Bulletin de veille n° 79

1er juillet 2026 – 31 août 2026

Surveillance biologique de l'exposition professionnelle aux médicaments cytotoxiques. Etude de terrain.

Objectif : *Disposer d'une connaissance actualisée du sujet en accompagnement des demandes d'assistance qui découlent de la valorisation de l'étude sur la surveillance biologique de l'exposition aux médicaments cytotoxiques en milieu hospitalier.*

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- ***Articles de périodique (PREPRINT)***

Chang Y.L., Lin Y.C., Hung L.C., Chen H.M., Hsieh T.Y. and Yen C.H.
Virtual reality simulation for chemotherapy drug spill management training in pharmacy education: A cohort-allocated crossover quasi-experimental study in Taiwan.
BMC Medical Education, 6 juillet 2026

Résumé: *BACKGROUND: Hazardous drugs such as antineoplastic agents pose occupational risks to healthcare workers, making appropriate chemotherapy spill management essential for workplace safety. Hands-on training opportunities in pharmacy education are often limited by safety concerns and resource constraints. Virtual reality (VR) simulation may provide immersive, guided rehearsal without hazardous-drug exposure, but comparative evidence remains limited. OBJECTIVE: This study examined changes in pharmacy interns' self-perceived knowledge, understanding, and ability following VR simulation-based training and traditional instructor-led instruction and explored whether short-term changes differed between the two cohort-defined instructional orders. METHODS: This cohort-allocated crossover quasi-experimental study included 37 pharmacy interns at a tertiary medical center in Taiwan. Instructional order was assigned by training cohort rather than by individual randomization and was completely confounded with cohort and calendar period. Cohort 1 ($n = 17$) received instructor-led instruction followed by VR training; Cohort 2 ($n = 20$) received the reverse order. Four single-item domains-knowledge of spill-kit contents, understanding of spill-management procedures, ability to independently don personal protective equipment (PPE), and ability to independently manage a spill-were assessed using a 5-point response scale at baseline, after the first intervention, and after crossover. Non-parametric tests were used. RESULTS: After the first session, self-perceived scores increased significantly across all four items in both cohorts (all $p < 0.001$). The instructor-led-first cohort showed greater first-phase changes than the VR-first cohort in self-perceived knowledge of spill-kit contents ($p = 0.006$) and ability to independently don PPE ($p = 0.047$); differences in the other two items were not statistically significant. These findings could not be attributed to instructional modality alone. Following crossover, second-phase change scores did not differ significantly between the cohort-defined orders ($p = 0.221$-0.956). All participants met the prespecified satisfaction criterion for the VR training (37/37, 100.0%; rating $\geq 4/5$); 27 (73.0%) identified instructor-led explanation combined with VR as the most helpful option, and 28 (75.7%) indicated that VR could not replace instructor-led explanation. CONCLUSIONS: Both first-session instructional approaches were followed by short-term increases in pharmacy interns' self-perceived knowledge, understanding, and ability. Because instructional order was completely confounded with cohort and calendar period, the absence of significant second-phase differences neither establishes equivalence between the orders nor rules out an instructional-order effect. VR may serve a complementary rather than competing instructional role and provide a safe approach for rehearsing hazardous-drug spill-management procedures. These conclusions are limited to short-term self-perceived outcomes and post-training learner perceptions.*

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Kunjam T., Eiambutlop N. and Baisaeng N.
Performance evaluation of a two-arm robotic chemotherapy compounding system: Effects of syringe size and compounding cycles on accuracy, efficiency, and safety margins.
Journal of Oncology Pharmacy Practice, 6 juillet 2026

Résumé: *Background Manual chemotherapy compounding carries occupational hazards and requires high technical accuracy. Robotic automation has emerged as an important advancement to enhance personnel safety and improve dosing precision.Objective This study evaluated the impact of syringe size and compounding cycle number on accuracy, operational efficiency, and safety margins of a prototype two-arm robotic chemotherapy compounding system during its first year of clinical implementation at Maha Vajiralongkorn Thanyaburi Hospital, Pathum Thani, Thailand.Methods A retrospective analysis of 7,922 intravenous chemotherapy preparations was conducted. Preparation accuracy was assessed using percentage volume error determined by gravimetric verification, and efficiency was measured by total preparation time. The effects of syringe size (10, 30, and 50 ml) and compounding cycles (one to three) were analyzed. Bootstrap resampling was applied to generate 90% confidence intervals and evaluate safety margins.Results The system demonstrated high precision, with an overall mean percentage error of -1.19 +/- 1.32% (median -1.14 +/- 1.86%) and a mean preparation time of 11.86 +/- 3.47 min (median 11.29 +/- 3.06 min). Smaller syringe sizes and increased compounding cycles were associated with a consistent tendency toward slight under-delivery. However, all deviations remained within the clinically acceptable +/- 5% threshold. Bootstrap analysis confirmed stable and reproducible safety margins across hardware configurations.Conclusion Clinical implementation of the robotic compounding system demonstrated high accuracy, reproducibility, and operational safety, supporting its role in enhancing safety in high-throughput chemotherapy compounding practice.*

