed since its implementation.

Why was it done?
When the National Institute for Occupational Safety and Health (NIOSH) published a list that included drugs considered dangerous for general and reproductive health, we had to devise a protocol in our field so that parenteral drugs could be administered in a safe way for health personnel.

How was it done?
The Depot Dangerous Drug Administration Protocol was intended to increase the safety of healthcare personnel in their preparation and administration. The recommendations contained therein, issued by official agencies and in force at the time, were transmitted by different means of communication: - Verbal: in a physical meeting with the nursing coordination of all the residences. - Written: through the distribution of the protocol via e-mail and in folders shared with the centers. - Audiovisual: elaboration and diffusion of a video explaining the preparation of the different drugs affected. For its implementation, the points mentioned in the previous section were implemented and a reference pharmacist was made available to each residence to resolve any doubts in this regard. Within a year of its implementation, from our socio-sanitary pharmacy service and in collaboration with the 16 residences specialising in geriatrics, disability and mental illness, the degree of adaptation to the protocol was measured.

What has been achieved?
In December 2017, the aforementioned protocol was implemented in the 16 residences. Within a year, more than half of the residences, 9 of the 16, acknowledged not taking any of the precautions indicated in the protocol. Of the rest of the residences, 4 stated that they have adopted all the recommendations in each preparation and administration of dangerous drugs and the remaining 3 placed their adaptation to the protocol at between 25% and 50%.

What next?
We believe it is necessary to reinforce the information contained in the protocol every 1–2 months in person. It is also necessary to keep the protocol continuously updated to detect changes in it.

Keywords | Injection.
Conflict of interest | I have no potential conflict of interest to disclose.

THE ACTIVITIES AND IMPACT OF A HOSPITAL-WIDE MEDICATION INITIATIVE

Authors: Alice Oborne, Mark Kinirons, Virginia Aguado, Steve Wanklyn, Laura Watson, Jaymi Mistry, Duncan McRobbie, Abhiti Gulati, Emma Ritchie, David Wood, Niall Stewart-Kelcher, Adrian Hopper, Patricia Snell, Tony West

What was done?
Senior and junior staff collaborated to systematically improve safe medication processes and outcomes in a 1200-bedded multi-site hospital. The work aimed to reduce harm from medicines and improve medication safety culture.

Why was it done?
Medicines are common interventions but have inherent dangers: 9% inpatient prescriptions contain errors, and medication errors occur at an estimated rate of one per patient per day [1-3]. Medication incident reporting was low, with high proportions of harmful incidents.

How was it done?
Pharmacists, doctors, nurses and governance staff set up a Medication Safety Forum which met monthly to focus on high risk drugs, processes and patients. Published literature and international guidance were reviewed [1-3]. Twelve subgroups worked on safer opioid, insulin, anticoagulant, allergy and injectable medicine use and paediatric, elderly, critical care and peri-operative care. Subgroups published guidelines on the hospital intranet. External aviation and patient safety experts reviewed processes. Medication incident data were reported to staff monthly from June 2008. A monthly medication safety newsletter (total 68), screensaver messages, podcasts, mouse-mats, 'safety days', audit, training and senior staff promoted best practice. Electronic prescribing and medication administration (EPMA) with decision support was introduced in 2015.

What has been achieved?
The Medication Safety Forum met monthly 2009–2019. Medication incident reporting increased from 60 to over 400 per month (total 31330 over 11 years), whilst harmful incidents all reduced (Figure). Incidents with harm reduced from 51 to 24 in the first to last 20 months. Dose omissions reduced by 10% despite an increase in patient acuity, anticoagulant use and insulin use. The most common incident type was wrong dose, agreeing with national incident data. New guidelines included 30 for insulin, 28 anticoagulation and 19 opioid use. Medication incident reporting increased from 10th to highest in similar hospitals [3].

What next?
Multidisciplinary leadership, multimedia guidance, technology, audit and feedback in medication safety can be applied in any healthcare setting to enhance patient safety. Further system enhancements are planned.

References:
[1] National Patient Safety Agency 2004. Seven steps to patient safety. [2] Prescribing re-port, 2010. www.rcpLondon.ac.uk. [3] NHS Improvement organisational data reports.

Keywords | Error-avoiding strategies, high risk medication, medication error.
Conflict of interest | I have no potential conflict of interest to disclose.

REVIEW OF THE HOSPITAL HIGH-ALERT MEDICATIONS LIST USING HOSPITAL AND INTERNATIONAL DATA

Author: Božena Bürmen

What was done?
We comprehensively updated the hospital list of high-alert medications (HAM) and identified hospital specific medications not yet present on HAM lists. We joined international HAM data supported by medication error (ME) reports and expert opinion with data from the hospital ME reporting system.

Why was it done?
In University Medical Centre Ljubljana (UMCL) a HAM list was created in 2008 and has not been significantly changed since then. Our aim was to develop a systematic strategy to review the list by including local data.

How was it done?
We analysed 390 MEs submitted to the UMCL ME reporting system from 2016 to 2018. We compared the HAM list from Institute for Safe Medication Practices (ISMP) and the UMCL HAM list. The criteria such as frequency of the reported ME, severity of harm for the patient, affected population, novelty, etc, were used to identify potential HAM. Furthermore, we calculated the probability of the ME report for the individual medications from the reported MEs and the hospital medication consumption data. The calculation was done for the medications involved in 3 or more reported MEs (Tyynismaa et al, 2017) and for the medications involved in MEs which caused harm to the patient.

What has been achieved?
The joined results from the comparison of HAM lists and reported MEs showed that several other medications could be added to the UMCL HAM list, e.g. individualised parenteral nutrition for the paediatric population, oral sedation agents for children, dialysis solutions, lidocaine IV, methadone, bupivacaine, and nusinersen. The probability-based HAM identifying method supported our previous suggestions to extend the UMCL HAM list. Additionally, the method unexpectedly revealed medications with a high probability of ME and/or harm for the patients, that are not included in any HAM list (ISMP, UMCL), such as romiplostim, parenteral iron preparations, ampicillin with sulbactam, and others.

What next?
In future we plan to develop a paediatric specific HAM list based on the same strategy; i.e. considering international suggestions and analysing paediatric ME reports in UMCL.

Keywords | High risk medication, medication error, process improvement.
Conflict of interest I have no potential conflict of interest to disclose.

IDENTIFICATION OF HAZARDOUS DRUGS IN EMERGENCY DEPARTMENT: DRUGS CABINET INSPECTION

Authors: Mª Antonia Meroño-Saura, María López-Morte, Taida Rodríguez-Martínez, Pilar Pacheco-López, Consuelo García-Motos

What was done?
The main objective is to label every drug considered "Hazardous" and to review the medication included in the Emergency Department kit in a tertiary hospital.

Why was it done?
The publication of the NIOSH list and its application by INSHT in Spain has changed the concept of "Hazardous drug" in terms of its handling and administration, as well as personnel training involved in its management.

How was it done?
Literature about Hazardous drugs was reviewed. All the drugs included in the Emergency Department kit belonging were identified and classified according to their level published in the NIOSH list. A kit's review was carried out on site, as well as a Hazardous drugs' categorisation by adequate labels.

What has been achieved?
6 out of 239 drugs included in the emergency kit were labelled as Hazardous drugs, and could be found in 9 different presentations. Regarding its risk level according to the NIOSH list; chloramphenicol, risperidone and all different presentations of phenytoin were classified as level 2. Acenocoumarol, colchicine/dicycloverine and all different presentations of valproic acid were classified as level 3. The following incidents were detected;

- Lack of identification: 8 out of the total number of drugs presented identification errors.
- Location error: 4 out of the total number of drugs were not well located.
- Photosensitive: 56 out of the total drugs were photosensitive, of which 11 were not correctly identified or stored.
- Expired drugs: 12 drugs, whose total stock was 399 units. 51 out of the total amount were expired.

After this review, the following measures were carried out:

- Orange labelling for Hazardous drugs' identification, regardless of their risk level.
- Misidentified drugs were re-labelled, and those that were misplaced were placed in their assigned spot.
- Photosensitive drugs were correctly identified by blue labels and properly preserved.
- Expired drugs were withdrawn.

W***hat next?***
Simplifying Hazardous drugs' identification by a categorisation following a colour code could lead to a safer manipulation by the professionals. During the review of the kit, several incidents were detected and sorted out, which avoided possible medication-related errors. Therefore, it is necessary to establish several control measures in emergency kits in order to avoid errors and improve the safety in the use of drugs.

Keywords | Drug review, error-avoiding strategies, labelling.
Conflict of interest | I have no potential conflict of interest to disclose.

DYSPHARMA: AN ITALIAN WEB-APPLICATION FOR DRUG THERAPY MANAGEMENT IN DYSPHAGIC PATIENTS

Authors: Serena Logrippo, Giulia Bonacucina Matteo Sestili, Alessandro Caraffa, Marco Cespi, Roberta Ganzetti

What was done?
To properly manage oral therapy in dysphagic patients, a multidisciplinary team developed an algorithm and applied it to over 8000 medicinal products available as solid oral dosage forms (SODSs). A web-based, decision-making tool was launched to support healthcare providers (HCPs) during the prescription, compounding and administration of SODFs to dysphagic patients.

Why was it done?
Dysphagia is a well-known community issue that affects primarily aged people [1]. The availability of appropriate dosage forms for

dysphagic patients is essential to guarantee therapy adherence. Extemporaneous compounding of SODSs (e.g. crushing tablet or opening capsules and dispersing the obtained powder in an appropriate base or vehicle) is a common practice due to the unavailability of different dosage forms to satisfy the current needs of patient. However, compounding practice is neither risk-free nor error-free [2]. The aim of the work was to realise a web application to support HCPs in drug therapy management of dysphagic patients.

How was it done?
An extensive review of the Italian pharmaceutical market database, product characteristic summaries and scientific literature were used for data collection. For each prescription drug formulated as SODF, an information sheet was elaborated and continuously updated.

What has been achieved?
DysPharma (www.dyspharma.it) is an on-line support currently available and under restyling. By registering and logging-in, it is possible to access technical content that comprises medicinal product details, drug-food interactions, extemporaneous compounding methods, and risk symbols. Medicinal products can be searched by active ingredient name, medicinal product name, and marketing authorisation.
Customised symbols are reported for: do not crush tablets or open capsules, do not split tablets, to wear personal protection devices in case of manipulation of hazardous drugs, and drug associated with dry mouth.

What next?
This decision support tool may be integrated with computerised medical records to reduce medication-prescribing and administering errors and to improve clinical outcomes of dysphagic patients.

References:
[1] Clavé, Pere, and Reza Shaker. "Dysphagia: current reality and scope of the problem." Nature Reviews Gastroenterology & Hepatology 12.5 (2015): 259. [2] Logrippo, Serena, et al. "Oral drug therapy in elderly with dysphagia: between a rock and a hard place!" Clinical interventions in aging 12 (2017): 241.

Keywords | Multidisciplinary team, drug dosage errors, error-avoiding strategies.
Conflict of interest: I have no potential conflict of interest to disclose.

SECTION 6: EDUCATION AND RESEARCH

COMPENDIUM OF POST-GRADUATE ITALIAN HOSPITAL PHARMACY SCHOOLS: AN INFORMATIONAL GUIDE OF ReNaSFO ASSOCIATION – NATIONAL NETWORK OF ITALIAN HOSPITAL PHARMACY SCHOOL STUDENTS

Authors: Antonio Pirrone, Federica Milani, Luca Cancanelli, Valentina Marini, Daniele Mengato, Roberto Langella

What was done?
"Compendium" project is designed to fill this lack and to gather information on post-graduate SHPs operating in Italy. In addition to outlining a summary description of the SHPs, the Compendium is configured as an official tool to respond and provide targeted information to near-graduates and graduates in Pharmacy (who often contact ReNaSFO) interested to approach the SHPs path.

Why was it done?
On October 5, 2017 the National Network of Italian Hospital Pharmacy School Students (ReNaSFO) was born with the aim to face the various critical aspects of post-graduate Hospital Pharmacy School (SHP), such as the need to make the different paths homogenous among regional SHPs, improve dialogue between colleagues and encourage a more informed approach focused to the training pathway for specialisation. In particular, little official information is available and hard to find about the different realities present in Italy.

How was it done?
Two project coordinators prepared a list of items submitted to representative ReNaSFO student in every 21 operating SHPs. The items refer to: available places and admission requirements, type of entry test, organisation of didactic lessons, exams and residency training, health facilities affiliated with SHP, potential availability of scholarships, useful links of the SHP or university. The help of universities was fundamental, in particular the helpfulness of SHP directors to collaborate with students.

What has been achieved?
As many as 18 SHPs out of 21 (85.71%) have joined the project: Bari, Bologna, Catania, Catanzaro, Camerino, Genoa, Florence, Milan, Modena and Reggio Emilia, Messina, Naples, Padua, Parma, Pisa, Rome, Siena, Turin and Sassari; of these, 14 schools have already sent their finished "Compendium" form.

What next?
Thanks to the widespread presence of associated ReNaSFO students, the initiative has immediately found interest and participation, reconfirming once again the active and unconditional collaboration between SHP students throughout Italy. Despite a heterogeneous situation between different SHPs, we keep working together hopeful to achieve national uniformity of SHPs and to improve educational objectives and training pathways.

Keywords | Educational tools, hospital pharmacy education, national standards.
Conflict of interest I have no potential conflict of interest to disclose.

DEVELOPMENT OF AN INTERNATIONAL EXCHANGE PROGRAMME IN HOSPITAL PHARMACY PRACTICE

Authors: Agnes Ann Feemster, Nicoletta Zallocco, Carlo Polidori

What was done?
A partnership between the University of Camerino (UNICAM), Camerino, Italy and the University of Maryland School of Pharmacy (UMSOP), Baltimore, Maryland, USA was formed. Under the agreement, the two universities exchange student pharmacists for five-week internships in hospital pharmacy.

Why was it done?
Development of pharmacy education on a global scale is an international initiative. Additionally, employers recognise that global experiences positively impact a variety of applicant qualities, including curiosity, willingness to take risks, a non-judgmental attitude, and a broader worldview. The goal of this collaboration is to expose students to the medication distribution system and role of the pharmacist in an international practice setting with an aim of developing a more well-rounded, culturally aware pharmacist.

How was it done?
A memorandum of understanding was implemented between the two universities in May 2018 with the first UMSOP student visiting in September 2018. A professor from each university co-coordinates the internship. UMSOP students self-fund travel while UNICAM students self-fund and seek university support; funding is a barrier to pursuing the experience. Housing logistics for the students is also challenging. UMSOP students

receive academic credit for the experience, requiring that the Italian site meet the advanced practice experience objectives.

What has been achieved?
The programme intended to exchange one-two students annually. After the inaugural student, eight UMSOP students pursued the UNICAM internship, resulting in six student placements at three Italian hospitals. One UNICAM student pursued a cardiology experience at an academic medical centre in Baltimore. UMSOP students perform a preceptor and site evaluation after the internship. 100% of students completed the evaluation with an overall evaluation score of strongly agree that the preceptor and site provided a positive experience. A structured interview with the UNICAM student indicated a greater understanding of clinical pharmacy practice and the role of a pharmacist on an interdisciplinary team, which may be used to further develop hospital pharmacy services in Italy.

What next?
This international exchange demonstrated a high degree of satisfaction among participants. While currently limited to students, this initiative should be considered for practising pharmacists. Sharing of best practices and the interchange of ideas may generate practice enhancements, lead to innovations, and stimulate personal growth.

Keywords | Educational programme, hospital pharmacy competencies, multidisciplinary team.
Conflict of interest | I have no potential conflict of interest to disclose.

INCLUSION OF PHARMACY STUDENTS IN AN INTERPROFESSIONAL TRAINING WARD PLACEMENT FOR HEALTHCARE STUDENTS IN SWEDEN

Authors: Matts Balgård, Maria Swartling, Srebrenka Dobrić, Lena Klarén, Lina Karlsson

What was done?
Final year undergraduate pharmacy students, specialising clinical pharmacy, were given the opportunity to spend two weeks of their six months pharmacy practice to participate in an interprofessional training ward placement (ITWP) together with medical, nursing and physiotherapy students. During this two-week clinical placement, the students were collaboratively responsible for managing the care of geriatric inpatients while under supervision of licensed practitioners.

Why was it done?
ITWP for healthcare students is established at various teaching hospitals. However, to our knowledge, no such programme in Scandinavia has included pharmacy students. Clinical pharmacy is a growing profession in Sweden and other healthcare students will in the future work alongside clinical pharmacists. Therefore we set out to add pharmacy students to the ITWP team, believing that it would be a valuable experience for them to collaborate and share knowledge with students from other healthcare professions. Equally important, it is a way to promote the pharmacist's competence and contribution to the multiprofessional healthcare team, prior to graduation.

How was it done?
A working group was formed consisting of teachers from the faculty of pharmacy, a student representative and a working clinical pharmacist. The group developed the initiative, including among other things, prerequisites, an evaluation plan, a workflow tool for clinical rounds, and suggested tasks for pharmacy students during the placement.

What has been achieved?
The programme has been running for three semesters and 6–8 pharmacy students have participated in the ITWP each semester. The initiative has been evaluated using surveys. Participating pharmacy students expressed gaining new knowledge and better insight into nursing care and the roles of the other professions. Nursing students appreciated the support in medication management and medical students found the pharmacy students to be valuable discussion partners that could challenge their drug-related decisions. Tutors expressed that the pharmacy students brought a beneficial dynamic to the ITWP team.

What next?
The opportunity for students from different professions to work together with a common objective in a real-life setting gives them valuable insight into each other's professional roles early in their careers. This good practice initiative could be used in other interprofessional training ward placements wishing to involve pharmacy students.

Keywords | Multidisciplinary team, hospital pharmacy education, training.
Conflict of interest | I have no potential conflict of interest to disclose.

AN OBSERVATIONAL MULTICENTRE STUDY TO PROMOTE INDEPENDENT CLINICAL RESEARCH AND EDUCATION TO YOUNG HOSPITAL PHARMACISTS: THE QOSMOS PROJECT

Authors: Daniele Mengato, Federica Milani, Laura Agnoletto, Nicoletta Freddi, Roberta Rampazzo, Vera Damuzzo

What was done?
In 2017 the Italian Society for Clinical Pharmacy and Therapeutics (SIFaCT) and the National Association of Hospital Pharmacy Students (ReNaSFO) established a join action to improve students' research competencies. To this end, we designed the QOSMOS study: "Quality Of life (QoL) in Multiple Sclerosis (MS): a Multicentre Observational Study".

Why was it done?
Recently, the national monitoring of Hospital Pharmacy Students (SHP) highlighted a lack of education in clinical research and in designing of independent studies among students. To fill this gap, we established a collaboration between Scientific Associations and Student Organisations.

How was it done?
The study has both educational and scientific objectives. Scientific objectives were to update data on QoL in MS and to correlate QoL to drug therapy. Regarding the educational challenge, every SHP participant received, by a panel of expert colleagues, the methodologic basis on observational studies and how to arrange teamwork activities. SHP could participate either as co-investigators or as members of teams which managed ethical approval, case report form (CRF), study monitor and data analysis. Investigators enrolled patients, collected clinical data and administrated a CRF, consisting of a questionnaire on QoL (MSQoL54).

What has been achieved?
22 SHP from 16 Italian centres, equally distributed from Southern to Northern Italy, joined the project. 20 SHP participated as co-investigators, one was included in the

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Scientific Committee of the study and 1 participated in the team dedicated to the Ethical Committee. We enrolled 341 patients with relapsing/remitting MS from May 2018 to June 2019 (median=20 per centre). The study achieved primary and secondary endpoints and pointed out a significant decrease in QoL related to physical health in patients treated with teriflunomide compared to other oral drugs (p=0.002).

What next?
Results will be presented in a scientific paper for submission to a peer-reviewed journal. This final aspect of the project has an educational goal once again, namely to bring young colleagues closer to writing and disseminating science. As QOSMOS gained good results, a new study investigating the role of clinical pharmacist in the Infectious Disease Department is starting with the goal to investigate optimisation strategies for treatment of HIV-positive patients.

Keywords | Patient satisfaction, education, health-related quality of life.
Conflict of interest | I have no potential conflict of interest to disclose.

