CYBER RESILIENCE : DEVELOPMENT OF A DIGITAL CLINICAL CONTINUITY SOLUTION TO MAINTAIN SAFE PRESCRIPTION AND COMPOUNDING ASSISTANCE IN ONCOLOGY

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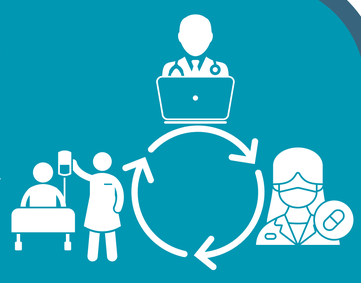
Background & importance

- In France, the growing threat of cyberattacks on healthcare has leaded health authorities to mandate the deployment of clinical continuity plan in each hospital department.
- In Oncology, care units and hospital pharmacy often share the same Electronic Medical Record (EMR) CHIMIO® (Computer Engineering) which combines a Computerized Physician Order Entry (CPOE) with an intra-venous compounding workflow management system (IVWMS).



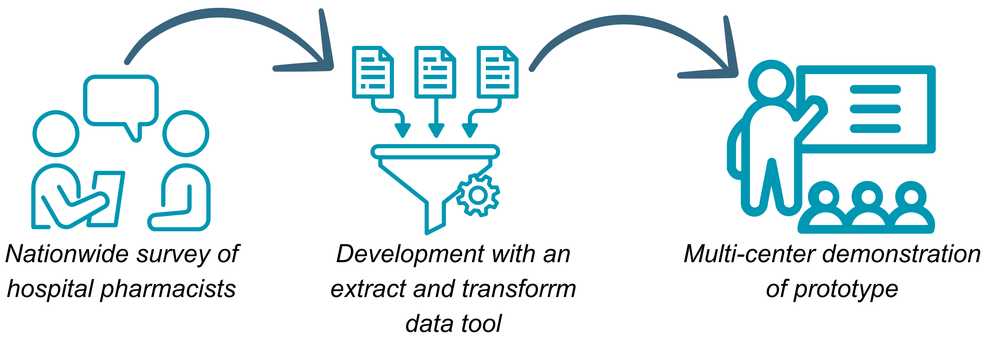
This digital workflow is dramatically sensitive to cyberattacks and its unplanned interruption can disrupt care and force patients to be rerouted to other hospitals

Aim & objectives

Develop a digital contingency plan in oncology, in order to maintain the oncology workflow safe and secure, avoiding to go back to pen and papers in case of cyberattacks

Material and methods

- **Nationwide survey** of hospital pharmacists with or without cyberattack experience
- **Development of the solution**
- **Multi-center demonstration** of the prototype with benchmark test and improvements based on feedbacks



Nationwide survey of hospital pharmacists — *Development with an extract and transforrm data tool* — *Multi-center demonstration of prototype*

Results

Nationwide survey

88 surveys responses lead project specification to include

- Fast and easy recovery solution
- Secure, automated and equivalent calculation of regimens and compounding formulas
- CHIMIO® backward compatibility

Development of the solution

- Extraction of dozens of tables from the database used by CHIMIO®
- Digestion of data by a PowerQuery code (Microsoft Excel ®)

→ Able to assist prescribers and pharmacists in prescription and dispensation the same way as usual

→ Works offline and easily communicable between computers from care units to the hospital pharmacy

Prescriber — *Pharmacist* — *Nurse*

Hôpital	GHSIF	Sexe (H/F)	H					
NOM Prénom	LEVIEUX Andre	Poids (kg)	65		Surf. corp (m²)	1,83		
IPP	123456789	Taille (cm)	180		Clairance (mL/min)	59,16		
Né(e) le	5/1/95 29 ans	Créat. (µmol/L)	150		Date du RDV	01/03/2024		
Service	HDJ PNEUMO	Cycle	1		Heure du RDV	8:00		
Incl. par	Ouloulou	Jour	1	1 - Sélectionner le protocole dans le menu déroulant				
OK Chimio par	Pineda	Numéro du dernier cycle voulu	1		CAV			

2- Générer apercu du protocole | 3- Saisie l'indication hors GHS | 4 - Générer le plan d'administration | 5 - Générer la fiche de fabrication