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Neethu M.V., Pandey V., Lakshmi M., Kumar C.K.A., Yanadaiah P., Rajput H.S., Anjali K. and Pamu S.
Pharmacists' Role in Ensuring Safe Handling and Administration of Anticancer Medications in India.
Current Drug Safety, 22 juillet 2026

Résumé: *Pharmacists play a significant role in oncology with respect to the safe handling and administration of anti-cancer drugs. This comprehensive review analyses pharmacists' roles, emphasising adherence to national and international safety standards and the implementation of institutional programs for protocols, training, and certification. Pharmacists will aid in the formulation and adjustment of chemotherapy medications through Personal Protective Equipment kits and working practices. Among administration methods, intravenous chemotherapy, oral anticancer agents, and special routes, such as intrathecal, can be used. Other notable responsibilities of pharmacists' work are medication safety, occupational exposure risk, and pharmacovigilance. Pharmacists can gain practical insights through case studies and possibly help prevent and control errors by implementing systemic strategies. Pharmacists are also involved in counselling and teaching patients for treatment, managing side effects, and other policies that enhance compliance. This review provides valuable insights into interprofessional collaboration to improve patient safety and achieve optimal outcomes. Emerging technologies and innovations are having a growing impact on medication management, and pharmacists have been recognised as playing a vital role in ensuring safe adoption in oncology practice. Continuous education and professional development enable pharmacists to stay up to date on the latest advancements, providing the best possible care. This review discusses the essential contributions pharmacists make to the oncology department by improving the care, safety, and efficacy of anticancer treatment, demonstrating their commitment to excellence and adaptability in healthcare settings.*

https://doi.org/10.2174/0115748863433931260707115559

Siegmund P., Klinken-Uth S., Michel A., Hacker M.C., Breitkreutz J. and Fischer B.
Development and evaluation of a Raman detector for non-destructive identification and quantitation of cytostatic drugs in different primary packaging containers.
Journal of Pharmaceutical and Biomedical Analysis, 10 août 2026

Résumé: *Personalized chemotherapy requires precise compounding and reliable quality control to assure therapeutic efficacy and safety. Raman spectroscopy offers a non-destructive and non-invasive method for the identification and quantitation of cytostatic drug substances, which could improve current quality assurance processes in hospital or community pharmacies. In this study, a dedicated Raman detector was developed that enables direct identification and measurement of cytostatic drug concentrations in aqueous liquids through closed primary packaging. Measurements were performed for cyclophosphamide and gemcitabine in clinically relevant concentrations (1 - 45 mg mL(-1)) using sealed infusion glass vials, filled syringes for bolus injections and infusion bags. Each concentration was analyzed at eight different positions. These measurement positions were chosen randomly to account for signal variability arising from local material variations, including inhomogeneities in wall thickness and curvature. For all tested drug substances and packaging types and materials, relative prediction errors remained within ±10% across the clinically relevant concentration range, with a RMSECV of 1.07 mg mL^{-1} for cyclophosphamide and 0.54 mg mL^{-1} for gemcitabine. As routine quality control of individually compounded antineoplastic formulations lacks standardized final-product verification, non-invasive through-container spectroscopic analysis offers the possibility to add identity and concentration confirmation without opening or sampling the CMR-classified formulation. This method preserves the integrity of the final drug product while reducing costs and the risk of occupational exposure for pharmacy personnel.*

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Liu H., Zou L., Song Y. and Yan J.
Study on the residual contents of empty drug vials from intelligent dispensing robots and manual compounding of cytotoxic drugs in PIVAS.
Journal of Oncology Pharmacy Practice, 14 août 2026