GOOD PRACTICE INITIATIVES 2021

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SECTION 1: INTRODUCTORY STATEMENTS AND GOVERNANCE

IMPLEMENTATION OF PHARMACOLOGICAL CONSULTATION AS PART OF GERIATRIC TRAUMA TREATMENT

Author: Tanja Schicksnus

What was done?
The geriatric trauma centre aims to provide geriatric patients with the best possible peri- and post-operative care after a fall with a fracture so that they resume their usual life and environment after the hospital stay. The pharmacist joined the interdisciplinary team with the aim of a medication review for the often multi-morbid and multi-prescription patients.

Why was it done?
The team of the geriatric trauma center consists of an orthopaedic surgeon, geriatrician, nurse, physiotherapist, occupational therapist and a discharge management and diabetic nutrition expert according to the German Society for Orthopedic Surgery (DGU) and now also a pharmacist who performs risk screening for drug-related problems such as a fall, dizziness, cognitive impairment, conspicuous laboratory values, lack of appetite, etc. immediately after admission, in order to optimise drug therapy.

How was it done?
After the patient has been assigned to geriatric complex therapy according to the DGU criteria, the doctor requests a pharmacological consultation for this patient via the digital patient record. The pharmacist carries out a medication analysis with information from the record as well as bedside visits focusing on possible medication based problems.
Results are stored in the consultation report, serving as documentation and as the basis for later evaluation. Important information for immediate implementation is highlighted in the digital file and transmitted to the attending physician by telephone.
Once a week, the entire team meets, with the scope for each patient being: What are the remaining problems? How can these be solved (interdisciplinary)?

What has been achieved?
During four months, medication reviews were carried out for about 100 patients. In the areas of bleeding risk, anticholinergic adverse events, antibiotics, malnutrition, dose adjustments and medicines inappropriate for geriatric patients, for one third of patients corrections led to an improvement in patients. For nearly 10% of patients also a prescription cascade was resolved and some medical device training has increased drug therapy safety.

What next?
Future benefit evaluation will be carried out based on resumption of patients due to a fall, in the categories: time until next hospital admission, reason for next admission, adoption of optimised medication plan.

Keywords | Drug prescribing and dosing Prescription appropriateness.
Conflict of interest I have no potential conflict of interest to disclose.

LEARNING FROM SARS-CoV-2 EXPERIENCE TO FACE FUTURE EMERGENCIES: ELABORATION OF A HOSPITAL PHARMACY EMERGENCY PREPAREDNESS PLAN

Authors: Edoardo Calzavara, Elena Galfrascoli, Stefania Vimercati, Lorenzo Gambitta

What was done?
We decided to start a self-auditing process, and we aimed to realise an emergency preparedness plan and a procedure, created from our experience, which will be helpful to face future emergencies.

Why was it done?
The discovery of Coronavirus disease in 2019 and the subsequent outbreak in many countries and regions constituted in the first 5 months of 2020 a prominent issue worldwide: hospital pharmacists as well as other health care personnel were hit by the pandemic emergency and faced a great challenge. We as hospital pharmacists had to cope with shortages of drugs, disinfectants, test and reagents, Intensive Care Unit medical devices, and personal protective equipment. For this reason, we needed to start interventions to meet the needs of the frontline medical and nurse staff.

How was it done?
The starting point was our Hospital Pharmacy process map, which identifies all pharmacy activities. For each one, actions taken during the emergency were described. Regulations at local and national level were analysed together with literature and international statements about the hospital pharmacist's role during the health emergency.

What has been achieved?
We developed a process map in which we split up pharmacy activities into five large areas:
1. DIRECTION AND COORDINATION: team communication, role and responsibilities definition ("role mapping"); multidisciplinary external communication with hospital management facilities;
2. LOGISTICS AND ADMINISTRATION (purchase, management and distribution of medical products): an inventory of drugs, medical devices and diagnostics was created, especially for the ones essential to challenge the SARS-CoV-2 health emergency;
3. RESEARCH, GALENIC, "PATIENT CARE": therapeutic protocols, galenic preparation, studies, home-therapies distribution and communication with patients;
4. PHARMACOVIGILANCE: close monitoring of potential Adverse Drug Reactions (ADRs);
5. REGULATIONS AND LEGISLATION: Updating and intra-hospital divulgation.
From this emergency process we created an emergency preparedness plan and an internal procedure, in which, for every activity area, we assigned specific roles and responsibilities and set operating instructions.

What next?
The emergency preparedness plan developed from our experience during the SARS-CoV-2 emergency will allow hospital pharmacists to anticipate, plan, and prepare strategies in case of future health emergencies, due to biologic infective agents. Our and other hospital pharmacies will be able to overcome priority drugs shortages, to set a drug home delivery service, to offer extemporary solutions, and to communicate and inform patients.

Keywords | Management organisation of health services,

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quality process improvement, quality quality management system.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 2:SELECTION, PROCUREMENT AND DISTRIBUTION

A PROTOCOL FOR PLACEMENT AND REMOVAL OF PERSONAL PROTECTIVE EQUIPMENT IN A POSSIBLE CASE OF CORONAVIRUS SARS-CoV-2

Authors: Rebeca Iglesias-Barreira, Emilio Rubén Pego-Pérez, Carlos Sandoval-Aquino, Cristina López-Pardo y Pardo, Maria Jesús Rodríguez-Gay

What was done?
To develop a protocol for placement and removal of personal protective equipment (PPE), established for contact with possible or confirmed coronavirus SARS-CoV-2 infected patients, taking into account the medical devices (MD) available during the pandemic. Alternatives and strategies were also proposed for resources optimisation. Final protocol resulted from a multidisciplinary team work (Hospital Pharmacy Service team and Emergency Service workers). It was finally revised and approved by the Medical and Quality Direction.

Why was it done?
To guarantee workers safety as well as optimise the use of PPE in the hospital.

How was it done?
1. A systematic bibliographic review was made, for article selection on the placement/removal of PPE. Technical specifications of the available MD and the sanitary recommendations of the competent organisations were reviewed.
2. Establishment of PPE components, and the order of placement and removal:
   a. PPE placement:1-Wash hands (WH). 2-Place shims. 3-WH. 4-Put on the first pair of gloves. 5-Put on FFP2 mask. 6-Wear waterproof protective overalls from the feet. 7-Place garbage bags on feet and adjust them on legs. 8-Wash gloves with a hydroalcoholic solution (HS). 9-Put on second pair of gloves. 10-Put on a standard/reinforced surgical gown. 11-Wash HS. 12-Put on surgical mask. 13-Put on disposable gown. 14-Put on third pair of gloves. 15-Put on face protection screen. 16-Put on surgical cap and fit it over a face shield.
   b. PPE removal: a) Before leaving the isolation room: 1-Remove and discard bags from both feet. 2-Remove and discard disposable gown. 3-Remove and discard the outermost gloves. b) Outside the isolation room: 1-Wash HS. 2-Remove surgical cap and screen (reserve screen). 3-Remove and discard surgical mask. 4-Wash HS. 5-Remove the standard/reinforced surgical gown and reserve it. 6-Remove second pair of gloves. 7-Wash HS. c) Before entering the clean area: 1-Remove shoes. 2-Remove third pair of gloves. d) Go to the clean area: 1-Disinfect footwear. 2-Wash HS. 3-Remove monkey and if necessary reserve it. 4-Wash HS. 5-Remove FFP2 mask and reserve it if necessary. 6-WH.
   c. A team member reads and checks all steps carried out during the all steps procedure.

What has been achieved?
The protocol was followed by 54 (100%) workers. Since its implementation, on March 16, only 3.7% (n=2) of workers were infected by SARS-CoV-2.

What next?
The protocol is under constant revision and modification to adapt it to the available MD in every moment.

Keywords | Hospital setting, multidisciplinary team, medical device, Medical device, quality Protocols & guidelines.
Conflict of interest: I have no potential conflict of interest to disclose.

HORIZON SCANNING IN DENMARK: PROVIDING THE HEALTH CARE SYSTEM WITH AN OVERVIEW AND IMPACT ESTIMATION OF NEW MEDICINES

Author: Helle Brauner

What was done?
Amgros, a part of the Danish health care system, has secured the supply of medicines and hearing aids to public hospitals and hearing clinics across Denmark for 30 years. This is done through efficient procurement and tendering procedures, creating economies of scale and savings.
In addition to this, in January 2017, Amgros launched its own Horizon Scanning unit. Now, the Danish Horizon Scanning system provides the health care system with an overview of medicines, indications and extensions e.g. pharmaceutical forms expected to be entering the Danish market within the next 2–3 years.

Why was it done?
There was a need for improved planning and preparing processes, as when it comes to price negotiations and estimates on financial burden and strategic procurement.

How was it done?
In 2016, it was decided to establish an Horizon Scanning system in Denmark. Then, input from internal and external stakeholders regarding their needs and expectations were gathered.
The outputs from the Horizon scanning unit consist of an overview of medicines about to reach the Danish market, as well as estimates of costs for new, expensive medicines and possible savings, for example, if there are cheaper biosimilar drugs on the market. We also assess the potential patient population and location of treatment. This is done in close cooperation with several Danish clinicians.
Sources for verifying and validating the data inputs are primarily EMA, complemented with commercial databases and a niche group of other sources. Data are gathered in a database.

What has been achieved?
The outputs enable our stakeholders to better plan the introduction of new medicines, to secure more cost-effective health solutions for everyone and to achieve more health for money in the Danish hospital setting.
Danish Regions, the interest organisation for the health care regions, use the estimates in their annual negotiations with the Government on finances and the individual regions use them in their own budgets.
The predictability this system brings to Denmark is key in a future with more rare diseases, treatments and advanced pricing.

What next?
The Horizon scanning function is continuously being developed to meet the needs of our stakeholders, as we want to enable them in providing health care to the Danish citizens.

Keywords | Drug information databases, management budget impact, procurement and market acess, tendering.

Conflict of interest I have no potential conflict of interest to disclose.

DEVELOPMENT OF AN IT TOOL TO ESTIMATE THE THERAPEUTIC NEEDS OF HOSPITALISED PATIENTS WITH COVID-19 INFECTION BASED ON SIR EPIDEMIOLOGICAL MODEL

Authors: Daniele Leonardi Vinci, Adriano Meccio, Alessio Provenzani, Piera Polidori

What was done?
We created a tool to perform a timely estimation of the drug needs to treat COVID-19 patients based on epidemiological forecasting.

Why was it done?
The COVID-19 pandemic unprecedently challenged National Health Services to assure adequate patient care, despite a constantly escalating drugs demand. This complex situation requires appropriate planning to avoid misleading estimations, which would have consequences on patients and overall resources available.

How was it done?
The tool's epidemiological forecasting was based on a compartmental model in which the population is divided into three compartments (Susceptible-Infectious-Removed, SIR), and transmission parameters are specified to define the rate at which persons move between stages. The appropriate data entry was guaranteed by the creation of a form in which users can enter information regarding: The population considered, the R0 calculation, the number of already known infected cases, the application of Non-Pharmaceutical Interventions, and the number of hospital beds. The drugs needed for the forecasted patients was calculated according to a list of critical care drugs compiled by consulting previous published scientific works, national and international guidelines. The list includes 51 drugs belonging to different therapeutic groups, such as: antiarrhythmics, antibiotics, antipyretics, antivirals, heparins, IV-fluids, local anaesthetics, neuromuscular blockade agents, sedative agents and vasopressors. For each drug the percentage average ICU uptake for therapeutic group and active principle was estimated.

What has been achieved?
A tool consisting of an Excel template, that, based on the information inserted, automatically calculates the number of patients classified by the intensity of care (hospitalised not-ICU, hospitalised ICU, ventilated, intubated or with shock) and creates a table that includes, for each drug to be used, the following information: therapeutic group, active principle, dosage considered, pharmaceutical form, total dosage for patients considered and total quantity of unit doses for patients considered. The tool is also made adaptable to different clinical situations, through the possibility of editing the assumptions adopted regarding the epidemiological and therapeutical parameters or the inclusion of new items in the drugs list.

What next?
Our tool represents an opportunity for the immediate and efficient estimation of the drugs necessary to assist COVID-19 patients during emergency scenarios. It will be periodically updated as new evidence becomes available.

Keywords | Drug distribution and supply, stock control, drug selection, drug selection, management, technology implementation.
Conflict of interest | I have no potential conflict of interest to disclose.

OPIOIDS STOCK OPTIMISATION UTILISING AUTOMATIC DISPENSING SYSTEMS DURING AND AFTER COVID-19 PANDEMIC

Authors: Marina Rodríguez Marín, Hilario Martínez Barros, María del Rosario Pintor Recuenco, Beatriz Montero Llorente, Ana María Álvarez Díaz

What was done?
A procedure was implemented to optimise the stock and manage the quarantine of opioids in Automatic Dispensing Systems (ADS) during and after their use in hospital units hosting COVID-19 patients.

Why was it done?
It was done in order to optimise opioids stock to meet the needs of COVID-19 patients and protocolise the correct quarantine without modifying the computerised registration in the 39 ADS.

How was it done?
As hospitalisation units were being adapted to host COVID-19 patients, opioids stock had to be modified to meet their new demands. Reversely, when hospitalisation units were recovered to host their usual type of patient, the opioids had to be replaced and quarantined for 10 days, according to our Preventive Medicine Unit. All these movements were recorded. We followed this process:

1. Physical and computerised unloading of opioids without dispensing in recent months and emptying of the returned drawer (storage space for opioids withdrawn from the ADS which were not used).
2. Relocation to hospitalisation units hosting COVID-19 patients.
3. Replacement of all (minidrawers) where opioids were kept with clean ones.
4. Quarantine in the Pharmacy Service, for the drugs unloaded which were unable to be immediately relocated.
5. Cleaning and sanitising of the removed minidrawers from COVID-19 hospitalisation units' ADS to be used in the next conversion.

What has been achieved?
29 ADS of the 39 available in the hospital were optimised.
Given the decrease in COVID-19 admissions during May, the hospital made a schedule to return to normality which allowed it to leave 5 ADS in quarantine without the need to unload or replace any drug,. The other 24 ADS had to be cleaned and disinfected,. It led to the physical unloading of 182 specialties (a total of 1519 units), the physical and computerised unloading of 124 specialties (850 units) and the emptying of the returned drawers (18 specialties and 20 units). 504 minidrawers were replaced by other cleaned and disinfected ones and 298 specialties (2080 units) were replaced.

What next?
Enhancing our protocol to allow us to spend more time with the patients in COVID's further waives.

Keywords | Drug distribution and supply, automated dispensing system, drug group, N02 - analgesics, quality process improvement.
Conflict of interest | I have no potential conflict of interest to disclose.

Indicates GPI award nominee

IMPLEMENTATION OF A TELEPHARMACY PROGRAMME TO HOSPITAL OUTPATIENTS DURING THE COVID-19 PANDEMIC

Authors: Rosalia Fernández-Caballero, Virginia Collados Arroyo, Clara Herranz Muñoz, Araceli Henares López

What was done?
During the COVID-19 pandemic, we designed and implemented a telepharmacy programmme to ensure access to medication for all patients.

Why was it done?
Every month, an average of 700 patients receive pharmaceutical care in the outpatient consultation (OC) of our first-level hospital. Given the mobility restriction measures applied by the Spanish government during the pandemic, access to this consultation was difficult for some patients. The aim of this programme is to ensure the access to medication for all patients and prevent them and professionals from virus exposure. The Telepharmacy programme consists of providing pharmaceutical care based on available means of communication and access to medication through home drug delivery.

How was it done?
Once weekly, the pharmacist contacted the listed patients during the following week in OC by telephone or via the hospital's electronic platform, to offer the possibility of participating in the programme. During teleconsultation, the pharmacist provided the same attention as in face-to face consultation: administrative situation of the patient, adequate medical follow-up, assessment of adherence, review of interactions and adverse events and treatment changes. Moreover, we emailed the patient's consent for home drug delivery by an external company. In case the patient didn't have a web mail, we requested verbal consent. Once a week, one pharmacy technician prepared the medication and the selected company performed the home delivery in guaranteed storage conditions. To minimise the burden of work, the medication was sent for 2 months per patient. Onco-haematological patients, who came to their doctor's appointment every month, were excluded from this programme.

What has been achieved?
Between March 20 and October 9, we have included 595 patients in this programme and conducted 1190 teleconsultations and 872 home drug deliveries with a great satisfaction of outpatients.

What next?
Our next step is to improve the web system for sending alerts through our electronic platform to automate the home delivery process and thereby to reduce the logistic burden of the pharmacist and to increase the pharmaceutical care given to patients.

Keywords | Drug dispensing, dispensing, drug dispensing, dispensing drugs, drug distribution and supply, delivery performance.

Conflict of interest | I have no potential conflict of interest to disclose.

RESOURCES OPTIMISATION OF LOPINAVIR/RITONAVIR IN THE SANITARY EMERGENCY DUE TO SARS-CoV-2 IN A THIRD-LEVEL HOSPITAL IN THE ULTRA-PERIPHERY

Authors: Lierni Goitia Barrenetxea, Natalia Toledo Noda Moisés Pérez León, Victoria Morales León

What was done?
Optimising the use of lopinavir/ritonavir solution during the state of sanitary emergency.

Why was it done?
Lopinavir/ritonavir is an HIV-1 and HIV-2 protease inhibitor indicated for HIV. It was used in patients with a positive SARS-CoV-2 test after being recommended by the Chinese health authorities. The hospital protocol guideline was: 400/100 mg every 12 hours orally. It was presented in both tablets and oral solution, which was reserved for patients intubated in the ICU and those who were not able to take tablets.

How was it done?
Descriptive study of resources optimisation for lopinavir/ritonavir and actions carried out to ensure the availability of the antiviral in intubated SARS-CoV-2 positive patients. Preparation and stability data were obtained from official sources (Spanish Agency for Medicines and Health Products) and from the Spanish Society of Hospital Pharmacy.

What has been achieved?
The Pharmacy Service designed a protocol to repackage lopinavir/ritonavir 80/20 mg/mL solution in syringes containing the exact amount for a single dose (400/100 mg in 5 mL), for single use. The solution is formulated on an alcohol basis and there is an interaction with the polyurethane nasogastric tube because the polyurethane absorbs alcohol causing the catheter to swell and deteriorate, which is why other services were notified to use polyvinyl chloride catheters or silicone. Likewise, the syringes used to repackage the solution were exclusive for oral administration used in paediatrics, with the aim of reducing medication administration errors, since it is not possible to connect parenteral injection needles with them. These measures were intended to make the dispensing system as efficient as possible, as once the drug entered a unit with patients with a positive test, it was contaminated, therefore it could not be reused. Additionally, the fact that the hospital is located on an island made it even more difficult to acquire the medicine, given the supply problems nationwide, the great restriction of air and maritime traffic and loan limitations from other hospitals.

What next?
The measures adopted managed to ensure the availability of lopinavir/ritonavir solution in all admitted patients, optimising the scarce availability of a solution medication whose presentation is formulated in multidose containers. By adding the use of syringes for exclusive oral use, administration errors were prevented.

Keywords | Drug administration, nasogastric tube, drug distribution and supply, drug packaging, drug safety›Drug interaction.
Conflict of interest | I have no potential conflict of interest to disclose.

REMDESIVIR SHORTAGE DURING SARS-COV2 PANDEMIC: A REGIONAL APPROACH

Authors: Francesca Venturini, Olivia Basadonna, Roberta Rampazzo, Girolama Iadicicco, Giovanna Scroccaro

What was done?
A controlled regional distribution of remdesivir (Veklury) was implemented by the Veneto Region, Italy, through the hospital pharmacies network, using a regional distribution centre located at the hospital pharmacy of the Padova University hospital.

Why was it done?
Remdesivir is the first authorised medicine by the European Medicine Agency (EMA) for SARS-Cov-2 treatment. In the first place, remdesivir was supplied exclusively in the context of the Emergency Support Instrument by the European Committee. A limited number of treatments were available to each member state, before Veklury marketing. Also after the national procurement process, through the joint procurement agreement by the EU, the number of vials was limited.