Réduc. (%)	Dose v	Jour(s)	NOMDCI	Dose Prot.	Dose esti.	DISPSOLV.NOMPDT	CODEVOIE	Heure	Durée
		1	Prémédication	80 mg	80 mg	METHYLPREDNISOLONE 40 M	IV	07:15	00:10:00
		1	Hydratation	1000 mg	1000 mg	Bionolyte G5 (B26) (polyioni	PERF	07:30	04:00:00
		1	Prémédication	8 mg	8 mg	ZOPHREN 8 MG INJ	IV	07:30	00:15:00
		1	Cyclophosphamide	1000 mg/m²	1827,79 mg	NaCl 0.9% 1000ML POCHE FI	PERF	08:00	01:00:00
		1	Prémédication	400 mg/m²	731,12 mg	UROMITEXAN 400 MG INJ	IV	08:00	00:15:00
		1	Doxorubicine	45 mg/m²	82,25 mg	NaCl 0.9% 100ML POCHE FRI	IV	09:15	00:15:00
		1	Vincristine	1,4 mg/m²	2 mg	NaCl 0.9% 100ML POCHE FRI	IV	10:00	00:15:00
		1	Prémédication	400 mg/m²	731,12 mg	UROMITEXAN 400 MG INJ	IV	12:00	00:15:00
		1	Prémédication	400 mg/m²	600 mg	UROMITEXAN 600 MG CP	PO	16:00	00:00:00

Prescribe module with preview of the administration plan

CH MELLN - GHSIF
LEVIEUX Andre - (05/01/1995)
Serv. : HDJ PNEUMO - Adm. le 01/03/2024 - C1J1

CYCLOPHOSPHAMIDE 1100 mg / 55 mL en IV sur 1:00:00 - NaCl 0.9% 500ML POCHE FREEFLEX / CONNECT Z (Vol. : 554 mL)

Conservation : À 2°C - 8°C ⊗ Abri lumière ☀

Péremp. le 19/06/2024 09:00

Date préparation : 12/06/24 09:00 | FICHE DE FABRICATION | Service : HDJ PNEUMO
Val.Ph. : Pineda | Prescripteur : Ouloulou | Cycle : 1 | Jour : 1

Protocole CAV

LEVIEUX Andre - (05/01/1995)

Voie d'administration : Intra Veineuse

CYCLOPHOSPHAMIDE 1100 mg (600 mg/m²)
NaCl 0.9% 500ML POCHE FREEFLEX / CONNECT Z

Volume final : 554 mL

Date d'administration : 01/03/24
Date de péremption : 19/06/24 09:00
Conservation : À 2°C - 8°C ⊗ Abri lumière ☀

Produit	Nb	UCD	Solvant de reconstitue	Vol. Prél.	Reliquat	Péremption
ENDOXAN 1000 MG en CYCLOPHOSPHAMIDE SANDOZ 1000 MG	2	9167977 ou 9412460	2×50mL	1×50mL (totalité) 1×5mL	1 Flacon de 1000mg / 50mL Poids de 100mg / 5mL Reliquat de 900mg / 45mL	13/06/24 09:00
TOTAL : Cyclophosphamide 20mg/mL	2		100mL de Chlorure de sodium	55mL		

Dispositif(s) : NaCl 0.9% 500ML POCHE FREEFLEX / CONNECT Z
Solvant de dilution : Chlorure de sodium
Volume à prélever : 55mL (1100 mg) de Cyclophosphamide

Generation of fabrication datasheets

Jour :	NOMDCI	Dose Prot.	Dosefin	OPTI.NOMPDT	CODEVOIE	Heure	Durée
C1J1	Vincristine	1,4 mg/m²	2 mg	NaCl 0.9% 100ML POCHE FRI	IV	10:00	00:15:00
C1J1	Prémédication	400 mg/m²	600 mg	UROMITEXAN 600 MG CP	PO	16:00	00:00:00
C1J1	Cyclophosphamide	1000 mg/m²	1820 mg	NaCl 0.9% 1000ML POCHE FI	PERF	08:00	01:00:00
C1J1	Hydratation	1000 mg	1000 mg	Bionolyte G5 (B26) (polyioni	PERF	07:30	04:00:00
C1J1	Prémédication	8 mg	8 mg	ZOPHREN 8 MG INJ	IV	07:30	00:15:00
C1J1	Prémédication	80 mg	80 mg	METHYLPREDNISOLONE 40 M	IV	07:15	00:10:00
C1J1	Prémédication	400 mg/m²	731,12 mg	UROMITEXAN 400 MG INJ	IV	08:00	00:15:00
C1J1	Doxorubicine	45 mg/m²	82 mg	NaCl 0.9% 100ML POCHE FRI	IV	09:15	00:15:00
C1J1	Prémédication	400 mg/m²	731,12 mg	UROMITEXAN 400 MG INJ	IV	12:00	00:15:00

Part of the detailed adminstration plan

Multi-center demonstration of prototype

- Tests in 5 different hospitals
- Comprehensive coverage of oncology protocols (pediatric, hematologic, home health care…)

Conclusion & relevance

- The success of these multiples demonstrations claims transposable results in each hospital using CHIMIO®.
- Although usable by oncologist and pharmacist, the next step is to embed the code in an Excel-free solution.
- In the future, this consolidate version could handle stock management and be qualified as a stand-alone solution of cyber-resilience in the chemotherapy workflow.