Résumé: *IntroductionThe residual drug content in empty vials post-compounding is a crucial indicator for assessing the accuracy of intelligent dispensing robots. Excessive residue not only reduces therapeutic efficacy but also increases occupational exposure risks during handling. This study aims to investigate the differences in residual drug levels between intelligent dispensing robotic and manual preparation methods for cytotoxic drugs.MethodThis experimental study was conducted in the Pharmacy Intravenous Admixture Service (PIVAS) of a provincial People's Hospital. Four cytotoxic drugs were prepared using both an intelligent dispensing robotic and manual preparation methods under a designed protocol. High-performance liquid chromatography (HPLC) was used to measure residual drug contents in empty vials. The residual proportions were analyzed and compared under various conditions.ResultsA total of 270 vials were analyzed, including 150 prepared by the intelligent dispensing robot and 120 from manual preparation. The residual drug content in vials prepared by the robot ranged from 1.050 to 29.450 mg, with a residual proportion of 0.73% to 4.90%. For manually prepared vials, the residual drug content ranged from 1.030 to 43.350 mg, with a residual proportion of 0.73% to 8.67%. The residual drug proportion was significantly lower for robotic preparation [2.23% (1.66%, 3.36%)] compared to manual preparation [3.02% (1.52%, 4.40%)] ($P < 0.001$).ConclusionThis study identified differences in residual drug proportions between robotic and manual compounding. Under the study conditions, robotic compounding resulted in a lower overall residual proportion; however, the direction and variability of the differences varied among drug-packaging combinations. Differences were also observed among formulations with different reconstitution characteristics, stopper types, and container types. These*

findings reflect the overall performance of the two workflow and provide valuable evidence to support the clinical application and regulatory development of intelligent dispensing robot systems.

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Crul M., Polidori C., Paolucci D., Rieutord A., Salinas Silva P., Hatlelid L.B., Riffle A., Eggers G., Amerine L. and Kraemer I.
Best practices to master robotic preparation of ready-to-administer systemic anticancer therapy in hospital pharmacies.
Journal of Oncology Pharmacy Practice, 22 août 2026

Résumé: *Automated reconstitution or preparation of systemic anticancer therapy has gained traction in the past decade. Transitioning from traditional manual workflows to fully automated production offers multiple benefits: decreased pharmacy staff workload, reduced risk of repetitive strain injuries, minimized medication errors, and lower risk of occupational exposure to hazardous medicinal products, especially when the robotic preparation areas are fully enclosed. Several elements can facilitate efficient implementation and improve productivity and safety in the use of robotic systems. The purpose of this study was to aggregate insights from an international expert group of early adopters on optimizing both productivity and safety in robotic drug preparation. Eight best practices regarding workflow, quality management, software integration, cleaning protocols, staff training, and safety measures during drug shortages have been identified and agreed upon. Application of these recommendations will enhance the robotic system efficiency, accelerate product turnaround times, and improve oncology pharmacy services.*

https://doi.org/10.1177/10781552261470008

- ***Articles de périodique***

Diab A.E.R.M. and Aljeesh Y.I.
Assessment of safe chemotherapy handling behaviors among oncology nurses in a conflict-affected setting: A cross-sectional study from Gaza.
Cancer, Volume 132, Numéro 16, 15 août 2026, article e70550

Résumé: *Background Chemotherapy drugs are hazardous and require strict safety protocols to protect health care workers. In the Gaza Strip, cancer is a leading cause of death, yet there is limited research on nurses' adherence to safe chemotherapy handling practices. This study assesses the safe chemotherapy handling behaviors of nurses at the Turkish Palestinian Friendship Hospital in Gaza.Methods A descriptive cross-sectional study was conducted between July and August 2023. All 110 nurses at the hospital were invited to complete a validated, self-administered questionnaire based on the Nova Scotia Health Authority Chemotherapy Checklist. Data were analyzed using SPSS v25 with descriptive statistics, t-tests, and analysis of variance.Results The response rate was 96.36% (n = 106). The mean self-reported scores for safe behavior domains were: safe handling before administration (81.77%), safe handling during administration (71.33%), safe disposal of equipment (83.05%), and safe disposal of cytotoxic body fluids (72.84%). These scores reflect nurses' perceptions of their own practices rather than objectively observed compliance. Significant associations were found between safe behaviors and age (p = .012), years of nursing experience (p = .001), oncology experience (p = .044), qualifications (p = .004), and previous training (p = .003).Conclusion Although nurses demonstrated moderate to good compliance*

with chemotherapy safety protocols, critical gaps remain, particularly in drug administration and disposal practices. Regular targeted training, protocol reinforcement, and hiring of specialized oncology nurses are urgently needed.

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