How was it done?
In the first shortage phase, the Italian Medicine Agency (AIFA) defined the selection criteria for the use of remdesivir, based on clinical trials evidence. A centralised authorisation procedure was implemented: each hospital was requested to send daily individual prescriptions through the local hospital pharmacy, to a dedicated AIFA email address.
After AIFA authorisation, the Ministry of Health forwarded the authorisations to the regional distribution centre, for drug distribution.
A map of hospital pharmacies references (e.g., pharmacist name, hospital postal address, mobile phone, presence of the pharmacist on duty, etc) was created, in order to quickly contact them for the distribution of the authorised therapies.
The regional distribution centre took charge of the authorised therapies and provided a personalised distribution to all the hospitals in the region. Each day the Ministry of Health warehouse replaced the stock of the regional distribution centre.

What has been achieved?
in a 3-week period, the regional distribution centre dispensed therapies for 87 patients to 17 hospitals in the region. In two cases a zero stock of vials was managed with the reallocation of experimental drugs left by closed clinical trials and compassionate use programmes, both authorised by AIFA and the manufacturer.

What next?
in the second phase of the shortage, single patient prescriptions will be validated by local hospital pharmacists in a national electronic registry. On a by-weekly basis, the infectious disease regional network will audit treated cases, to verify inclusion criteria and discuss future approaches. A centralised distribution will be maintained, allowing a small stock in each hospital for emergency use.

Keywords | Drug distribution and supply, drug shortage.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 3: PRODUCTION AND COMPOUNDING

HAZARDOUS DRUG ENTERAL DEVICE

Authors: Vidal Carlos

What was done?
We developed a new medical device to protect caregivers from exposure risk derived from crushing and dispersing in water hazardous drugs tablets.

Why was it done?
We designed a new medical device by combining existing issues so as to develop a workable solution that could overcome this safety problem and ensure the compliance with occupational regulations and ensure a complete dosage.

How was it done?
We designed a new medical device by combining existing issues so as to develop a workable solution that could overcome this safety problem and ensure the compliance with occupational regulations, and ensure a complete dosage.

What has been achieved?
We patented a new medical device that will allow a safe administration, reducing exposure risk and environmental pollution at: pharmacy departments (cross contamination in cabinets), nursery units and even at patient's homes to protect caregivers and relatives.
Its design and simplicity of operation will favour its universalisation.
https://www.youtube.com/watch?v=maWWR_Ij91g
This is an initiative of a hospital pharmacist to solve a daily problem and an example of the potential for healthcare innovation.

What next?
The commercialisation of this medical device will fulfill an unmet need in our daily practice at healthcare facilities and patients' homes.

Keywords | Drug administration, enteral drug administration, nasogastric tube, preparation and compounding, closed system transfer device.
Conflict of interest | I have no potential conflict of interest to disclose.

Indicates GPI award nominee

BEST PRACTICES FOR THE IMPLEMENTATION AND USE OF THE APOTECAchemo TECHNOLOGY AGREED BY THE GERMAN HOSPITAL PHARMACY USER GROUP

Authors: Bastian Mende. Irene Krämer, Jannik Almasi, Christoph Klaas, Bernhard Rainer Kujau, Swantje Eisend, Herwig Heindl, Jacopo Raffaelli, Jochen Schnurrer

What was done?
Robotic systems, designed for the aseptic preparation of ready-to-administer parenterals in hospital pharmacies, should facilitate a fully integrated workflow and a process organisation interconnecting the automated and manual preparation. Despite some differences between the hospital pharmacies, the definition of standards and Best Practices for the automated compounding of cytotoxic preparations facilitates the implementation of the technology in different hospital pharmacies.

Why was it done?
During a two-day meeting in September 2018, the German community of APOTECAchemo users and technology experts developed Best Practices for the optimal implementation and subsequent application of APOTECAchemo technology in pharmacy based aseptic preparation of ready-to-administer antineoplastic medicinal products.

How was it done?
Prior to the meeting of the user group a survey with 24 statements for the implementation and use of the APOTECAchemo technology was sent to the German APOTECAchemo users. The 24 Best Practices were assigned to four categories: Workflow & Organisation, Production, Roles & Responsibilities, and Quality & Process Control. The survey participants evaluated the proposed Best Practices in view of the practicability in German hospital pharmacies. During the meeting, results of the survey were consented or adapted and additional best practices were defined.

What has been achieved?
The German user group defined the Best practices for the implementation and use of APOTECAchemo technology. The most relevant result for each of the four categories is:

- Workflow and Organisation: The automated preparation should reduce the daily workload of manual preparation and minimise potential errors.
- Production: Optimum interconnection between technicians and the robot will increase the efficiency.
- Role and responsibilities: Pharmacists are responsible for the design of the automated production workflow, while technicians become the manager of the automated compounding process.
- Quality & Process Control: Microbiological controls must be performed during manual and automated production.

What next?
The best practices defined by the German APOTECAchemo Community support experienced users and are especially useful for hospital pharmacies newly implementing the technology.

Keywords | Preparation and compounding, cytostatic preparations.

Conflict of interest | I have no potential conflict of interest to disclose.

DEVELOPMENT OF A STANDARDISED PAEDIATRIC PARENTERAL NUTRITION FOR THE FIRST DAYS OF LIFE OF A TERM OR PRETERM NEWBORN

Authors:Isabelle Sommer, David Palmero, Céline Julie Fischer-Fumeaux, Lydie Beauport, Vincent Adamo, Hervé Schwebel, Pascal Bonnabry, Lucie Bouchoud, Farshid Sadeghipour

What was done?
A standardised paediatric parenteral nutrition (PN) solution for the first days of life of newborn infants has been developed. An industrial partner manufactures the ready-to-use double-chamber bag which is available 24/7 and of high-quality, allowing a secured administration as well as a reduction of medication errors (ME).

Why was it done?
PN can be composed of about 50 different ingredients, whereof the majority are amino acids (AA). Therefore, PN represents a complex and high-risk fabrication. ME are often related to PN and may include prescription, transcription, preparation, and administration errors. As the treatment with PN is indispensable for good cerebral and neurologic development as well as postnatal weight gain, ME can result in growth retardation, developmental disturbances, and infections. This project was performed with the aim to reduce ME having an impact on vulnerable newborns and to improve the security and quality of their nutritional treatment.

How was it done?
A working group composed of pharmacists, clinicians, neonatologists, and industrials developed a PN solution for the first days of life of newborn infants conforming to the needs of two different neonatal services. An applied standardised PN and the ESPGHAN guidelines have been used as references. The feasibility of an industrial production of double-chamber bags has been evaluated and implemented.

What has been achieved?
The developed PN solution has been formulated for a peripheral venous administration with an osmolarity under 900 mOsm/L to allow a wider range of application. The production of double-chamber bags has been chosen to increase the stability and shelf-life. The first compartment contains an AA admixture and the second compartment contains glucose and electrolytes (sodium, calcium, organic phosphate). This solution is initially produced by the service of pharmacy and afterwards by the industrial partner. The standardised PN bag was implemented successfully on the neonatal ward in March 2019. Since then, almost 1800 standardised bags have been used (appr. 90 bags/month), resulting in a reduction of individual on-ward PN preparations of nearly 80%.

What next?
Further standardised PN for newborn infants need to be developed to allow a safe nutritional treatment. On-ward PN preparations must be prohibited to prevent undetectable preparation errors.

Keywords | Drug administration, ready to use, drug prescribing and dosing, prescribing errors, preparation and compounding, manufacturing.
Conflict of interest | I have potential conflict of interest to disclose *

Disclosure statement:
This is a collaborative work of two university hospitals who apply the developed product and a contractual industrial partner who manufactures it for the Swiss market only as "formula hospitalis".

GOOD MANUFACTURING PRACTICE AND CHEMOTHERAPY PREPARATION: A CASE STUDY ON IMPLEMENTATION OF A ROBOTIC SYSTEM IN A DANISH HOSPITAL PHARMACY

Authors: René Rasmussen, Arnela Ajanovic, Anni Christensen, Federico Belegni, Matteo Federici

What was done?
A robotic system for aseptic preparation of cytotoxic drugs was implemented in the pharmacy-based, Grade C cleanroom compliant with Good Manufacturing Practice (GMP). Specific work organisation allowed the integration of APOTECAchemo into the pharmacy workflow, thereby steadily improving the robot productivity.

Why was it done?
In 2017, the hospital pharmacy started a project for automated chemotherapy preparation aimed at managing the increasing workload, while ensuring the highest level of quality and healthcare worker safety. In Denmark, the authorities expect hospital pharmacy preparation to be GMP compliant. To achieve the best implementation of APOTECAchemo, go-live was preceded by a thorough qualification process and followed by robot performance evaluation in a GMP-pharmacy.

How was it done?
A multidisciplinary team defined 228 User Requirements Specification (URS) addressed in the tender and associated to GMP regulations to assess that the technology complied with the intended purpose. APOTECAchemo passed through all qualification stages: design qualification (DQ), factory-acceptance testing (FAT), installation qualification (IQ), site-acceptance testing (SAT), operational qualification (OQ), performance qualification (PQ). The implementation of the robot was evaluated in terms of doses prepared, active ingredients processed, and % of the total production compounded. Data were taken from the management software and examined from June 2019 to September 2020.

What has been achieved?
The qualification process was completed in 13 months (from April 2018 to May 2019). APOTECAchemo fulfilled the requirements set in accordance with GMP regulations and went live in May 2019. In the first 15 months of operation, 20,968 doses were prepared with the robot, comprising 18,242 infusion bags (87%) and 2726 elastomeric pumps (13%). The number of active ingredients processed were 21, of which five (5-fluorouracil, calcium folinate, irinotecan, gemcitabine, carboplatin) covered 58% of the total production. Average production of the robot increased by 39%, from 963 doses/month in 2019 to 1582 doses/month in 2020. The % of the total production operated by APOTECAchemo rose from 20.9% (2019) to 46.4% (2020).

What next?
APOTECAchemo robot was successfully implemented in a fully GMP-compliant hospital pharmacy, thereby enabling the automation of the preparation process and the reduction of the manual operations. Through the evaluation performed, the hospital pharmacy decided to install a second robotic system to further enhance the automated production.

Keywords | Drug group, L01 - cytostatics, preparation and compounding, compounding robots, QC/QA›Good manufacturing practice (gmp).
Conflict of interest: I have no potential conflict of interest to disclose.

OUTPATIENT ADMINISTRATION OF DOSE-ADJUSTED ETOPOSIDE, PREDNISONE, VINCRISTINE, CYCLOPHOSPHAMIDE, DOXORUBICIN (DA-EPOCH) FOR NON-HODGKIN LYMPHOMA

Authors: Marianna Rivasi, Gregorio Medici, Lucia Ricchi

What was done?
DA-EPOCH (etoposide, prednisone, vincristine, cyclophosphamide and doxorubicin)-based chemotherapy is traditionally administered in the inpatient setting because of its complex protocol and number of involved medications. These routine admissions are costly, disruptive and isolating to patients. Here we describe our experience transitioning from inpatient to outpatient setting.

Why was it done?
Because of the need to administer DA-EPOCH over a continuous 96-hour period, patients are traditionally hospitalised. Frequently, these admissions may be delayed because of bed shortages. Previous studies have shown that EPOCH-containing regimens can be safely administered in the outpatient setting, thus decreasing inpatient bed use and overall health care costs. Home-based chemotherapy is normally preferred by patients and helps reduce the risk of hospital-acquired infections; furthermore, other aspects such as functional decline and social isolation are minimised. Beginning in August 2019, we introduced an outpatient EPOCH-based chemotherapy model with portable infusion pumps and have already treated 9 patients.

How was it done?
We purchased three CADD-SOLIS infusion pumps (Smiths Medical) and connected them to the bags containing chemotherapy. One of the main issues we observed in this procedure was the flow disturbances due to the presence of small air bubbles in the pump delivery line so we tried to develop a method aiming to reduce this effect.
We changed the first type of device we used with a new one consisting of an irreversible spike needle-free access to IV bag (BTC, Italia) inserted to the medication port of the bag. Into the spiking port we insert the CADD High-Volume administration set. It is crucial to remove all the air inside the IV bag and make sure there is no extra air injected into the bag when adding medication; finally do not forget to fully prime the tubing.

What has been achieved?
Outpatient EPOCH administration was associated with cost savings of approximately 400.000€ for both chemotherapy costs and hospital day avoidance (45 days). In addition to cost savings, outpatient administration improves patient satisfaction, without any apparent decrement in treatment efficacy.

What next?
Outpatient treatments would lead to changes in how both

patients and providers relate to cancer care. Transitioning care out of the hospital and related cost reduction allowed for additional investments in public health.

Keywords | Hospital setting, hospital-home transition, preparation and compounding, drug formulation, preparation and compounding, preparation.
Conflict of interest I have no potential conflict of interest to disclose.

COMPARISON OF ENVIRONMENTAL CONTAMINATION WITH CYTOSTATICS IN FOUR AUSTRIAN HOSPITALS AND IMPLEMENTATION OF A STANDARDISED TRAINING ABOUT SAFE HANDLING OF ANTINEOPLASTIC AGENTS ON THE WARD

Authors: Martin Munz, Ewelina Korczowska, Maria Costa,,Christine Petter, Shahla Farokhnia, Katharina Kronister, Sandra Dunkler, Thomas Schweiger, Martina Anditsch, Martina Jeske

What was done?
Hospital pharmacists of four Austrian hospitals (Vienna General Hospital, Innsbruck University Hospital, Landesklinikum Horn-Allentsteig, and Landesklinikum Zwettl) differing in size, logistic requirements and production capacity, equipment (but all using Closed System Devices), and involved staff participated in the MASHA (Research about Environmental Contamination by Cytotoxics And Management of Safe Handling Procedures) project of the European Society of Oncology Pharmacy (ESOP).

Why was it done?
Several studies show that contamination with cytostatics is found on various work surfaces in hospitals [e.g., Chauchat L et al. 2018, Hon CY et al. 2014]. Wipe sampling for surface residue of antineoplastic and other hazardous drugs in healthcare settings is currently the method of choice to determine the workplace's environmental contamination with these drugs [Connor TH et al. 2016].

How was it done?
In the first part of the project, surface contamination by cytostatics was investigated using wipe samples. Subsequently, training materials were developed and used for uniform training of medical staff involved in administering antineoplastic drugs. After the training, a second set of wipe samples of the same surfaces were taken and analysed.

What has been achieved?
All four hospitals' results in the first series of measurements were below the reference value given in the project of 0.1 ng/cm^2, indicating "low" contamination. Only a small amount of samples show values between the limit of quantification (LOQ), dependent on the substance and analytical method, and 0.1 ng/cm^2. The same is for the second series of wipe samples after the training. Considering that standards, recommendations or training by pharmacists or occupational health professionals have already been in place before this project, the impact of further training for the medical staff could not be quantified by measuring the residues. However, feedback from trained staff was exclusively positive, and our main objective to demonstrate that occupational exposure with cytostatics is low to non-detectable on our wards was achieved.

What next?
We want to encourage more hospitals to get involved in similar projects, and we hope that more powerful analytics will give us more answers for proper handling.

Keywords | Preparation and compounding, closed system transfer device, preparation and compounding, environmental contamination, preparation and compounding, wipe sampling.
Conflict of interest | I have no potential conflict of interest to disclose.

SARS-CoV-2 SPECIMEN COLLECTION KITS: MAINTAINING SUPPLY THROUGH IN-HOUSE PRODUCTION

Authors: Nikolaus Lindner, Doris Haider

What was done?
During the first wave of SARS-CoV-2 infections the hospital pharmacy of Clinic Favoriten, Vienna's specialised Covid-19 centre, assembled specimen collection sets manually to meet rising demands, compensate for shortages and secure vital diagnostics supply.

Why was it done?
In Austria, Covid-19 infection rates began to increase in March. At Clinic Favoriten, over 700 patients were treated during the first wave. This resulted in an increasing demand of specimen collection sets. Even though various wholesalers and contractors were contacted, the orders could not be served in a quantitative or timely manner. These circumstances forced the pharmacy to look for alternative solutions.

How was it done?
In collaboration with the laboratory department and other clinics of the Vienna health care group, appropriate materials with CE-certification were sought to assemble a set that is easy to handle concerning production, distribution and application. Sterile plastic tubes were filled aseptically with physiologic saline and labelled. Tubes and sterile swabs were then packed in a plastic bag that was sealed with a label providing general instructions for use. Manufacturing protocols as well as batch documentation ensured quality assurance and traceability.
Major obstacles included availability and suitability of the needed materials. Manufacturers of tubes and swabs had to be changed over time, which required close communication with medical wards and the laboratory department.

What has been achieved?
Over a period of 7 weeks 2033 specimen collection sets were assembled. In detail, a total of 20,330 swabs were packed and 10,165 tubes were filled. Through this measure a continuous supply of specimen collection sets, essential for further COVID-19 testing, was secured.
Moreover, the importance of a pharmacy in-house production with the aim of maintaining supply security was acknowledged throughout the entire hospital.

What next?
The initiative has demonstrated that pharmacists play a vital role in handling product shortages and maintaining supply security. In the future, the pharmacy will be reinforced to monitor trends even more and will thus be able to balance changing demands and non-availabilities. Like this, the existence of an in-house pharmacy department securing appropriate supply will gain more and more significance. In times of increasing shortages, the initiative serves as a model for other healthcare systems confronted with similar difficulties.

Keywords | Drug distribution and supply, drug shortage, drug group, V04 - diagnostic agents, preparation and compounding, aseptic preparation.
Conflict of interest | I have no potential conflict of interest to disclose.

STANDARD OPERATING PROCEDURES FOR URGENT CHEMOTHERAPY MIXTURE PREPARATION BY NON-EXPERIENCED STAFF

Authors: Ana Marín-Romero, Inés Monge-Escartín, Esther Carcelero-San Martín, Gisela Riu-Viladoms, Rubén González-García, Jaume Planas-López, Dolores Merino-Calderón, Rodolfo Juncos-Pereira, Carolina Lesta-Domene, Carmen López-Cabezas, Dolors Soy

What was done?
The oncohematology pharmacy team created a visual guide aimed to pharmacy personnel who do not routinely work with intravenous mixture preparations. This guide includes instructions about parenteral cytotoxic drug preparation for chemotherapy regimens that should be immediately initiated.

Why was it done?
Cytostatics are hazardous drugs that must be prepared under safe and sterile conditions. In some life-threatening situations, there is an urgent need to initiate chemotherapy immediately. However, not all hospitals have experienced personnel in safe-handling cytotoxic drugs for 24 hours and 7 days per week. The objective is to create a consensual protocol to be used when immediate start of chemotherapy is required, and preparation must be done out of working hours of specialised pharmacy staff. A secondary objective is to confirm that non-experienced staff can prepare cytostatics safely and to guarantee their quality by following this protocol.

How was it done?
Urgent regimens were agreed with clinicians. They are: (i) fixed-dose intrapericardial cisplatin, (ii) intravenous carboplatin and etoposide, (iii) intravenous cisplatin and etoposide, (iv) intravenous cyclophoshamide, and (v) fixed-dose intravenous daunorubicin. For schemes with different possible doses, fixed banding doses were agreed with clinicians.
A visual guide with images of all the material and preparation steps (including labelling, packaging and protection measures), for each scheme, was developed and attached to a prescription form to be completed by the physician and associated with a material kit that contained personal protective equipment, expendable material, cytostatic vials and serum bags.
The guide was distributed to pharmacy personnel external to the preparation area, accompanied by a training session. Selected trained workers were supervised while preparing the mentioned cytostatic drugs in a simulated-base patient scenario.

What has been achieved?
All the cytostatic drugs were prepared correctly reaching a maximum preparation time of 45 minutes since the physician's prescription. The personnel involved maintained all the specified protection measures and reported feeling confident while doing cytostatic manipulation.
The guide proved to be useful to cover a possible urgent chemotherapy treatment outside the stipulated work schedule.

What next?
Re-training in safe-handling of cytotoxic drugs should be ongoing with regular updates to ensure a proper follow-up of this guide. This work methodology could be extrapolated to other pharmacy areas with similar needs.

Keywords | Drug safety, drug safety, preparation and compounding, cytostatic preparations, preparation and compounding, safety cabinets.
Conflict of interest | I have no potential conflict of interest to disclose.

