

Evaluating the potential clinical and economic impact of chemotherapy prescribing by pharmacists at a university teaching hospital

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Background and Importance

- Chemotherapy medication errors can cause serious patient harm; most of these occur at the prescribing stage, with high rates reported for chemotherapy prescribing errors¹.
- Whilst pharmacist prescribing is well established in many settings worldwide and has shown to be effective, there is limited research on pharmacists prescribing chemotherapy^{2,3}.

Aim and Objectives

- **Aim:** To assess the potential clinical and economic impact of introducing pharmacist prescribing versus medical prescribing of chemotherapy regimens at a university teaching hospital.
- **Main objectives:** to quantify pharmacists' and doctors' prescribing errors, assess their potential severity and probability to cause an adverse drug event (ADE), and thereafter estimate the associated costs of pharmacists prescribing versus doctors prescribing.

Methods

- This prospective study examined the same set of prescriptions prepared by doctors and pharmacists independently.
 - Doctors were not aware of the study but were aware that their prescriptions would be screened for errors as normal.
- Patients aged ≥18 years receiving chemotherapy on the haematology-oncology inpatient and outpatient wards in a 562-bed university teaching hospital in Ireland across a 2-week time period in June 2022 were included.
- Prescribing errors were quantified, classified⁴, and analysed using descriptive and inferential statistics. The time taken to correct any error and re-prescribe was calculated.
- Assuming errors were not spotted and reached the patient, an independent blinded peer review panel assessed the errors' potential severity⁵ and their probability of an ADE occurring⁶.
- The ADE cost avoidance was calculated using the Nesbit *et al.* method⁶ by multiplying the cost of a potential ADE (€1200 – adjusted for inflation)^{7,8} by the ADE probability score.
- The annual cost avoidance associated with providing pharmacist prescribing chemotherapy was estimated and compared to the current doctor prescribing service.

Results

- In the comparative sample of 155 prescriptions, there were 714 medications each prescribed by doctors or pharmacists:
 - 352 anticancer and 362 supportive medications.
 - mean 4.6; standard deviation 3.94; range 1-18.
- 53.1% of all errors were due to the incorrect dose prescribed.
- **Doctors made significantly more errors than pharmacists ($p < 0.05$)**
 - 105 in 40.6% of prescriptions versus 23 in 14.8% of prescriptions.
- The mean severity scores for all prescribing errors that could have reached a patient ($n=124$) are shown in Table 1.
- 17.6% of doctor-prescribed errors were classified with a 'high' ADE probability versus 0% for the pharmacists.

Table 1: Mean error severity scores

Peer Review Panel Mean Severity Score	Doctor Prescribing n (%)	Pharmacist Prescribing n (%)
Minor	50 (49%)	13 (59.1%)
Moderate	35 (34.3%)	9 (40.9%)
Severe	17 (16.7%)	0 (0%)
Total	102	22

Cost Avoidance: ADE and Labour Costs

- The estimated ADE cost for these 102 doctor errors and 22 pharmacist errors was €23,004 and €2,448 respectively.
 - Extrapolated to reflect annual figures: this was €1,389,144.77 and €147,827.61 – i.e. **a €1,241,317.16 difference in ADE costs.**
- Table 2 shows that pharmacist prescribing had an **annual labour cost saving of €43,026.51** when comparing costs of prescribing, correcting errors, re-prescribing, and additional infusion times.
 - Doctors had 26 incorrect infusion times while pharmacists had 5 (an avoidable 835 and 30 nursing minutes respectively).

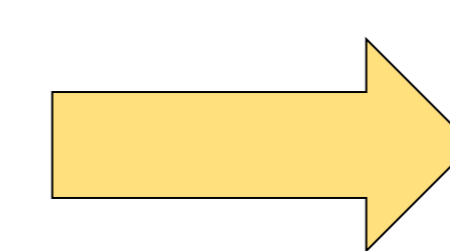
Table 2: Extrapolated annual labour cost comparison for doctor prescribing versus pharmacist prescribing

Annual Labour Costs	Doctor Prescribing	Pharmacist Prescribing
Initial Prescribing	€20,818.62	€23,841.94
Correcting Errors	€31,417.53	€3,691.66
Re-prescribing	€3,626.47	€1,845.83
Additional Nursing Time	€17,159.84	€616.52
Total Cost of Service	€73,022.46	€29,995.95

- Assuming that errors were not spotted and reached the patient, the net cost benefit of utilising a pharmacist chemotherapy prescribing service would have been €1,254,347.72 annually.
 - (ADE Cost Difference + Labour Cost Saving) – Cost of Service

Conclusion and Relevance

- This study has shown that pharmacist prescribing:
 - results in **significantly fewer chemotherapy prescribing errors** than doctors.
 - **minimises workload** for healthcare professionals.
 - **reduces the risk of ADEs and patient harm.**
 - has the potential for **substantial cost savings** for hospitals.



- With patient safety as the priority, **pharmacist prescribing should be considered for more widespread implementation** in hospital cancer care services in future.