INTEGRATION OF CLINICAL TRIALS MANAGEMENT INTO A SAFE AND FULLY-AUTOMATED ONCO-HAEMATOLOGY WORKFLOW

Authors: Francesca Vagnoni, Andrea Marinozzi, Sabrina Guglielmi, Chiara Capone, Francesca Mura, Adriana Pompilio, Simone Leoni

What was done?
In 2018, a clinical trial (CT) managing system (APOTECAtrial) was integrated into the existing fully-automated workflow of the chemotherapy production unit. APOTECAtrial was developed to enable real-time visualisation of CT-related data and trace the processing of investigational (IMP) and non-investigational (NIMP) medical products, such as delivery, assignment, preparation, return, and disposal.

Why was it done?
The management of CT requires thorough documentary evidence and a well-organised reporting system in compliance with the Good Clinical Practice. Since 2009, the entire onco-haematology workflow is fully-controlled by information technology devices and robotic systems to prevent medication errors and guarantee data integrity. The implementation of APOTECAtrial was aimed to extend the same level of control to CTs.

How was it done?
A team of hospital pharmacists, physicians, clinical data managers, and IT specialists analysed the CT workflow and defined the system specifications. Data related to IMP/NIMPs (both for parenteral and oral administration), patients enrolled, and investigator/sponsor affiliations were entered into APOTECAtrial and sorted by CT. The onco-haematology unit's electronic prescribing system was bidirectionally interfaced with APOTECAtrial. Aseptic preparation of patient-specific injectable therapies was implemented in the supporting device for manual preparation that checks dosage accuracy and identity by photographic and barcode recognition.

What has been achieved?
Since 2018, the overall number of CTs managed was 95. In total, 81 IMPs/NIMPs and 135 patients were entered into the system, while 2740 injectable therapies were prepared, and 690 oral medications and 60 pre-filled syringes delivered. The following major objectives were achieved: automated inventory accounting and stock management, reduced manual time-consuming activities (i.e., documentation, transcription), standardised reports in digital not-editable format, and full traceability. In addition, the audit trail tool tracks all user edits and changes performed at any stages of the CT management by electronically recording the user's name, date, and time. APOTECAtrial was evaluated by clinical research associates (CRA), clinical research

organisations (CRO) and CT sponsors and approved for use in the daily clinical practice.

What next?
The project represents a good example of multidisciplinary collaboration focused on improving the quality of the processes in healthcare settings. The implementation of information technology and automation ensures improved data integrity, safety, and working efficiency, which are key determinants for managing CTs in hospital pharmacies.

Keywords | Clinical pharmacy, clinical trials,p reparation and compounding, automated production, quality, quality improvement.
Conflict of interest | I have no potential conflict of interest to disclose.

AFLIBERCEPT REDOSIFICATION IMPACT IN A SECOND-LEVEL HOSPITAL

Authors: Javier Alfonso Buendía Moreno, Andrea Portela Sotelo, Lidia Martínez Valdivieso, Jaime Fernandez-Bravo Rodrigo, Gema Marcos Pérez, Dolores Barreda Hernandez

What was done?
A protocol for the redosification of aflibercept intravitreal therapy was implemented by the Commission of Pharmacy and Therapeutics and the Ophthalmology Service, which proposed the redosification of aflibercept vials into sterile syringes for intravitreal use.

Why was it done?
Aflibercept is an agent against vascular endothelial growth factor A (VEGF-A) whose intravitreal indications such as age-related macular degeneration (AMD), macular oedema (ME), and retinal vein occlusion (RVO), have a high economic impact on a Pharmacy Service (PS) budget.

How was it done?
Aflibercept 4 mg vials were recompounded by infirmary staff in a horizontal laminar air flow cabinet into syringes with the recommended dosage of 2 mg, hence one vial could approximately be fractionated for the production of 2.5 syringes.
The variables compiled to maintain the traceability of aflibercept through the programmes of computerised clinical history, MambrinoXXI® and electronic prescription, Farmatools®, were: sex, age, indications, number of spent vials and syringes prepared and average number of syringes dispensed per patient. In addition, it compared the direct estimated cost of the syringes versus vials to calculate the saving cost.

What has been achieved?
During the year 2019, 305 patients received aflibercept syringes, 172 (56'4%) were male, the average age was 76 years (41–95). Main diagnoses were 145 AMD, 71 ME, 43 diabetic ME and 33 RVO. The total numbers of vials spent were 341, the syringes dispensed were 1174 and the average number of syringes dispensed per patient was 3.85. The total price of one vial was 612.31€, so one redosificated syringe in the PS approximately costs 204.10€. Therefore the use of syringes instead of vials had a potential saving cost of 331,672€ (58.01%) if the vials would have been used. The cost reduction of the intravitreal therapy with aflibercept supposed a saving of 1.58% of the total expenditure of the PS during 2019.

What next?
The optimisation of aflibercept intravitreal therapy is a big cost-effective measure for reducing costs in a PS. It helps to reduce costs in a therapy that is increasing the number of patients each year, contributing to the financial sustainability of Health Systems and improves the efficacy of the resources of the PS.

Keywords | Drug distribution and supply, drug packaging, drug group, S01 - ophthalmologicals, preparation and compounding, sterile production.
Conflict of interest | I have no potential conflict of interest to disclose.

HOW ROBOTICS IMPROVED SAFETY AND WORKING EFFICIENCY IN A EUROPEAN PREMIUM CANCER INSTITUTE

Authors: Mathilde Roche, Annabelle Angapin, Vincent Blazy Alexandre Hyvert, Loretta Moriconi, Matteo Federici, Bintou Diawara, Cindy Monnel, Lison Ferreol, Assia Mitha, Hail Aboudagga, Romain Desmaris

What was done?
In 2018, our chemotherapy production unit implemented an automated anticancer drugs compounding platform, embedding two APOTECAchemo robots. This aims to meet the increasing patient-specific chemotherapy demands (78,000 preparations/year). In order to minimise human risk and optimise work efficiency, implementation of a bidirectional interface between the robots and the hospital's Electronic Prescribing Software (EPS) was considered as mandatory, to allow exchange and clinical information retrieval.

Why was it done?
Initially, robot operations required prescription re-transcription and chemotherapy relabelling by technicians, leading to manual data entry risks. Robots are known for high-standardised procedures, great repeatability and limited human intervention: adding a bidirectional interface enabled improvement of patient safety. Moreover, it shows significant benefits during the compounding process, streamlining pharmacy workflows and ensuring full and paperless traceability.

How was it done?
In 2020, pharmacists and the IT team defined the interface specifications. Bidirectional information flow was implemented using Health Level Seven (HL7) standards. Interface between EPS and APOTECAmanager was developed and a comparative robot performance analysis was undertaken by evaluating processed drug products, compounded preparation numbers and actual average usage time per day. The staff (ie, two technicians) remained identical. Data were retrieved from robot's embedded statistical tool over 3 months, before (March-May 2020) and after interface implementation (July-September 2020).

What has been achieved?
During these 6 months, 13,746 preparations were compounded, with 95% infusion bags and 5% elastomeric pumps. Most of these preparations were produced in advance (administration on day+2 or day +3). After interface implementation, the average production was raised by 40.5% (from 1905 to 2676/month). Interface implementation increased also the average robot operating hours from 3.6 hours/day/robot to 5.8 hours/day/robot (+61.1%). In total, 19 different molecules were compounded, including conventional anticancer drugs and monoclonal antibodies with the number of reconstituted drug vials increasing by 38.1% (from 625 to 863).

What next?
Interface between robots and the EPS was successfully implemented, thereby enabling improved safety and efficiency. Today, syringes and paediatric preparations are still made manually. They require visual and analytical controls to verify their conformity. Mid 2021, a third robot customised for syringes and paediatric preparations will be installed in the compounding unit, to secure these preparations in a more efficient way.

Keywords | Drug group, L01 - cytostatics, IT, information transmission, preparation and compounding, compounding robots.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 4 - CLINICAL PHARMACY SERVICES

PANDEMIC CRISIS COVID 19: THE DRUGS HOME DELIVERY AS A TOOL FOR ADHERENCE AND COMPLIANCE

Authors: Barbara Re, Marta Del Vecchio, Claudia Lauria Pantano, Elirosa Minniti, Vito Ladisa

What was done?
Drugs home delivery has been implemented for fragile patients and those at risk, both oncological and haemato-oncological, all over the Italian territory.

Why was it done?
The COVID-19 pandemic and the lockdown made it difficult and very often not possible to access hospital pharmacies for dispensing of drugs for cancer treatment.

How was it done?
Through the telemedicine programme, in agreement with the oncologist, patients unable to reach the pathology doctor's office are contacted and the project explained to them. If the patient accepts the delivery at home, paths with specialised couriers have been activated, in compliance with the GDPR, which ensure the delivery of medicines within 48 hours. Upon delivery the pharmacist contacts the patient to ensure that they have received the medicines and reinforces how you take the drug and the potential side effects that need to be reported to the doctor and/or pharmacist.

What has been achieved?
In the period from March to September 2020, 501 deliveries were made, of which 301 were in the regional territory and 200 in the national territory. 423 patients were contacted. A customer satisfaction was activated to which 90% of patients with a high degree of acceptance of the service responded.

What next?
The home delivery service has shown that integrating telemedicine, with the collaboration of the oncologist and pharmacist, allows, when possible, fragile patients to avoid having to go to the hospital every month to collect the drug needed for their treatment. Furthermore, the role of the pharmacist will be increasingly central in the home clinical management of this patient population to assure adherence and compliance even in a home setting.

Keywords | Clinical pharmacy, multidisciplinary, clinical pharmacy, patient empowerment, management, outpatient pharmacy.
Conflict of interest | I have no potential conflict of interest to disclose.

DELIVERY OF SPECIALISED MEDICINES IN MEDICINE POST BOXES - A PILOT STUDY

Authors: Maja Kirstine Brøns, Gitte Borup

What was done?
This was a pilot study that investigated a method for, and patient satisfaction with, delivery of specialised cost-free hospital medicines via Medicine Post Boxes (MPB) in rural areas.

Why was it done?
The purpose was to move medicine collection from the outpatient clinics to a MPB in order to reduce CO2 emission, due to less kilometres being travelled by patients, to increase equal access to healthcare services, and to reduce physical patient contact during a global pandemic.

How was it done?
The project was initiated by clinical pharmacists, who acted as interdisciplinary liaisons, who understood the clinical aspect of the medical treatment, the importance of good distribution practice and the logistic capacity at the hospital pharmacy. Having completed clinical controls via telephone, the clinic forwarded the information needed to the hospital pharmacy. Initially, all requisition forms were checked by clinical pharmacists to ensure complete information was given, and that documentation was performed properly. Once fully implemented, a task shifting onto the pharmacoeconomist was done concerning the control of the requisitions; however, initiation of cooperation and problem solving with the clinic was maintained as a pharmacist task.

What has been achieved?
Focus group interviews with doctors and nurses from the clinics expressed satisfaction with the flexibility of conducting clinical controls over the phone, and not having to handle the practical part of ordering, documenting and handing out medicines. No concerns of patient safety were expressed, and a wish for full coverage for medicine delivery via MPB was stated. A survey among the patients using the MPB was conducted. A total of 148 respondents participated of whom 98% stated being 'very pleased' or 'pleased' with the service. Also, 98% felt safe to 'a very high degree' or 'high degree' with using the MPB and 99% wished

to use the MPB again. Estimates of CO2 reduction have not yet been calculated.

What next?
MPBs should be available in urban areas also, as it increases flexibility for the patients and healthcare professionals. The goal is to include all suitable clinics and patients who receive long term treatment with hospital medicines..

Keywords | Clinical pharmacy, multidisciplinary. clinical pharmacy, patient satisfaction, drug distribution and supply, controlled drugs.
Conflict of interest | I have no potential conflict of interest to disclose.

DESIGN AND IMPLEMENTATION OF A TELEPHARMACY PROTOCOL IN A THIRD LEVEL HOSPITAL DURING THE CORONAVIRUS PANDEMIC

Authors: Ylenia Jiménez López, Maria Isabel Sierra Torres, Encarnación Pérez Cano, Juan Jerez Rojas, Carmen Lucía Muñoz Cid, Raquel Claramunt García

What was done?
Due to the SARS-CoV-2 pandemic situation, we developed a telepharmacy protocol for the outpatients of a Pharmacy Service (PS).

Why was it done?
After the declaration of the national state of alarm due to the COVID-19 crisis, the Outpatients Pharmaceutical Care Unit detected the need to design a telepharmacy protocol. This protocol was established with the aim of avoiding patient visits to the PS, thus reducing the risk of outbreaks originating in the hospital. Since 19 March 2020, the protocol has been implemented with no interruption.

How was it done?
Circuit and stages:
1. Selecting patient candidates for telepharmacy, who were those with an appointment for collecting medication in the PS and had no other appointment within the hospital (with the doctor or for treatment administration).
2. Contacting with the patient or the caregiver via telephone to verify treatment adherence and the delivery data and place.
3. Packaging, highlighting the correct identification data and storage conditions.
4. Notifying to the delivery company.

This protocol was agreed by the PS, the hospital management and the physicians involved.
The system was designed, in the first place, so that treatments were delivered by courier service to the patients' addresses. Finally, due to logistic and economic problems, it was modified to make delivery through pharmacy offices (PO).

What has been achieved?
6068 treatments have been delivered from 19/03/2020 to 30/09/2020: an average of 47 shipments per day.
In the 6068 shipments, there have been:
• 722 (11.9%) delivered through an external company (19/3-20/4/20)
• 756 (12.5%) delivered by the local courier (19/3-29/4/20)
• 4590 (75.6%) delivered through PO (8/4-30/9/20)
During this whole period, 14,496 patients (including telepharmacy) have been attended to in the PS. The 6068 deliveries mean that we have avoided 42% of hospital visits, thus minimising the risk related to the pandemic.
The change in the delivery system has meant a cost reduction from 10,000 €/month with the first system to 0 €/month with the pharmacy office system.

What next?
Our telepharmacy protocol is still active. We keep working on ways to improve the communication with patients and increase the number of telecare services.

Keywords | Drug dispensing, dispensing.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPACT OF AN INTEGRATED MEDICINES OPTIMISATION PHARMACIST (IMOP) ON BIOSIMILAR UPTAKE IN THE MATER MISERICORDIAE UNIVERSITY HOSPITAL

Authors: Grainne Johnston, Jennifer Brown

What was done?
The Mater Misericordiae University (MMUH) Integrated Medicines Optimisation Pharmacist (IMOP) provided education and removed barriers to initiate biosimilar prescribing of adalimumab and Enbrel in the MMUH.

Why was it done?
The High Tech Scheme (HTS) in Ireland facilitates access to high cost drugs with proven cost benefit for patients. Combined national expenditure on adalimumab (Humira®) and etanercept (Enbrel®) exceeded €190 million in 2017. Biosimilar versions of both drugs are available, however largely not utilised. The most cost effective options for each drug were designated as the Best Value Biologic (BVB). Prescribing a BVB option offers the opportunity to save a considerable amount of money for the state.

How was it done?
The MMUH IMOP was delegated to assist with implementation of BVBs prescribing.
The MMUH IMOP generated Patient Information Leaflets in relation to BVB switching.
The IMOP reviewed out-patients currently prescribed Humira® or Enbrel®, and provided education and information on switching from the originator to the BVB.

What has been achieved?
Prior to the IMOP intervention, no patients in the MMUH had been prescribed a BVB.
Following IMOP intervention, between 26 June and 27 September 2019:
- 291 Humira® or Enbrel® patients were scheduled to attend MMUH rheumatology, gastroenterology and dermatology clinics.
- Of these, 64% (n=185) were switched to a BVB. An additional 19 patients were newly commenced on a BVB.
- The IMOP educated and counselled 91% (n=92), 93% (n=53) and 48% (n=13) of patients switched to a BVB in rheumatology, gastroenterology and dermatology, respectively.

The largest contributing factor identified for patients not being prescribed a BVB was, no review by the IMOP prior to medical review; 65% (n=35), 59% (n=10) and 86% (n=12) for rheumatology, gastroenterology, and dermatology, respectively.

What next?
BVB prescribing can save vital health funds for the state while maintaining patient care. The MMUH IMOP is now progressing to adopt BVB prescribing for a number of other biological medicines at significant savings for the MMUH and state.

Keywords | Drug selection, optimisation of therapy.
Conflict of interest | I have no potential conflict of interest to disclose.

THE APPLICATION OF AN EHEALTH MODEL IN THE HEALTH CARE SYSTEM

Authors: Mar Gomis-Pastor, Anna De Dios López, Maria Antonia Mangues, Miriam Ors, Meritxell Cucala, Caterina Sanpol, Victor Robert, Xavier Borras, Gemma Craywinckel

What was done?
An eHealth programme directed to heart transplant patients (HTP) was implemented. The software developed was called mHeart and consists of a mobile phone application complemented by a website (https://n9.cl/ajut). A pilot study to validate the software and a clinical trial were conducted. This tool is now extended into clinical practice.

Why was it done?
HTP are therapeutically complex patients who may benefit from an intensive telematic follow-up. Moreover, human relations among patients and health providers may be enhanced to improve patients' empowerment with their health care. Additionally, interdisciplinary eHealth projects lead to increased interaction among health providers, expanding advanced patient-centred care in healthcare systems.

How was it done?
This project and its potential scalability has achieved the creation of a well-established framework involving among relevant others the Legal Department, the Information Systems Department, the patient data protection supervisor, and the Innovation Research Institute.
The success and the scalability of these innovative projects in our centre depended on health providers' engagement with eHealth, new interoperability solutions, adequate institutional support, and government reimbursement models.

What has been achieved?
The clinical trial conducted in 134 HTP has demonstrated to improve recipients' adherence to immunosuppressants (85% mHeart follow-up vs 46% conventional follow-up) [OR=6.7 (2.9;15.8), P value=0.000], to improve patients' experience of therapeutic regimens and to reduce in-clinic facilities because the mHeart follow-up (65% mHeart follow-up vs 35% conventional follow-up) [OR=3.4 (1.7;6.9), P value=0.001].

What next?
This eHealth experience has allowed continuing creating evidence on the use of the eHealth in other populations: an onco-haematological platform, EMMA (Ehealth Medical self-Management Aid), has been designed including diverse profiles depending on the clinical specifications (eg, multiple myeloma or bone marrow transplant conditions); MyPlan has been adapted to perform an interdisciplinary follow-up of any multimorbid population with polypharmacy. Thus, the system can be used in any multimorbid patients by activating or omitting certain modules that define the target patients' specific comorbidities (eg, glycaemia module or blood pressure module). The new EMMA and MyPlan will be clinically tested in diverse trials in 2020 including several health care interdisciplinary teams, including the emergency setting, onco-haematology, migraine, dyslipidaemia and cardiovascular risk, among relevant others. In addition, other Spanish centres are implementing the eHealth model and the software in their Institutions assisted by the experience gathered.

Keywords | Clinical pharmacy, healthcare team, IT, telemedicine, patient safety, high risk medication.
Conflict of interest | I have no potential conflict of interest to disclose.

PHARMACOGENETICS IS GROWING FAST

Authors:: Xando Díaz-Villamarín, Ana Pozo-Agundo, Paloma García-Navas, Celia Castaño-Amores, Alba Antunez-Rodriguez, Cristina Lucía Dávila-Fajardo

What was done?
We have implemented pharmacogenetic tests in our hospital for a total of nine drugs.

Why was it done?
Pharmacogenetics (PGx) has the potential to predict the patient's drug response. Many genetic polymorphisms have been associated with variable drug response. This has been demonstrated with the highest level of evidence, in fact many of them have been included in clinical dosing guidelines such as those from the Dutch Pharmacogenomics Working Group (DPWG) and Clinical Pharmacogenetics Implementation Consortium (CPIC). Actually, many drug labels include the recommendation about genotyping specific single nucleotide polymorphisms (SNP) prior to drug prescription.

How was it done?
Our hospital provides a PGx test service according to the following workflow. Physicians order the PGx test to the Pharmacy Unit, we take a saliva sample with sterile-cotton tipped swabs and send them to the Genomic Unit at Genyo. There, we extract the DNA and genotype the variants of interest. Genetic results are reported back to the Pharmacy Unit within 48–72 hours. After genotype-phenotype-recommendation translation according to the CPIC and DPWG dosing guidelines, we upload the dosing recommendation as a PGx report to the electronic patient's medical history.

What has been achieved?
Since 2012, 2414 patients have benefited from our PGx test service for at least one drug–gene interaction. These tests have been requested by seven hospital departments with regard to a total of nine different drugs. We have reported 932 PGx dosing recommendations: Clopidogrel with 2013 genotyped patients and 845 dosing recommendations; Azathioprine with 208 and 21; Capecitabine: 48 and 1; 5-FU: 5 patients without recommendations; Tamoxifen:

117 and 48; Trastuzumab: 34 and 15; Irinotecan: 4 and 2; Simvastatin/Atorvastatin: 2 genotyped patients and no recommendations.

What next?
Since the first PGx test in 2012, we have been able to implement PGx tests in daily clinical routine in our hospital affecting 9 drugs. 2414 patients have benefited from this service and we are working on the implementation of new polymorphisms affecting drug response to expand our services.

Keywords | Clinical pharmacy, healthcare team, IT, telemedicine, patient safety, high risk medication.
Conflict of interest | I have no potential conflict of interest to disclose.

THE EXPERIENCES OF A UNIVERSITY HOSPITAL MEDICATION PREPARATION UNIT IN COVID-19 PANDEMIC

Author: Sinem Şeker Şimşek

What was done?
We have taken general precautions recommended by the World Health Organization. However, the protocol we have used is to prepare Lopinavir/Ritonavir, preparation of Hydroxychloroquine sulfate, Favipiravir and Hydroxychloroquine sulfate with Simple Syrup, and Preparation of intravenous drugs (Tocilizumab).

Why was it done?
In terms of medication and patient safety, to establish a safe non-cytotoxic medication preparation process, to ensure continuity of well-educated and motivated pharmacy staff are the key elements of pharmacy-based medication preparation units. This work aimed to share our experiences about how to be challenged with the risk in the drug preparation process during the pandemic as a university hospital pharmacy centred non-cytotoxic medication preparation unit.

How was it done?
The preparation of solid oral dosages, which should be administered to intubated COVID-19 patients through a nasogastric tube, was prepared by the ready to administration team of our pharmacy.
There is no evidence-based data on the bioavailability of these enteric-coated tablets after being crushed and administered to these vulnerable patients. The biggest challenge was lack of the reliable medication information sources. Before starting the Covid-19 medications preparation process, possible risks that could arise if crushed administration of these drugs were evaluated with a multidisciplinary team.

What has been achieved?
We suspended the Lopinavir/Ritonavir with dextrose during the preparation phase. We preferred the lavage syringe for intravenous administration risk elimination through ensuring patient and drug safety by preventing the risk of intravenous administration of the diluted suspended drug we have prepared. However, when we used a 3-way infusion manifold the strain during pushing and easy disconnection of the joints thus the risk of dose loss were the disadvantages.

What next?
The two pillars of dealing with the COVID-19 epidemic, which has affected the whole world, are the proper preparation of the necessary medicines for treatment and the treatment itself. Drugs were prepared in line with the search for "a practical solution immediately" and the directives of the Ministry of Health and successfully administered to the patients. Our study is noteworthy as it shows that drugs can be prepared not only by the default ways but also by the different methods.

Keywords | Clinical pharmacy, clinical pharmacy services, preparation and compounding, preparation, preparation and compounding, reconstitution.
Conflict of interest | I have no potential conflict of interest to disclose.

CLINICAL PHARMACOKINETICS OF ANTI-TNF THERAPY: OUR FIRST EXPERIENCE IN INFLAMMATORY BOWEL DISEASE

Authors: María Mar Alañón Pardo, Alejandro Marcos de La Torre, Beatriz Proy Vega, Adrián Pérez Facila, María Luisa Moreno Perulero, Clara Notario Dongil

What was done?
Pharmacokinetic monitoring (TDM) of anti-TNF therapies (infliximab/adalimumab) in inflammatory bowel disease (IBD) was implemented in our hospital by a multidisciplinary team of pharmacists, gastroenterologists and clinical analysts.

Why was it done?
Numerous publications have demonstrated a correlation between serum concentrations (Cs) of anti-TNF drugs and the therapeutic response and a wide interindividual variability in pharmacokinetics among patients with IBD. TDM permits dosage individualisation and optimisation of anti-TNF therapy.

How was it done?
A computer platform was developed within the hospital electronic records system to manage consultations of gastroenterologists with the Clinical Pharmacokinetics Unit (CPU) of the Pharmacy Department. Variables in this electronic interconsultation system were: "anti-TNF drug", "concomitant immunomodulator (IMM)", "diagnosis", "reason for consultation", "date of last dose", "date of extraction", "weight/height", and "observations". Laboratory tests ordered from the Department of Clinical Analysis on the electronic request form included blood count, Cs of infliximab/adalimumab, albumin, C-reactive protein and faecal calprotectin. Quantum Blue® lateral flow immunoassay was used to quantify Cs of the anti-TNF drugs; when undetectable, the presence of anti-drug antibodies (ADAs) was investigated.
The CPU developed pharmacotherapeutic recommendations based on therapeutic algorithms, pharmacokinetic/pharmacodynamic principles and population models implemented using MW-Pharm++® software, which incorporates the principle of Bayesian estimation. For a correct interpretation of the Cs observed, adherence to anti-TNF ± IMM regimens was evaluated using electronic dispensing records and the self-administered Morisky-Green questionnaire.

What has been achieved?
Since its implementation (January 2019 – August 2020), the CPU has responded to 269 consultations on 121 patients treated with infliximab (46.3%) or adalimumab (53.7%): 70.2% were prescribed with IMM (89.4% with thiopurines); 93.4% adhered to the anti-TNF regimen and 82.4% to the IMM. Baseline anti-TNF Cs were subtherapeutic in 37.2% of patients, therapeutic in 35.5% and supratherapeutic in 27.3%. ADAs were positive in 28.6% of patients with undetectable anti-TNF Cs (n=28). A large proportion (84.8%) of consultations were related to proactive monitoring (to optimise treatment) and the remainder were reactive (after treatment failure). A very high percentage (89.9%) of the gastroenterology specialists accepted recommendations.

What next?
Extend TDM to other biological therapies and immune-mediated diseases.

Keywords | Clinical pharmacy, multidisciplinary, pharmacokinetics og -dynamics, therapeutic drug monitoring (tdm).
Conflict of interest | I have no potential conflict of interest to disclose.

DETECTION OF PHARMACOKINETIC/ PHARMACODYNAMIC DRUG INTERACTIONS OR PATHOPHYSIOLOGICAL CONTRAINDICATIONS WITH INJECTABLE CHEMOTHERAPIES: IMPLEMENTATION OF THE SOFTWARE PHARMACLASS® IN ONCOLOGY

Authors: Pauline Barreau, Joséphine Courouble, Pierre Pilven David Vandecapelle, Thibault Stala, Geoffrey Strobbe, Guillaume Marliot, Frédéric Feutry

What was done?
Pharmaclass® is a software based on rules created by the pharmacist, from pharmaceutical algorithms. This rule engine crosses in real time all data flows of several software and sends alerts that must be analysed by a pharmacist. It was applied in oncology for injectable chemotherapies.

Why was it done?
Two prescription assistance software are used in the hospital: DXCare®, for global drug management, and Chimio®, specific to the prescription and preparation of injectable chemotherapies. Clinical pharmacists (DXCare®) and pharmacists in charge of preparation (Chimio®) carry out the pharmaceutical analysis independently and they may not detect potential pharmacokinetic/pharmacodynamic drug interactions or pathophysiological contraindications, slowing down the pharmaceutical analysis. Pharmaclass® can improve that by crossing all data flows between DXCare® and Chimio® and alerting the pharmacist. The objectives were to select and code priority alerts and evaluate the detectability of drug interactions and pathophysiological contraindications by the software Pharmaclass®.

How was it done?
An interface was set up between DXCare®/Chimio® and Pharmaclass® to allow the creation of requests. An analysis of drug consumptions and drugs at risk of interactions helped to select seven molecules (Methotrexate, Bevacizumab, Fluorouracil, Ifosfamide, Irinotecan, Cisplatin, Pemetrexed). A study of the summaries of the product characteristics and the drug interaction thesaurus and a bibliography was conducted and the rules were coded. These were checked by creating test patients with false prescriptions.

What has been achieved?
Eleven rules were created and, after some tests and coding readjustments, all was detected. Nine rules are about drugs interactions: three contraindications (Methotrexate/Trimethoprim, Methotrexate/Acetylsalicylic acid, Bevacizumab/Naloxegol), three associations not recommended (Methotrexate/Amoxicillin, Methotrexate/ Ciprofloxacin, Fluorouracil/Antivitamin K), one precaution of use (Ifosfamide/Aprepitant) and two other rules concern enzymatic induction and inhibition of the metabolism of Irinotecan. The last two rules link the glomerular filtration rate with Cisplatin and Pemetrexed.

What next?
Following these creations, Pharmaclass® has allowed the detection of drug interactions and pathophysiological contraindications that were not previously detectable. Thereafter, the objective will be to establish an organisation for the management of alerts and evaluate the number and the relevance of these alerts. New rules will be created for all injectable chemotherapies used in the hospital. Other centre of Unicancer will be able to use these rules.

Keywords | Clinical pharmacy, pharmacy interventions (pi), drug safety, drug interaction, IT, electronic medication record.
Conflict of interest | I have no potential conflict of interest to disclose.

A MULTI-DISCIPLINARY TEAMS' COLLABORATIVE APPROACH TO TRANSITION MEPOLIZUMAB DEPENDENT SEVERE EOSINOPHILIC ASTHMATIC PATIENTS TO SELF-ADMINISTRATION IN RESPONSE TO THE COVID-19 PANDEMIC

Authors: Grainne D'Ancona, Niall Stewart-Kelcher, Schaya Bains, Andrew Hearn, Joanne Kavanagh, Cris Roxas, Linda Green, Louise Thomason, Marianna Fernandes,,Brian Kent, Alexandra NanzerKelly, David Jackson, Jaideep Dhariwal

What was done?
87 severe eosinophilic asthmatic (SEA) patients treated with mepolizumab, a biologic agent targeting interleukin-5 (IL-5), at a specialist NHS asthma clinic, were transferred to self-administration at home compared to usual practice of administration in a hospital setting. 40 patients were transferred in late 2019 as a planned 'pilot' transition and 47 patients were transferred unplanned due to the COVID-19 pandemic. We investigated whether there was a change in asthma control following the transition to home administration and whether a differential response to treatment exists following transition to homecare before and after the onset of the COVID-19 pandemic.

Why was it done?
The COVID-19 pandemic necessitated the rapid transition of the remaining 41 mepolizumab dependent SEA patients onto home administration to facilitate on-going therapy in a cohort of patients who were "shielding" under UK government guidance.

How was it done?
A varied multi-disciplinary team including pharmacists, pharmacy technicians, specialist nurses, doctors, physios and psychologist conducted a variety of in-person and virtual (telephone and video) consultations to consent and train patients on self-administration in their own homes in a rapid transfer to home administration.

What has been achieved?
Patients receiving mepolizumab at home were stratified according to those who had a planned transition prior to 1 February 2020 versus those who had an unplanned transition after this date necessitated by the COVID-19 pandemic. The last Asthma Control Questionnaire-6 (ACQ6) measured in clinic ("baseline") was compared with that collected by telephone consultation 6–8 weeks after transition. Immediately prior to transition to homecare (baseline), the planned group had a lower mean ACQ6 than those in the unplanned group (1.19 vs 1.90, P=0.004). The ACQ6 on home administration decreased significantly in both groups (–0.47 in the planned group vs –0.56 in the unplanned group, both P<0.001). The ACQ6 for the planned cohort during homecare was significantly lower than that for the unplanned group (0.72 vs 1.34, P=0.012).

What next?
Evaluation of patient experience on the switch to home administration is currently being carried out via patient surveys with this to be completed in early 2021. Further research is required to understand the potential influence of lockdown and/or telephone vs face-to-face ACQ reporting.

Keywords | Clinical pharmacy, clinical pharmacy services, drug administration, administration, patient safety, patient safety.
Conflict of interest | I have no potential conflict of interest to disclose.

RESHAPING OF CLINICAL PRACTICE AND REORGANISATION OF CHEMOTHERAPEUTIC PROTOCOLS DURING COVID-19 PANDEMIC: THE INITIATIVE OF THE NATIONAL INSTITUTE OF TUMORS

Authors: Giuliana Lo Cricchio, Margherita Galassi, Ernesto Ruffino, Claudia Tirone, Vito Ladisa

What was done?
Some therapy protocols have been modified for the treatment of blood, gastrointestinal, lung, breast, head and neck tumours, in order to obtain equally effective patterns but with longer intervals between doses.

Why was it done?
In accordance with regional provisions and national guidelines, the initiative has had the dual objective of reducing hospital access, and potential infections, and ensuring therapeutic continuity for cancer patients.

How was it done?
Patients have been stratified on the basis of the neoplasia location and biology, the general conditions and the treatment characteristics and they have been shifted to modified treatment regimens, even outside the indications temporarily authorised by regional decision: Nivolumab from 240 mg Q2W to 480 mg Q4W for Hodgkin lymphoma, non-small-cell lung cancer, squamous cell carcinoma of the head and neck; from weekly Paclitaxel to Docetaxel Q3W for breast cancer; Pembrolizumab from 200 mg Q3W to 400 mg Q6W for lung cancer and melanoma; remodulation of protocols including fluoropyridines and platinum coordination compounds for gastroenteric tumours.

What has been achieved?
The schedule modification allowed a reshaping of agendas to reduce the frequency of day-hospital access and the risk of infection with SARS-Cov-2 for patients, carers and health professionals, in addition to reducing the costs of outpatient services. Treatment interruption rate, with possible consequent progression of disease, as reported by early Chinese data in the literature, has been reduced.

Keywords | Clinical pharmacy, clinical practice, drug prescribing and dosing, dosage, drug safety, drug safety.
Conflict of interest | I have no potential conflict of interest to disclose.

A MULTI-DISCIPLINARY TEAMS' COLLABORATIVE APPROACH TO TRANSITION BENRALIZUMAB DEPENDENT SEVERE EOSINOPHILIC ASTHMATIC PATIENTS TO SELF-ADMINISTRATION IN RESPONSE TO THE COVID-19 PANDEMIC

Authors: Grainne D'Ancona, Niall Stewart-Kelcher, Schaya Bains, Andrew Hearn, Joanne Kavangh, Cris Roxas, Linda Green, Linda Thomson, Marianna Fernandes, Brian Kent, Alexandra NanzerKelly, David Jackson, Jaideep Dhariwal

What was done?
246 severe eosinophilic asthmatic (SEA) patients treated with benralizumab, a biologic agent targeting the human interleukin-5 receptor (IL-5Rα), at a specialist NHS asthma clinic, were transferred to self-administration at home in response to the COVID-19 pandemic. Alongside this, patients continued to need to be newly initiated on benralizumab therapy in spite of the pandemic and innovative pathways were created to ensure rapid initiation of therapy and home administration.

Why was it done?
The COVID-19 pandemic necessitated the rapid transition of benralizumab dependent SEA patients onto home administration to facilitate ongoing therapy in a cohort of patients who were "shielding" under UK government guidance.

How was it done?
A varied multi-disciplinary team including pharmacists, pharmacy technicians, specialist nurses, doctors, physios and a psychologist conducted a variety of in-person and virtual (telephone and video) consultations to consent and train patients on self-administration in their own homes in a rapid transfer to home administration.

What has been achieved?
We have investigated this patient cohort for any unwarranted effects by comparing the last Asthma Control Questionnaire-6 (ACQ6) measured in clinic with that collected by telephone consultation 8–12 weeks after transition to home administration. 246 benralizumab

patients were included in the analysis, of whom 49 (20%) were new. There was no significant difference in pre-biologic ACQ6, pre-homecare (baseline) ACQ6 or post-homecare ACQ6 between the new and established patient groups. Both cohorts exhibited a similar magnitude of improvement in their ACQ6 following the transition to home administration (−0.73 in the established group vs −0.73 in the new group, both P<0.0001). We have demonstrated that early transition to home administration in patients treated with benralizumab is not associated with worse clinical outcomes as assessed by ACQ6.

What next?
Evaluation of patient experience on the switch to self-administration is currently being carried out via patient surveys with these data due to be completed in early 2021. Further research is required to understand the potential influence of lockdown and/or telephone versus face-to-face ACQ reporting.

Keywords | Clinical pharmacy, clinical pharmacy services, drug administration, administration, patient safety, patient safety.
Conflict of interest | I have no potential conflict of interest to disclose.

DRUG-DELIVERY-SYSTEMS FOR OPAT SELF-ADMINISTRATION: A GRAPHIC GUIDE

Author: Tania Truelshoej

What was done?
A graphic guide showing the ready-to-use antibiotics for outpatient parenteral antimicrobial therapy (OPAT) with special emphasis on drug-delivery-systems suitable for self-administration was developed.

Why was it done?
Department of infectious diseases at Aarhus Universitetshospital, Denmark, has successfully implemented OPAT as a standard modality for certain patients requiring long-term intravenous antibiotic therapy, e.g, patients with cystic fibrosis. This also includes a guideline to OPAT self-administration at home. To implement the OPAT guidelines throughout the hospital there was a need for an overview of available ready-to-use antibiotics for OPAT. The graphic guide is a help for the physicians in choosing the right drug-delivery-system suitable for OPAT self-administration.

How was it done?
Most information about the available ready-to-use antibiotics were obtained at the hospital pharmacy. In addition, the requirements for the different drug-delivery-systems were obtained by interviewing nurses from different wards.

What has been achieved?
Available ready-to-use antibiotics were listed in a graphic form with the following information: type of antibiotics, drug-delivery-system, available doses recommendations to time of administration and storage time and temperature. The drug-delivery-systems were all illustrated with a photo.
The graphic guide is now part of the implemented guideline for OPAT at the hospital and is also available as a printed poster to place, for example, in the medicine room.
The guide is a help for the physicians in choosing the right drug-delivery-system suitable for OPAT self-administration and helps to raise overall awareness of the possibility of OPAT as self-administration at the hospital.

What next?
Implementation of the OPAT guideline and the included graphic guide has increased awareness of the need for the hospital pharmacy to deliver ready-to-use antibiotics that can match the needs for safe and efficient treatment at home. This is an important strategic focus for the hospital pharmacy in the coming years.

Keywords | Drug administration, patient self administration, drug group, J01 - antibacterials for systemic use, hospital setting, hospital-home transition.
Conflict of interest | I have no potential conflict of interest to disclose.

SHARED PHARMACEUTICAL CARE PROGRAMME AGAINST COVID-19

Authors: Olivia Ferrández, Cristina Rodriguez, Nuria Carballo, Zara Corinne, Marta de Antonio, Miquel Ojeda, Rita Puig, Jordi de Dalmases, Jordi Casas, Santiago Grau

What was done?
On 14 March 2020, the Spanish Government declared the state of alarm which restricted citizens' mobility due to the SARS-CoV-2 coronavirus pandemic. The Catalan Health Service (CatSalut), which provides health support to an autonomous community of 7.5 million people, issued a series of strategies to protect vulnerable patients from commuting to the hospital to collect their Outpatient Hospital Medicines (OHM).
One of these strategies established a shared pharmaceutical care programme involving both hospital and community pharmacists. Thus patients collect their OHM at their local community pharmacy and avoid commuting to the hospital.

Why was it done?
It was established as a primary strategy against COVID-19 and to demonstrate the benefits of shared care of the patient, by hospital and community pharmacists, as regards to the improvement in their health status.

How was it done?
An official standard operating procedure reflecting this strategy was drawn up by CatSalut, Barcelona Pharmacists Association (COFB) and Hospital del Mar de Barcelona (HMar). This project was initiated on 23 March 2020 and it has been offered to all publicly funded hospitals in Catalonia.
A safe cloud-based web application, designed between COFB and HMar, was available to monitor all the medicines delivered using this circuit. Patients are included in this platform and are notified when their OHM has been sent to the community pharmacy selected by them. The computer application also includes a communication channel between community and hospital pharmacists to assess any medication-related incidence detected, as well as a telepharmacy service for patients.

What has been achieved?
On 9 October 2020, 3293 patients, from 22(34.9%) hospitals in Catalonia, had been included in this system. The number of participating community pharmacies is 2851(88.6%). A

total of 8806 treatments were delivered to the patients by community pharmacists. 10.2% of treatments are delivered through community pharmacies sharing the same postal code of the Hospital; 41.6% are delivered in the same municipality; 35.9% in the same province and 12.3% are delivered through community pharmacies which are in a different province.

What next?
Establishing optimal communication channels between both professionals results in a better understanding of patients' pharmacotherapeutic treatment and being able to act efficiently in those cases that are necessary.

Keywords | Clinical pharmacy, pharmacy interventions (pi).
Conflict of interest | I have no potential conflict of interest to disclose.

EARLY DETECTION OF PRERENAL ACUTE KIDNEY INJURY (AKI) INPATIENTS THROUGH MULTIDISCIPLINARY ACTION

Authors: Margarita Beltran García, Natalia Martín Fernández Mercedes Salgueiro Lazo, Santiago Sandoval Fernández del Castillo, Miguel Ángel Calleja Hernández, Antonio León Justel

What was done?
A multidisciplinary protocol was established for the detection and early action of prerenal AKI inpatients with hospital and Primary Care monitoring.

Why was it done?
AKI is an underdiagnosed syndrome due to delay in detection and late referral to the nephrology unit. A real-time electronic alert system integrated into a multidisciplinary protocol could be useful for early identification and diagnosis. Among the risk factors associated with AKI is the use of nephrotoxic drugs such as NSAIDs and COX-2, ACE inhibitors and ARA-II, Cyclosporine and Tacrolimus.

How was it done?
An automatic electronic tool, agreed between Biochemistry and Nefrology units, was designed for the selection of AKI patients. The pharmacist was contacted when a prerenal AKI was detected, who generated an alert in the electronic prescription system in order to recommend actions related to prescribed nephrotoxic drugs. An analysis was requested to check renal function in these patients, after 48 hours in the hospital and after 1 month of discharge from Primary Care.
There were many previous meetings and the leadership of each unit was maintained in the participation of strategies.

What has been achieved?
The aim was to improve the detection of prerenal AKI in inpatients and increase the quality of healthcare in these patients.
For this 3-month pilot phase, 3 clinical units were selected and 9 prerenal AKI cases have been detected. The most frequent risk factors were: 9 cases due to volume depletion, 6 due to nephrotoxic drug use and 3 due to chronic kidney damage (CKD). The measures adopted were: add fluid therapy in all cases, cancel nephrotoxic drugs and modify the diuretic drugs prescription in 6 of 7 cases. There was only 1 death.

What next?
This strategy will be extended to all hospital clinical units. Data will be obtained on incidence and morbidity and mortality in these patients, as well as on length of hospital stay.

Keywords | Clinical pharmacy, interventions, patient characteristics, inpatient, patient safety, contraindicated.
Conflict of interest | I have no potential conflict of interest to disclose.

THE LABOUR OF HOSPITAL PHARMACY SERVICES IN THE COVID-19 HEALTH CRISIS

Authors: Clara Notario Dongil, Patricia Araque Arroyo, María Mar Alañón Pardo, Alejandro Marcos de la Torre, María Carmen García Conde, Beatriz Proy Vega

What was done?
Due to the current pandemic caused by SARS-CoV-2, our Pharmacy Service (PS) has been reorganised and adapted its activity by areas according to the needs of a given situation.

Why was it done?
The circuit was designed during the pandemic period responding to the COVID-19 situation. The aim was providing the best service to hospitalised patients. The activity began on 10 March 2020.

How was it done?
1. Priority areas were set up.
2. Main activities to develop in each section were defined.
3. There was a redeployment of the PS staff.

What has been achieved?
Pharmaceutical assistance: PS developed pharmacotherapeutic protocols, collaborated giving advice to medical staff selecting appropriate treatments and detecting the most important interactions between drugs. It also advised regarding the compatibility and stability of medication, providing in addition written information through tables and triptychs elaborated.
Pharmacotechnics: 1,320 L of hydroalcoholic solution were elaborated and 1,161 L that were donated to the hospital were repackaged; 5.3 L of hydroxychloroquine 25 mg/mL oral suspension were prepared for patients in the Intensive Care Units (ICU).
Parenteral preparations: Perfusion elaboration was centralised in the PS; 495 infusions of midazolam 1.6 mg/mL and 1,570 of fentanyl 0.012 mg/mL were formulated to ICU. Individualised doses of intravenous tocilizumab belonging to 31 patients were elaborated.
Management and acquisition of medicines: Two new hospitalisation areas and three new ICUs were set up, equipped with medication kits. We increased the frequency of medication replacement and the stock of medication in the hospitalisation units was adapted. We made a continuous review of medication stocks due to high stocks turnover because of an elevated demand. To guarantee the supply of medicines related to SARS-CoV-2, medication was requested through the application of "management of medicines in special situations" of the Ministry of Health. 45 applications were processed.

What next?
The project is applicable to whatever PS, a defining figure in SARS-CoV-2 health crisis´s management, giving priority to essential services.

Keywords | Drug distribution and supply, stock control, drug information, pharmaceutical counseling.
Conflict of interest | I have no potential conflict of interest to disclose.

HOME DELIVERY OF DRUGS, A DISPENSING SYSTEM THAT HAS COME TO STAY

Authors: Ignacio Salar Valverde, Maria García Coronel, Consolacion Pastor Mondéjar, Mayte Gil Candel, Iris Muñoz Garcia, Carles Iniesta Navalon, Elena Urbieta Sanz

What was done?
Send the hospital dispensing medication to the patient's home.

Why was it done?
This project was carried out to avoid the possibility of contagion by SARS-CoV-2 when going to collect the medication. The circuit began at the end of March and the month of April 2020.

How was it done?
The first step was to specify the patient was considered at risk for SARS-CoV-2; in the end, patients over 65 years of age or immunosuppressed were considered at risk.
The second step was what order to follow to select and evaluate candidate patients for home delivery, for which the solution was simple, it was decided to follow the order of the pharmacy agenda for the collection of medication. The SELENE® electronic medical record programme was used to evaluate the patient's risk.
The third step was to contact him by phone, to check if there was a possibility of collecting the medication by a family member/caregiver, and if not, confirm a delivery address.
The last step was the preparation of the medication in the proper conditions of conservation and identified with the name and address of the patient. Shipments were organised from the pharmacy service. Patients were given an appointment in the pharmacy agenda for the next shipment.

What has been achieved?
There were 139 home deliveries of medication, 47 in March and 92 in April. Around 139 telephone calls were made, they are not counted, not all patients could be contacted in the first attempt, and up to three attempts were made per patient.
The majority, 124 shipments, were made through the service that the hospital made available to them, except for 13 that were made through the Red Cross and 2 through Civil Protection.

What next?
Although the delivery of medication at home was already carried out in some pharmacy services, because of the pandemic it has spread to the rest of the hospitals in our country. This service should be maintained, despite its cost, for patients who meet a series of criteria, which must be established and agreed upon. In addition, a telephone follow-up should be carried out on the patients that we send the medication to their home.

Keywords | Drug dispensing, dispensing drugs, patient characteristics, comorbidities, patient safety, patient safety.
Conflict of interest | I have no potential conflict of interest to disclose.

MEDICATION MANAGEMENT OF COMBINATION THERAPY IVACAFTOR, TEZACAFTOR AND ELEXACAFTOR FOR CYSTIC FIBROSIS PATIENTS WITH THE F508del MUTATION BY THE HOSPITAL PHARMACY IN A CENTRAL GENERAL HOSPITAL

Authors: Despoina Makridaki, Kalliopi Allagianni, Nikolaos Skordas

What was done?
A Phase 3, open-label clinical trial (CT) with 3 enrolled patients runs since April 2019 and two early access (EA) programmes with 23 enrolled patients runs since the end of July 2020 to permit the access of cystic fibrosis (CF) patients with the F508del mutation in the innovative combination therapy of ivacaftor, tezacaftor and elexacaftor (IVA/TEZA/ELEXA) in our hospital.

Why was it done?
In our hospital the main CF Unit for Adults in the country is located. Ensuring that as many as possible young patients benefit from accessing the new and crucial treatment, even during the COVID-19 period, reflects our commitment to improve patients' outcomes and overall survival.

How was it done?
3 outpatients enrolled in the CT and procedures regarding the protocol have been followed strictly. Medication dispensing is conducted every 12 weeks.
In the EA procedure, 2 parallel programs have been approved by authorities, one for the homozygous including 19 patients and one for the heterozygous including 4 patients. Dispensing is programmed every 4 weeks, although an initial stock for 3 months was shipped to pharmacy.
The role of HPs was decisive for the quick start of the EA programmes during the COVID-19 period. Roadmap was designed at the beginning by HPs in collaboration with the physicians to accelerate approval and shipment procedures and also regarding licensing for each patient, drug receipt, storage, dispensing, accountability, electronic registry in designated EA platform and additional electronic recording and follow up in the electronic Pharmacy platform for both the IVA/TEZA/ELEXA and supporting therapies (e.g. inhaled antibiotics, dornase alfa).
For 17 EA patients with chronic obstructive pulmonary disease in exacerbation, hospitalisation before starting the IVA/TEZA/ELEXA therapy was necessary. HPs monitored closely their medication cards to avoid adverse reactions and delays in therapy.
HPs served all outpatients on personal afternoon appointments, to avoid overcrowding in the hospital during the pandemic.

What has been achieved?
Critically ill patients have been able to receive in priority the IVA/TEZA/ELEXA treatment, without cost, and valuable scientific experience has been gained.

What next?
EA programmes have received 3 months extension until reimbursement negotiations are completed by authorities. In

the meantime, we design a cost affordable procedure to ensure continuity of access for our patients.

Keywords | Clinical pharmacy, clinical trial medication, clinical pharmacy, pharmacy interventions (pi), quality, documentation system.

Conflict of interest | I have no potential conflict of interest to disclose.

IMPLANTATION OF A PHARMACEUTICAL CARE AND HOME DELIVERY CIRCUIT FOR OUTPATIENTS DURING THE ALARM STATE FOR COVID-19

Authors: Rocío Tamayo Bermejo, Aranzazu Linares Alarcón Casilda Ortega de la Cruz, Isabel Muñoz Castillo

What was done?

A circuit of Pharmaceutical Care and home delivery was implemented for outpatients in the alarm state due to COVID-19.

Why was it done?

In the alarm state due to COVID-19 in March 2020, in order to reduce the number of visits to the hospital for outpatients who go to the Outpatient Pharmaceutical Care Area, a new Pharmaceutical Care and home delivery circuit is implemented.

How was it done?

The needs, possibilities and resources of the Hospital were identified. Material resources were adapted: supply and stock management. A logistical solution was sought and a review of thermolabile drug stabilities was made. Human resources were restructured: definition of a new team, functions and responsibilities.

A new circuit was implemented with remote access. When the patient contacts, he's attended by a pharmacist who performs the screening and interview (initiation/follow-up), who after reviewing the clinical records, validates the treatment and selects the dispensing process of the patient according to individual. The preparation of shipments is organised through the use of a web resource, by a pharmacy technician and at a specific time, based on a list of shipments per day, dispensing sheets and personalised labels. Once the dispensations have been prepared, a double check is made by another pharmacy technician on a different shift.

Three phone lines and an email weren't enough to attend to all concurrent demands in a period of less than 24 hours. To mitigate this situation, a multichannel information strategy was implemented to notify all patients.

Other limitations: incidents by the logistic operator, errors in addresses and incorrect dose shipments.

What has been achieved?

During 2 months (April-May), 1103 patients benefited from the new circuit, approximately 30% of the patients who collect medication in our Outpatient Pharmaceutical Care Area during this period.

What next?

The pharmaceutical care and home delivery circuit has been shown to be safe, and has been able to meet the needs that are required in an alarm state. Also, it's a circuit applicable to other Pharmacy Departments since it doesn't require a large investment in resources.

Keywords | Drug dispensing, dispensing drugs

Conflict of interest | I have no potential conflict of interest to disclose.

MPLEMENTATION OF A SAFE EXTERNAL DISPENSING SYSTEM DURING THE COVID-19 PANDEMIC IN A REFERRAL HOSPITAL

Authors: Marina Corrales Paz, Claudia Rodriguez Moreta, Inmaculada Lomares Manzano, Ana Ganfornina Andrades

What was done?

To implement a system that guarantees a sure and effective supply of medical treatments to those vulnerable patients, those at increased risk or with difficult access to the hospital during the coronavirus pandemic.

Why was it done?

Due to the health crisis caused by the SARS-Cov-2 virus, many hospitals have seen the necessity to implement a safe dispensing system (telepharmacy) to provide medication to high risk patients and those infected with COVID-19 in order to prevent interrupting their treatments.

How was it done?

A database was created with those patients attending our hospital's outpatient service (OS) to pick up their medication within the next 7 days, verifying through pharmaceutical software and the patient's medical history records (MHR) their next dispensing date. After checking if the patient had a medical appointment that could coincide with the dispensing date, a phone interview was conducted with the patient to schedule the pick-up of the medication through the OS or by telepharmacy (patients' consent was required to use their personal information and we asked how the treatment was going). In our case the patients could pick-up their medication in the referral hospital (RH), a newly created OS in an affiliate hospital or by telepharmacy to prevent the collapse of the hospitals. We registered: number of patients attended in RH, new OS or by telepharmacy and number of dispensations. Patients were grouped in areas based on their city and delivery date for telepharmacy and in the case of patients picking up their own medication they were made an appointment.

What has been achieved?

During the months the state of emergency was in place in Spain (14 March– 21 June) 3385 patients were attended in total and 9316 medications were dispensed. 2245 (66.3%) patients were attended in the RH (5794 dispensations), 583 (17.2%) patients were attended through the new OS (1436 dispensations) and the rest 557 (16.5%) had their medication sent to their address (2086 dispensations).

What next?

A safe and effective dispensing system was achieved for outpatients during the COVID-19 pandemic through the implementation of a new telepharmacy method and the establishment of a new OS that allows convenient dispensation of medication while minimising the risk of virus spread.

Keywords | Clinical pharmacy, clinical pharmacy services, drug distribution and supply, delivery performance, IT, telemedicine.

Conflict of interest | I have no potential conflict of interest to disclose.

TELEMEDICINE AND HOMEDELIVERY: MANAGEMENT OF THERAPEUTIC CONTINUITY IN THE PANDEMIC ERA

Authors: Marta Del Vecchio, Federica Chinotti, Claudia Lauria Pantano, Elirosa Minniti, Erika Cataldo, Francesco Guidoni, Vito Ladisa

What was done?

The hospital pharmacist, focusing on therapeutic continuity, closely collaborated with the clinicians in monitoring patient's condition using telemedicine and homedelivery services.

Why was it done?

The Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) pandemic made it difficult to monitor the patient's health condition because many of them were locked down at home, unable to attend routine hospital visits.

How was it done?

In the multidisciplinary team, the pharmacist and the clinician defined the criteria to choose the most suitable patients for the homedelivery service. One of the options was to dispense the drug in a neighboring hospital. Because of the sanitary system regionalisation, some of those hospitals could have been located even more than 100 km away, resulting in a problem for the most critical patients. In order to help them, home delivery and telemedicine services has been considered. The clinician used to visit patients on digital platforms, making clinical evaluations based on the results of blood tests, diagnostic tests and imaging techniques. According to the clinician's indications, the pharmacist took contact with patients, first to collect information about any residual storage of the drugs, adverse reactions, therapeutic compliance, and then to proceed with the delivery. Everything has been done in conformity with the General Data Protection Regulation (GDPR).

What has been achieved?

From March to September 2020, the homedelivery service counted 501 shipments all over the Nation, 480 patients have been contacted to receive therapy and 250 of them have been intensively monitored by calling to manage their follow up. Everything has been done in order to protect critical patients from the pandemic, safeguarding the therapeutic continuity, in compliance with pharmacovigilance, risk management and cost saving for the national health system, considering that the suspension of therapies could be considered an additional and not quantifiable cost, but certainly important.

What next?

The hospital pharmacist must collaborate ever more with the clinician even in the post-pandemic phase, remotely managing not only the most weak patients, but extending the telemedicine and homedelivery services to an increasing number of patients, in order to safeguard their health.

Keywords | Clinical pharmacy, patient counselling, management, technology implementation, patient safety, patient safety.
Conflict of interest | I have no potential conflict of interest to disclose.

AN ITERATIVE APPROACH TO THE DEVELOPMENT OF PHARMACOLOGICAL MANAGEMENT GUIDELINES FOR THE TREATMENT OF PAEDIATRIC INFLAMMATORY MULTISYSTEM SYNDROME – TEMPORALLY ASSOCIATED WITH SARS-CoV-2

Authors: Carol Ann Jones, Nanna Christiansen

What was done?

This good practice initiative describes the rapid and iterative development of a treatment pathway for the newly described Paediatric Inflammatory Multisystem Syndrome – temporally associated with SARS-CoV-2 (PIMS-TS). Due to the similarity to Kawasaki disease and septic shock, the routine treatments for these conditions were considered as well as the experience of our adult colleagues, especially in terms of anticoagulation and hyper-inflammation seen in patients presenting with COVID-19. This ensured holistic management plans could be made to provide the highest quality of care.

Why was it done?

Starting in mid-April 2020 as a result of the Coronavirus pandemic, a cluster of patients displaying multisystem inflammation and shock were admitted to our hospital. Similar cohorts have subsequently been reported internationally. Over a 6 week period, in which our institution cared for over 70 children with the newly described PIMS-TS, we developed new pharmacological treatment guidelines. Due to the novelty of the disease, treatment options were unclear and decisions were made by a multidisciplinary team (MDT) of clinicians and pharmacists.

How was it done?

A MDT of clinicians (intensivists, infectious diseases, cardiologists, rheumatologist, haematologists, endocrinologists) and pharmacists arranged daily meetings to discuss admitted patients as well as pulling together information to formulate a treatment guideline to enable the safe management of these patients. Version 1 of the treatment pathway was approved in April 2020, and by the beginning of June version 6 was published. The final treatment pathway included intravenous (IV) immunoglobulin, IV methylprednisolone, aspirin, venous thromboembolism (VTE) prophylaxis and immunomodulation therapy including tocilizumab, infliximab and anakinra.

What has been achieved?

A total of 74 patients have been successfully treated against the treatment pathway, and discharged from hospital. Managing a new condition with no published evidence on treatment was a huge challenge, especially given the large numbers and high acuity of patients. Collaborative learning and reflection have enabled us to develop a robust treatment pathway for our patients. We have witnessed MDT working at its best, united with the sole aim of combating this rare condition.

What next?

An ongoing coordinated effort is required to undertake paediatric research to understand PIMS-TS and establish the most effective treatment for this novel disease.

Keywords | Clinical pharmacy, multidisciplinary team, drug safety, response rate, drug selection, drug formulary management.

Conflict of interest | I have no potential conflict of interest to disclose.

TELEPHARMACY PROGRAMME IN CHRONIC NEUROLOGICAL PATIENTS DURING THE COVID PANDEMIC

Authors: Rosario Mora-Santiago, Jose-Luis Ortiz-Latorre, Elena Sanchez-Yanez, Angel Jurado-Romero, Isabel Moya-Carmona

What was done?
The main purpose was to design a telepharmacy programme (TP) understood as the provision of pharmaceutical care by pharmacists through the use of telecommunications to patients located at a distance. Telepharmacy services include patient follow-up and clinical service delivery. In our case, home delivery is also included.

Why was it done?
During the health alert caused by COVID-19, home delivery was quickly implemented in our country to reduce attendance at the Hospital Pharmacy Service (HPS) to obtain their medications. In our HPS we transform home delivery into the telepharmacy programme (TP) with chronic neurological patients, who are suffering pathologies that decrease their autonomy, with the purpose to optimise clinical outcomes and reduce the risk of contagion.

How was it done?
We designed the TP stratifying stable chronic patients (more than 6 months of treatment) by level of autonomy, physical distance to our Hospital and high risk (due to immunosuppressive treatment). Inclusion in the TP was proposed to patients with multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS).
Telepharmacy appointments were recorded and scheduled within the outpatient care activity; they were recorded in the patient's medical history, as a pharmaceutical clinical follow-up, reviewing adherence, interactions and possible adverse events. Later, home delivery was made, through an external logistics company. Patients gave their consent to transfer personal data for home delivery.
Data collected were: sex and age, first or second line treatment in MS patients, pharmaceutical form (pill or syrup) in ALS patients and number of total deliveries made.

What has been achieved?
We started on April 2020 with the programme, 6 months later 56 patients were included, 48 with MS (total of MS patients attended by our HPS: 296) and 8 with ALS (total of ALS patient attended by our HPS: 58). Median age: 45 years in MS group and 65 in ALS group. In MS group 37 patients received first line treatment and 10 second line. In ALS patients 6 received tablets and 2 syrup. 420 deliveries took place (average: 3.1 for patient).

What next?
The implementation of the TP was well accepted, avoiding longed displacement in patients with neurological pathologies. Our future target is to reach a greater number of patients that can be included in the programme.

Keywords | Clinical pharmacy, clinical pharmacy services, clinical pharmacy, impact clinical pharmacy, drug dispensing, dispensing drugs.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 5 - PATIENT SAFETY AND QUALITY ASSURANCE

THE INTRODUCTION OF AN EMERGENCY INTRAVENOUS ANTIBIOTIC RECONSTITUTION SERVICE DURING THE COVID-19 PANDEMIC

Authors: Joanne Rhodes, Chris Bidad

What was done?
In the absence of aseptic dispensing facilities an emergency intravenous (IV) antibiotic reconstitution service was set up in a laminar flow operating theatre. Nurses who could not work in a patient-facing role during the pandemic prepared ready-to-use infusions under the direct supervision of a pharmacist.

Why was it done?
There was concern that there was a risk of reconstitution errors, missed doses or variation in dosing intervals which could impact on treatment efficacy and patient safety due to: • a sudden increase in demand for IV antibiotics, • depleted numbers of front-line nursing staff, and • nurses being deployed to unfamiliar clinical environments and encumbered by PPE. The emergency IV antibiotic reconstitution service was designed to mitigate these risks.

How was it done?
It was determined that a manufacturer's licence was not required under part 1, section 3 of the Human Medicines Regulations 2012 providing strict criteria were adhered to. Stability data were collated for the most frequently used IV antibiotics. Even where stability data supported a longer period, a maximum expiry of 24 hours after preparation was assigned. Processes were designed to adhere as closely as possible to the GMP principles described within the Rules and Guidance for Pharmaceutical Manufacturers and Distributors 2017. Specially tailored IV reconstitution training was delivered to the nurses.

What has been achieved?
Over a period of 4 weeks at the peak of the pandemic 1000 doses of IV antibiotics were prepared and supplied, enabling ward-based nurses to focus directly on patients. There were no reports of any incidents of delayed or missed doses, or administration errors relating to IV antibiotics supplied to the wards involved during this period. The time saved on the wards was equivalent to having 3 additional nurses on the wards each day.

What next?
With a reduction in the number of COVID-19 positive patients now presenting to the hospital the service has been paused but placed on standby so that it can be resumed in the event of a second wave. Work is underway to determine if there would be value in the team preparing a wider range of products, particularly those which may be of particular use in critical care areas such as sedatives and inotropes.

Keywords | Drug administration, ready to administer, patient safety, error-avoiding strategies, preparation and

compounding, aseptic preparation.

Conflict of interest | I have no potential conflict of interest to disclose.

EMERGENCY DRUG DISPENSING BY PHARMACIST BASED ON EPRESCRIPTION INFORMATION SYSTEM

Authors: Olga Nedopilkova, Stanislav Gregor

What was done?
The Association of Young Pharmacists, with support of the Czech Chamber of Pharmacists, created a project which is focusing on a possibility of dispensing a chronically used prescription drug in case a patient cannot obtain a prescription for various reasons ('emergency dispensing of a drug'). In hospital pharmacies in the Czech Republic (CZE), it is possible to dispense medicines to the public. A concept has been developed that describes all the essentials that must be followed.

Why was it done?
The project was created to increase quality and maintain continuity of health care provided in the Czech Republic and to prevent any discontinuity which could endanger the patient. Emergency dispensing of a drug is enabled by new functionality which is the patient's drug record (PDR) which was only launched in the CZE in June 2020. Last but not least it is about expanding existing competencies of pharmacists and strengthening pharmacists' position in the healthcare system.

How was it done?
A project proposal describing specific situations when the pharmacist can proceed to emergency dispensing, rules of the actual implementation and also cost analysis has been prepared. A search for experience from abroad has been conducted as well. Subsequently, a survey among pharmacists was conducted. The purpose of the survey was to determine whether pharmacists are interested in this competence and have comments on it. Then a comprehensive concept was submitted to the Ministry of Health. Specific legislative changes will now be needed.

What has been achieved?
Among pharmacists in the CZE, a considerable agreement was reached with the draft. According to the survey 94% of pharmacists agree with the prepared proposal, 3.2% disagree, and the remaining 2.8% agree with minor modifications to the request. Furthermore, we managed to develop a concept that describes detailed conditions for dispensing drugs in emergency mode. The concept was submitted to the Ministry of Health, with which the details of this proposal will now be gradually negotiated.

What next?
This project represents only one of the new competencies that pharmacists could achieve. We want to follow up on this step with another project that would enable pharmacists to prescribe chronically used drugs under specific conditions even outside emergency situations.

Keywords | Drug dispensing, dispensing drugs, drug prescribing and dosing, pharmacist prescribing, education and research, hospital pharmacy competencies.

Conflict of interest | I have no potential conflict of interest to disclose.

ROLE OF PHARMACISTS DURING COVID-19 PANDEMIC IN A BELGIAN GENERAL HOSPITAL

Authors: Lotte Deschepper, Kenny Noerens, Nilgün Kizilmese

What was done?
In our hospital one pharmacist was dedicated fulltime to the COVID-19 drug management. Another pharmacist was committed to ensure the safe and efficacious use of drugs by conducting medication reviews and giving relevant drug and laboratory recommendations.

Why was it done?
The COVID-19 pandemic caused limited availability of critical drugs and rapidly evolving treatment guidelines. Patient safety must be guaranteed at all times. However, the pandemic took the follow-up of drug shortages to an unprecedented level, increasing the risk of errors. Fulfilling this task was therefore difficult and new strategies needed to be implemented.

How was it done?
Microsoft Power BI©, a tool to analyse data, was used to monitor the specific drug needs on the COVID wards. Higher drug consumption was more rapidly detected and more specific actions could be executed. The available stocks in the hospital were also registered in a database and this information was updated and reported daily to the medical staff. In this way treatment guidelines could be proactively adjusted if necessary. Medication alerts were sent regularly by mail to ensure that all health care providers were informed about (temporary) changes in order to reduce the risk of medication errors.
Additionally, pharmacists collected evidence-based drug information concerning indications, dosing, possible side effects, drug-drug interactions and other precautions based on (inter)national guidelines. This information was used to develop a back-office validation tool that supported pharmacists to conduct medication reviews in a uniform manner. Daily updated reports from Microsoft Power BI© were used to analyse relevant interactions and contra-indications. Pharmaceutical recommendations were promptly documented and reported in the medical record of the patient and the physician was contacted immediately if urgent.

What has been achieved?
Due to the multi-disciplinary approach and guided medication use, therapy continuation could be guaranteed for all patients. Our validation tool resulted in the early detection and interception of medication errors ensuring patient safety.

What next?
A retrospective risk assessment will be done to evaluate our approach and a disaster plan concerning medication will be established based on our experience. The development of a computer-based analytical tool will be encouraged to maximise patient safety while minimising risk of medication errors.

Keywords | Clinical pharmacy, clinical pharmacy services, drug distribution and supply, drug shortage, patient safety, patient safety.

Conflict of interest | I have no potential conflict of interest to disclose.

A PHARMACOGENETIC CLINICAL DECISION SUPPORT SYSTEM (CDSS)

Authors: Xando Díaz-Villamarín, Ana Pozo-Agundo, Paloma García-Navas, Alba Antúnez-Rodríguez, Celia Castaño-Amores, Cristina Lucía Dávila-Fajardo

What was done?
We have developed a local Clinical Decision Support Systems (CDSS) that informs the physician on the availability of a pharmacogenetic (PGx) test in our hospital for certain prescribing drugs. This system will also be able to translate the genetic information into dosing recommendations.

Why was it done?
Nowadays, it is known that at least 33% of patients show variable response to drugs. Of those, genetic polymorphisms explain around 15–30% of these cases, single nucleotide polymorphisms (SNP) being the genetic markers most clinically relevant. In 2013, 40 million SNPs were identified in humans and some have been observed to determine drug response. These observations lead to the incorporation of genotyping some of these SNPs as a recommendation in many drug labels before treatment initiation. Since a patient's drug response may be determined by certain SNPs in different genes it is necessary to develop CDSS based on PGx information that makes feasible its application in clinical routine, translating genotypes into phenotypes and dosing recommendations.

How was it done?
We selected all the SNPs affecting drug response for which there is already a PGx test available in our hospital. All of them have been previously validated, and only genes/SNPs related to drug response with the highest level of evidence, available in the Dutch Pharmacogenomics Working Group (DPWG) and Clinical Pharmacogenetics Implementation Consortium (CPIC) dosing guidelines with a minor allele frequency higher than 0.1% in our population, have been included. We have considered all the different genotypes according to the SNPs included and linked them to a phenotype and dosing recommendation according to CPIC/DPWG guidelines.

What has been achieved?
Our CDSS connects different drugs with available PGx test in our unit, showing which gene should be genotyped before prescription. It translates genotypes into phenotypes and also provides dosing recommendations once PGx results are received, according to the CPIC and/or DPWG guidelines. Nowadays, this system facilitates the workflow for the implementation of pharmacogenetic tests in our hospital.

What next?
We have developed a CDSS that manages PGx information facilitating the implementation of pharmacogenetics in daily clinical routine. It will also allow us to expand our services to other medical departments within our hospital.

Keywords | Drug information, pharmaceutical counseling, IT, electronic prescribing system, patient safety, error-avoiding strategies.

Conflict of interest | I have no potential conflict of interest to disclose.

HOW TO SECURE THE COLD CHAIN MANAGEMENT OF TEMPERATURE-SENSITIVE PRODUCTS IN THE HOSPITAL AND WHAT IS THE ECONOMIC IMPACT?

Authors: Cyril Magnan,Elise Betmont, Guillaume Saint Lorant, Hubert Benoist

What was done?
Cold chain is a major issue in the pharmaceutical industry as a growing number of its products are temperature-sensitive and also in hospitals. In 2017, 27 cold chain breaks were declared by care units (CU) within a French teaching hospital, resulting in a risk for patient care and a potential loss of 40,363 euros, of which 18,505 euros (45%) could be avoided. Following this first study, a set of measures have been implemented in our establishment in order to secure the cold chain.

Why was it done?
In our hospital the main CF Unit for Adults in the country is located. Ensuring that as many as possible young patients benefit from accessing the new and crucial treatment, even during the COVID-19 period, reflects our commitment to improve patients' outcomes and overall survival.

How was it done?
3 outpatients enrolled in the CT and procedures regarding the protocol have been followed strictly. Medication dispensing is conducted every 12 weeks.

What has been achieved?
The schedule modification allowed a reshaping of agendas to reduce the frequency of day-hospital access and the risk of infection with SARS-Cov-2 for patients, carers and health professionals, in addition to reducing the costs of outpatient services. Treatment interruption rate, with possible consequent progression of disease, as reported by early Chinese data in the literature, has been reduced.

What next?
To evaluate the economic impact of improvement actions taken since 2017 on temperature-sensitive product (TSP) management.

Keywords | Clinical pharmacy, clinical practice, drug prescribing and dosing, dosage, drug safety, drug safety.
Conflict of interest | I have no potential conflict of interest to disclose.

IATROMED 360°#NEONAT: METHODOLOGY TO DEVELOP AND EVALUATE A VIRTUAL REALITY-TRAINING COURSE ON MEDICATION ERROR PREVENTION AND MANAGEMENT IN NEONATAL INTENSIVE CARE UNITS (NICUs)

Authors: Elodie Delavoipière, Laura Fazilleau, Carine Lehoussel, Isabelle Goyer, François-Xavier Roth, Julien Mourdie, Agnès Bobay-Madic, Simon Rodier, Bernard Guillois, Albane Cherel

What was done?
360° virtual room of errors is an innovative educational tool which can be included in strategies of ME risk management. NICUs are high-risk areas and, consequently, a priority target. Therefore, we developed and evaluated a virtual reality-training programme based on medication error management in the NICU of a university hospital centre.

Why was it done?
The COVID-19 pandemic necessitated the rapid transition of benralizumab dependent SEA patients onto home administration to facilitate ongoing therapy in a cohort of patients who were "shielding" under UK government guidance.

How was it done?
A multidisciplinary working group was set up (2 pharmacists, 2 neonatologists, 1 pharmacy resident and 3 NICU nurses) to define: the target audience, the training model, the assessment methods (pre-training and post-training evaluations), training days and educational materials.

What has been achieved?
The programme was intended for professionals involved in the medication circuit in the NICU: physicians, residents, and nurses. Weekly sessions have been scheduled in order to train 99 professionals. Every session was run by 3 professionals (physician, nurse and pharmacist) and lasted two and a half hours. The session was divided into 5 stages: 1) pre-training evaluation, 2) briefing, 3) 360° digital simulation allowing ME detection, 4) debriefing, 5) post-training evaluation. Although it was a digital-training, a pedagogical formula with "classroom" training sessions has been chosen in order to promote interactivity between learners and trainers particularly during the debriefing. This virtual reality-training course was assessed by Kirkpatrick's four levels of training evaluation model: satisfaction questionnaires, knowledge evaluation and skills self-assessment, audits of practices, monitoring of indicators (adverse event reports). Assessments were done before each session, immediately after and within 3 months of the session, to both evaluate and enhance educational impact.

What next?
This concept promotes the link between clinicians from the NICU and the multi-disciplinary approach concerning the risk management of ME. By directly involving all the healthcare professionals, this innovative training provides a patient-safety culture development and the implementation of safety measures. The implementation of this training concept in a multi-centric assessment of professional practices should enable to confirm pedagogical interest of such innovative sessions and its deployment in other health facilities.

Keywords | Patient safety, medication error, quality, error-avoiding strategies, quality, risk management.
Conflict of interest | I have no potential conflict of interest to disclose.

USE OF LINKED DATA SOURCES IN DYNAMIC DASHBOARDS TO VISUALISE HOSPITAL PRACTICE DIFFERENCES IN MEDICATION USE AND OUTCOMES

Authors: Rawa Ismail, Jesper van Breeschoten, Michel Wouters, Anthonius de Boer, Alfonsus van den Eertwegh, Maaike van Dartel, Caspar van Loosen, Doranne Hilarius

What was done?
In the Dutch Institute for Clinical Auditing (DICA) medicines project, administrative data on the use of expensive drugs from hospital pharmacies were linked to clinical data from national quality registries and hospital declaration data. Data were visualised in six dynamic dashboards (lung cancer, breast cancer, rheumatic disorders, colorectal cancers, gynaecological cancers and metastatic melanoma), leading to insight into expensive drugs use and clinical outcomes in real-world practice.

Why was it done?
Most drugs obtain approval based on limited numbers of highly selected patients and mostly surrogate outcomes. Little is known on hospital variation on the use of new treatments in daily clinical practice. Benchmark information can be used to limit between hospital variation and provides real world evidence on the value of these treatments.

How was it done?
The three data sources were linked using patient-specific data and provide real-world insights in anti-cancer drug use and outcomes. After linkage, data were validated by individual sessions with hospital pharmacists and medical specialists.

What has been achieved?
Hospital pharmacists and medical specialists gained insight into expensive drugs use and treatment patterns in patient groups, compared to other hospitals. The dashboards also contain information on outcomes such as toxicity, emergency admissions, and time-to-next treatment, and users receive signals when their use of expensive medicines deviates from the benchmark. An example of the information provided by the dashboards was the number of stage IV non-small cell lung cancer patients treated with only one or two gifts of pembrolizumab. All hospitals received a report on this subpopulation to improve their treatment approach. Other findings were differences in the adjuvant treatment of stage III colon carcinoma patients and the treatment duration of trastuzumab/pertuzumab as adjuvant treatment in breast cancer patients.

What next?
The DICA medicines project is an example of good practice as it reuses available data sources without any additional registration burden. In the future, the dashboards will be extended with survival data and PROMs data. The focus of the programme in the next year will be to include all hospitals in the Netherlands and to extend the dashboards with more features.

Keywords | Clinical pharmacy, shared decision making, drug use evaluation, drug efficacy, drug use evaluation, drug therapy outcomes.
Conflict of interest | I have no potential conflict of interest to disclose.

NEW TECHNOLOGIES TO IMPROVE SAFETY IN PREPARATION AND ADMINISTRATION OF INTRAVENOUS ANTINEOPLASTIC DRUGS

Authors: Carlos Aparicio Carreño, Arantxa Gándara Ande, Beatriz Fernández González, Andrea Forneas Sangil, Belén Rodríguez de Castro, Rubén Pampín Sánchez, Cristina Martínez-Múgica Barbosa, Paloma Nieves Terroba Alonso

What was done?
A new computerised system was established to improve quality control and traceability in preparation and administration of an intravenous antineoplastic drug (IAD).

Why was it done?
To improve safety during preparation and administration of IAD.

How was it done?
The software currently in use was updated, checking densities of IAD, weights of diluents and consumables. Protocols in pharmacology were adapted and maximum permissible error rates during elaboration were established. The Aseptics Pharmacy Department was equipped with a barcode label printer (BLP), a barcode scanner (BS), a precision scale and an All In One computer for the biological safety cabinet (BSC). The Haematology and Oncology Day Treatment Unit (DTU) was equipped with a BLP (for hospital bracelets) and portable computers with BS.
Regarding elaboration, a qualitative control was performed in the BSC by scanning data matrix or barcodes, recording batches and expiration dates, both of the diluent and antineoplastic agents. A quantitative gravimetric test was also performed using weight measurement of the diluent and devices before and after adding the drug. When the mixture was correctly prepared a label was printed with an identifying barcode.
Administration of the right bag to the right patient was also ensured by scanning barcodes in DTU: a hospital bracelet with a barcode was printed to identify each patient at their arrival to DTU. Prior to administration, double scan confirmation was made, checking patient's bracelet and treatment (label), by using BS, ensuring that each patient received the drug, at the right dose, on time and by the correct route of administration.

What has been achieved?
All intravenous cancer therapies have been administered with double scan confirmation in DTU since the new system was established (November 2019).
This new way of processing IAD has been completely installed, but not all the antineoplastic treatments have been prepared with quality control.
The whole process has also left a complete computer record of the staff, task performed, time, duration and potential incidents.

What next?
We will gradually implement quality control while processing all intravenous antineoplastic treatments.

Keywords | Drug administration, ready to administer, patient safety, rror-avoiding strategies, preparation and compounding, safety cabinets.
Conflict of interest | I have no potential conflict of interest to disclose.

USING IN-HOUSE RAPID QUALITY CONTROL EQUIPMENT TO REVEAL MORPHINE AMPOULE TAMPERING – A CASE REPORT

Authors: Robert Baghdarsarian, Karin Hellström, Mattias Paulsson

What was done?
This case report describes how the compounding unit of Uppsala University Hospital (CU) was able to assist in analysing the contents of morphine glass ampoules and infusion solutions, in a case with suspected tampered containers.

Why was it done?
The health care providers at the Paediatric Emergency Ward discovered that when opening glass ampoules of morphine by snapping the top off, this did not result in the normal straight cut by the score. A close examination also revealed residual glue and the glass at the ampoule neck not being fully transparent. The sealed outer packaging also seemed manipulated for most of the morphine ampoules stored in the ward medication room. Simultaneously, staff discovered that one of the paediatric patients had not received the anticipated analgesic effect of the ordered morphine infusion.

How was it done?
CU has invested in an easy-to-use spectrophotometer to check the concentration and identity of chemotherapy prepared in the clean rooms. The primary focus is to have an independent system to check preparations done by the chemotherapy robot e.g. in connection with software upgrades. This equipment was within hours adapted to be used for morphine analyses. The results clearly show that the infusion labelled 10 mg/mL was tampered with, containing only 0.4 mg/mL morphine. Samples were also sent to the Microbiological laboratory to check for risks for microbial exposure during infusion of tampered morphine.

What has been achieved?
CU was able to provide results of the contents of all ampoules, and the infusion solution administered to the patient, within a couple of hours and without any cost. The results showed that all ampoules had been emptied of their labelled contents and likely refilled with Sodium Chloride 9 mg/mL. The infusion solution given to the patient was also likely prepared from a tampered ampoule. These results were crucial information in the conversation with parents about the incident, and the subsequent report to the police regarding the probable violence offence.

What next?
We recommend that all healthcare settings evaluate the possibility to collaborate closer with the hospital pharmacy, and in new ways. Thanks to our CU being an integral part of the hospital with close interaction with wards, this rapid handling was possible to stage.

Keywords | Clinical pharmacy, healthcare team, drug dispensing, dispensing drugs, patient safety, errors.

Conflict of interest | I have no potential conflict of interest to disclose.

ISMP MEDICATION SAFETY SELF ASSESSMENT® FOR HIGH-ALERT MEDICATIONS – ASSESSMENT OF THE SAFETY OF SYSTEMS AND PRACTICES ASSOCIATED WITH SIX CATEGORIES OF HIGH-ALERT MEDICATIONS

Authors: A. Sonnleitner-Heglmeier, M. Jeske, C. Petter, S. Grimm, S. Kerndler, U. Horvath

What was done?
We translated, adjusted and introduced the Medication Safety Self Assessment® for High-Alert Medications from the Institute for Safe Medication Practice (ISMP)–USA to our university hospital. With a clinical pharmaceutical approach in multidisciplinary teams, we revealed challenges on different wards in the hospital and discussed and planned appropriate solutions.

Why was it done?
The aim of this initiative was to assess, from 14 December 2018 to 7 February 2019, the practices associated with six high-risk drug classes – opioids, insulin, anticoagulants, methotrexate for non-oncological indications, muscle relaxants, chemotherapeutics – and high-risk drugs in general at the University Hospital Innsbruck using the ISMP Medication Safety Self Assessment® for high-risk drugs. A further reason was to build up a strong and active cooperation among interdisciplinary teams with the focus on clinical pharmacy to raise awareness towards the competencies of clinical pharmacists.

How was it done?
The first step was to find an appropriate assessment accreditation programme which was found by the ISMP Medication Safety Self Assessment® for High-Alert Medications. This tool offers the opportunity to assess the safety of systems and practices associated with up to 11 categories of high-alert medications. As the assessment was written in English it had to be translated by us into German for a better basis for discussions. Further, as the ISMP assessment is implemented in the USA, words and processes had to be adjusted to the work in an Austrian university hospital. To optimise the outcome of the ISMP, the drug therapy pharmacy department, health care practitioners, and care management, jointly implemented a quality assurance project.

What has been achieved?
Different hazardous workflows and medication handling processes beginning from pharmacy dispensing until receiving patients got identified and discussed. The urgent need of a patient data management system was emphasised to safely ensure a closed loop medication management. This would allow a clear and trackable communication in and between different wards and reduction in errors made by clinical staff.

What next?
The foundation was built for compulsory personal training done by clinical pharmacists on different wards. The awareness towards the importance of clinical pharmacy was strongly increased leading to more inclusion, eg, developing guidelines.
Keywords | Clinical pharmacy, clinical pharmacy services, drug safety, safety profile, hospital setting, multidisciplinary team.
Conflict of interest | I have no potential conflict of interest to disclose.

POSSIBLE INTERACTIONS FROM COVID-19 DRUG EMPLOYMENT: THE HOSPITAL PHARMACIST'S INTERVENTION IN A REGIONAL HOSPITAL

Authors: Simone Leoni, Sabrina Guglielmi, Vincenzo Nicola Menditto, Adriana Pompilio, Francesca Vagnoni

What was done?
During the COVID-19 emergency we developed a quick reference tool for clinicians involved in first line assistance to patients. A table summarising drug–drug interactions (DDI) of the most used therapies was created to allow professionals making the best pharmacological decision.

Why was it done?
During the pandemic, almost all hospital departments were converted in COVID-19 wards and clinicians of several specialisations were asked to work in. In a situation characterised by a great number of patients, mainly old and with several comorbidities, health professionals had to employ quickly drugs never used before and supported by limited scientific evidence. In this context the percentage of possible DDI rises out of proportion exposing patients to potential devastating consequences.

How was it done?
After a literature review using Micromedex and TERAP (Mario Negri Institute), we have created two tables summarising DDI of lopinavir/ritonavir (LR) and hydroxychloroquine (HC). Those drugs have been grouped according to pharmacological group and clinical relevance. The tables were provided to Infectious Disease, Intensive Care Unit and Emergency Medicine departments.

What has been achieved?
The tables showed 359 DDI for LR (67% contraindicated/severe, 12% major and 21% moderate) and 176 for HC (96% contraindicated/severe, 1% major and 3% moderate). Almost all contraindicated/severe interactions of HC were the same of LR and regarded: protein kinase inhibitors, beta2 agonists, macrolides and fluoroquinolones antibiotics, some antidepressants, phenothiazines, protease inhibitors and antiarrhythmics. Other LR severe interactions were: factor Xa inhibitors, statins and benzodiazepine derivates. Both LR and HC present moderate interactions with acid pump inhibitors, while LP interacts with Ca and vitamin K antagonists and antiepileptics.
Interactions mentioned have a great impact, since they concern drugs commonly used, and hypertension, diabetes, respiratory system disease, and cardiovascular disease are the most frequent comorbidities linked to COVID-19. The tables provided had a positive impact in avoiding DDI. The Pharmacist was consulted for drug dosing and frequency adjustments. The intervention was fully accepted and extended to the rest of COVID-19 wards.

What next?
The project represents a good example of multidisciplinary collaboration able to improve safety and efficacy in pharmacological treatments. The added value of the

Pharmacist and the simplicity of the tool make it useful and easy to extend to other healthcare settings.

Keywords | Clinical pharmacy, pharmacy interventions (pi), drug safety, drug interaction, patient safety, error-avoiding strategies.
Conflict of interest | I have no potential conflict of interest to disclose.

INCOMPATIBILITIES OF PARENTERAL DRUGS IN INTENSIVE CARE – ANALYSIS AND OPTIMISATION OF ADMINISTRATION SCHEDULES OF CENTRAL VENOUS CATHETERS AND FREQUENTLY USED DRUG COMBINATIONS

Authors: Martina Jeske, Jasmin Stoll, Vanessa Funder, Sabine Bischinger

What was done?
To optimise the drug therapy at four intensive care units (ICUs) of the University Hospital, the pharmacy department, physicians, and care management jointly implemented a quality assurance project. In multidisciplinary teams, we had to overcome various challenges in different wards to develop standards regarding administering drugs via multi-lumen catheters. We analysed all frequently used drugs (n=72) for their compatibility and summarised findings in a crosstable.

Why was it done?
Due to the limited number of ports, it is necessary to administer several drug solutions via the same access. Incompatibility reactions can occur and may lead to a reduction or loss of drug efficacy and severe damage to the patient's health. The objective was to create standardised administration protocols for central venous catheters and verify parenterally administered drugs' incompatibility reactions. A further purpose was to build multidisciplinary cooperation to improve the drug administration processes.

How was it done?
The current situation was recorded using a questionnaire and collecting individual cases of protocols for central vein catheters. About 2000 drug–drug combinations were analysed using three databases, KiK 5.1, Micromedex, Stabilis 4.0, corresponding specialist information, and manufacturer data. Nevertheless, the compatibility check based on the databases is subject to some restrictions. In several cases, the databases give different or contradictory results, and compatibility data are rarely available for some combinations. The project revealed that although infusion therapy is standardised in intensive care units, there are fewer standards regarding administering drugs via multi-lumen catheters. There are significant differences between theory and practice in terms of handling infusion therapy.

What has been achieved?
Different hazardous practices got identified and eradicated. The incompatibility table allows a quick assessment. The advantages/disadvantages of varying software systems were broadly discussed. KiK 5.1 was implemented in the ICUs, Micromedex in the pharmacy department. The team agreed that existing uncertainties must be decided jointly. Different practices in different wards may pose a threat to patient safety. The results were presented in a clinic-wide interdisciplinary training.

What next?
The awareness towards the need for cooperation and hospital pharmacists' competence concerning incompatibility reactions strongly increased, leading to more standardisation in the infusion therapy and avoiding incompatible drug combinations. The aim is to initiate a continuous improvement process.

Keywords | Drug administration, administration, drug safety, sdverse drug events, patient safety, computerised medical record.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLEMENTATION OF A DASHBOARD WITHIN A QUALITY MANAGEMENT SYSTEM IN THE PHARMACY DEPARTMENT

Author: Hana Sakly

What was done?
The purpose of our work is to identify the key performance indicators for management and piloting a hospital pharmacy. The aim is to develop dashboards, a real management tool, for the management and monitoring of pharmaceutical activities in order to optimise performance and ensure continuous improvement.

Why was it done?
The pharmacy must assess its own activity in order to better manage, to structure, and respond to needs. This assessment is necessary in order to measure the productivity.

How was it done?
The methodological basis of our study is based on a process-based management of hospital pharmaceutical activities. Our target is to achieve the same approach to these processes, within the various functional and concerned units, in order to harmonise and simplify the quantitative and qualitative monitoring of pharmaceutical activities.

What has been achieved?
Macroscopic cartography of pharmacy processes was established and the most critical processes were selected on the basis of a matrix. In total, eight key processes have been identified. The identity cards for these processes have been drawn up. Quality indicators have been identified. These indicators are intended to assess and monitor the processes. A first design of dashboards with the elements collected was proposed. This dashboard could evolve during the implementation of this project within the Pharmacy department.

What next?
These dashboards have to be finalised, validated and officially put into practice within the Pharmacy department. This methodology must be applied to the discipline of Clinical Pharmacy. Quantitative and qualitative assessment of the activities carried out within the pharmacy should be a subject for priority debate at the national level to finally find agreement on a relevant measurement tool.

Keywords | Management, management, quality, quality indicators, quality, quality management system.
Conflict of interest | I have no potential conflict of interest to disclose.

HOME DELIVERY SERVICE DURING COVID-19 PANDEMIC TO RHEUMATOLOGIC DISORDERS

Author:s: Ana Pelaez Bejarano, Maria de las Aguas Robustillo Cortes, Pilar Villar Santos, Olalla Montero Pérez, Ignacio Garcia Gimenez

What was done?
On 14 March 2020, the Spanish government declared a state of alarm to deal with the spread of COVID-19. Medication dispensing protocols were immediately established to deliver drugs to patients who could not come in person to the hospital pharmacy department. These measures were designed to benefit citizens who, due to age or physical fragility, were more vulnerable to contagion. We had the collaboration of community pharmacies actively practising during the COVID-19 pandemic and a logistics service, with no extra cost to the public healthcare system..

Why was it done?
Rheumatologic disorders carry increased risk of infection compared with the general population, so facilitating access to hospital medications is of vital importance.

How was it done?
Between 30 March and 1 September 2020, a circuit was designed as follows: First, patients request the delivery service in the community pharmacy of their choice, which sends the request of each patient to college of pharmacists. Later, this institution sending of applications received from all pharmacies to hospital pharmacy. Here, the hospital pharmacist reviewed the patient's electronic medical record, checking that the medication requested was appropriate, modifying it if deemed necessary (change of drug, dose, and so on). A pharmaceutical cooperative sending antirheumatic drugs to the community pharmacies. Finally, the community pharmacist who received the package checked the medication and, with the patient, reviewed and reinforced the information on the treatment.

What has been achieved?
587 patients were included: 211 rheumatoid arthritis, 173 psoriatic arthritis, 121 psoriasis and 82 ankylosing spondylitis. The delivery service enabled us to provide antirheumatic drugs to patients in their immediate environment through a service that was free for both the patient and the hospital pharmacy service. This contributes to guaranteeing the achievement of the pharmacotherapeutic objectives established for these patients.

What next?
Further action is needed to identify which groups of patients require more intensive pharmaceutical care and, therefore, who could benefit most from telepharmacy, and not only the delivery service.

Keywords | Drug dispensing, dispensing drugs, drug prescribing and dosing, prescription compliance, hospital setting, hospital-home transition.
Conflict of interest | I have no potential conflict of interest to disclose.

IMPLEMENTATION DESIGN OF A SECURITY STRATEGY IN THE HANDLING OF HAZARDOUS DRUGS IN A SOCIAL HEALTH CENTRE

Author:s: Cristina Mora Herrera, Victoria Vazquez Vela

What was done?
The hazardousness of drugs can cause damage due to exposure in healthcare workers from Social Health Centers (CSS). As an objective, the design of a security strategy in the handling of hazardous drugs (HD) was proposed with the elaboration of a safety working procedure (SWP) and preventive measures. In addition, the HDs were identified, with proposals for alternatives and recommendations for handling and administration were released.

Why was it done?
Occupational exposure to HD can cause health damage to exposed healthcare professionals, so protective measures must be taken.

How was it done?
Observational cross-sectional study to identify employment MPs in a public CSS. The demographic characteristics of the patients and their pharmacotherapeutic prescription were recorded. A total of 107 residents were included, with a mean age of 78.9 years and 59.8% (64) men. The average stay in the centre was 7.4 years (1–27). Regarding functional capacity, 53.3% were considered assisted, 89% of them with grade III-II assessment, that is, large dependents and severe dependents. Of the valid group (46.7%), 70% belonged to socially excluded. The most prevalent pathologies in the centre are vascular, neurodegenerative, osteomuscular and respiratory. The mean number of medications per patient was 4.8. Only 6 patients did not receive pharmacological treatment.
The design of the security strategy was structured in 3 phases; 1st) Elaboration of an SWP with assignment of functions/ responsibilities, preventive measures to be adopted in the handling of HDs, description of the circuit and quality indicators of the strategic procedure; 2nd) Carrying out a descriptive observational cross-sectional study to identify the HDs used. The list of active principles (AP) included "NIOSH list of antineoplastic and other hazardous drugs in healthcare settings 2014" was compared with those included in the GFT of the centre; 3rd) Releasing of recommendations through information sessions/workshops for healthcare professionals.

What has been achieved?
An effective and safe employment system/circuit is established in the SWP, with relative preventive measures to control associated risks that may occur in handling and/or administration. 22 HDs were identified. A safer alternative was proposed for 9. Recommendations for the handling of HDs, associated risks and proper use of PPE were disseminated through 2 training sessions.

What next?
The identification of hazardous drugs and communication of improvement actions made it possible to implement a standard work procedure guaranteed safety in handling, and to provide an adequate means to avoid exposure due to healthcare workers.

Keywords | Drug safety, safety profile, patient safety, error-avoiding strategies.
Conflict of interest | I have no potential conflict of interest to disclose.

HANDLING OF HAZARDOUS DRUGS IN HEALTHCARE SETTINGS – HAZARD EVALUATION AND PROTECTIVE MEASURES RELATED TO EXPOSURE LEVELS

Authors: Falko Schüllner, Martina Jeske, Martin Munz, Sabine Bischinger, Anna Reich

What was done?
In this study drugs used in the University Hospital considered hazardous and to describe potential exposure values were evaluated in connection with exposure limits. A health risk assessment was conducted regarding protective measures related to exposure levels.

Why was it done?
The right handling of hazardous drugs in healthcare settings is essential to ensure occupational safety and health as the use and number of these potent drugs increase. In the last decades, protection at the workplace has become more important and several organisations analyse substances for this very reason. Although the antineoplastic drugs remain the principal focus, other drugs may also be considered hazardous because they are potent or cause irreversible effects.

How was it done?
The National Institute for Occupational Safety and Health (NIOSH) assumes five categorisations with hazardous potential. According to their ATC-Code, substances from this categorisation were listed. Findings of the European Chemicals Agency (C&L inventory), European Directorate for the Quality of Medicines & HealthCare, manufacturer's guidance, European public assessment report, and safety data sheets were compared with categorisation from the International Agency for Research on Cancer, NIOSH, Food and Drug Administration pregnancy categories, and publications from the German Berufsgenossenschaft für Gesundheit und Wohlfahrtspflege. The topic of exposure was divided into a determination of exposure limits in safety data sheets or in the "Grenzwerteverordnung" and into published information regarding exposure in healthcare settings. Monoclonal antibodies were examined separately. For risk assessment purposes, Stoffenmanager and other relevant tools were used.

What has been achieved?
717 substances were analysed. 461 of them showed at least one probable hazardous or hazardous characteristic. It was possible to establish 177 threshold values, 124 for hazardous substances. The range of threshold values for the criterion "hazardous" was 0.015 µg/m3 – 10 mg/m3. Further research yielded a few public health publications referring to exposure values. It is hardly possible to quickly obtain information on the hazard potential of drugs, but C&L inventory has shown good results. Besides, there is a lack of data on exposure limit values, which is due to the difficulty in providing safety data sheets from manufacturers. As a result, exposure tools are not readily available for use by health care workers.

What next?
In an ongoing process every new drug will be evaluated towards the hazardous properties respectively associated exposure limits and communicated to the health care workers in the institution.

Keywords | Drug safety, poisoning, drug safety, safety profile, drug safety, toxicity.
Conflict of interest | I have no potential conflict of interest to disclose.

SECTION 6 - EDUCATION AND RESEARCH

MANAGING THE RISK OF MEDICATION ERRORS: A MULTI-DISCIPLINARY CONTINUING PROFESSIONAL DEVELOPMENT PROGRAMME

Authors: Elodie Delavoipière, Marianne Pavard, Anne-Laure Richard, Julien Montreuil, Albane Cherel, Céline Bouglé

What was done?
A regional multi-disciplinary Continuing Professional Development (CPD) programme was developed, dealing with the risk management of medication errors (ME).

Why was it done?
Every year in our country, 10,000 preventable deaths and more than 130,000 preventable hospitalisations are related to drug misuse. This issue is a priority of the national health strategy. Therefore, we developed a CPD training programme on the issues and methods of managing the risk of ME.

How was it done?
This program was submitted to the National CPD Agency and accepted as a continuing education measure, corresponding to the national orientation: "control of risks associated with healthcare acts and pathways". The programme and the training materials were developed by a 13-member regional working group, including hospital pharmacists and quality managers, the drug observatory and the regional health quality network.

What has been achieved?
The training is intended for any health professional involved in the medication circuit in a health or medico-social institution: physicians, pharmacists, residents, nurses, pharmacy technicians. The first part is an e-learning slide presentation with voice commentary, on the theoretical aspects of ME and on the principles of a priori and a posteriori risk management. Concrete examples of ME are integrated throughout the slide presentation. This e-learning is divided into 4 parts and is accessible for 1 month. It must be validated by the learner before participating in the second part of the training: a face-to-face simulation session with 15 learners and 2 hospital trainers (pharmacist and health quality professional). During half a day, the learners apply a posteriori risk management by analysing a fictional adverse event (ME). The case addresses several themes: never events, drug reconciliation, city-hospital link, lack of communication, human factors. Questionnaires completed before, during and after the training allow for the evaluation of learners' satisfaction as well as the impact of the training on their knowledge and skills.

What next?
This regional training will promote the link between actors from different institutions and the multi-disciplinary approach around the management of the risks of ME. In addition, we provide an awareness kit on ME reporting,

including a customisable slide show and a quiz, which allows short sessions to be conducted in any health facility.

Keywords | Drug safety, drug safety, education and research, educational program, quality, risk management.
Conflict of interest | I have no potential conflict of interest to disclose.

WHAT IS A GPI (GOOD PRACTICE INITIATIVE)?

The GPI initiative was launched as part of EAHPs effort to show to stakeholders what European hospital pharmacists are doing, and might also be part of the coming educational programme of EAHP.

The overall purpose of collecting and sharing GPIs is:

to inspire and encourage fellow hospital pharmacists in other countries to strive for the next high standard in practice;
to identify how colleague hospital pharmacists were able to overcome barriers and obstacles in order to make improvement happen; and,
to give recognition to those who have completed successful new initiatives in hospital pharmacy service.

GPIs can continually be submitted via the submission page in the EAHP website. There will be one closing deadline a year: 15 October. GPIs submitted by this deadline will be evaluated and, in case of acceptance, uploaded to the GPI-database within 45 days from the deadline. Should changes be foreseen, authors will be notified by the EAHP secretariat. Mor information HERE.