Bulletin de veille n° 72

1er mai 2025 – 30 juin 2025

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.*

La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS. Les éléments issus de cette veille sont founis sans garantie d'exhaustivité.

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

Knowles L.
Evaluation of the effect of closed system transfer device syringe adaptor connection in the isolator on cytotoxic residue contamination during intravenous administration.
Journal of Oncology Pharmacy Practice, 23 avril 2025

Résumé: *IntroductionThe European Biosafety Network recommends that cytotoxic drug surface contamination in pharmacies and patient wards not exceed 0.1 ng/cm(2). Among other mitigations, closed system transfer devices (CSTDs) are recommended in the US, Europe, and UK for the reduction of surface contamination. Although in the UK CSTDs are not part of standard cytotoxic preparation procedures in isolators, CSTD syringe adaptors are recommended for use with syringes for intravenous administration. We investigated whether the addition of a CSTD syringe adaptor in the isolator reduces cytotoxic residue contamination during intravenous bolus administration.MethodsTwenty-five cyclophosphamide syringes were prepared with hub caps and twenty-five with SIMPLIVIA(®) (formerly Tevadaptor/OnGuard(®)) Syringe Adaptor Locks (SALs) in an isolator. Surface contamination of syringes, gauze pads placed at the administration site, and nurses' gloves was compared between the practice of connecting hub caps in the isolator and removing them in the ward versus connecting SALs in the isolator during preparation. Cyclophosphamide contamination was quantified by liquid-chromatography mass spectrometry.ResultsUse of SALs compared to standard hub caps led to statistically significant reduction in cyclophosphamide contamination on the syringes (2.41 ± 0.89 ng versus 33.42 ± 8.48 ng, p = 0.0007), the swabs used for connect/disconnect (0.01372 ± 0.01 ng versus 655.80 ± 190.18 ng, p = 0.001), and nurses' gloves (0.0009 ± 0.0009 ng versus 8.31 ± 3.94 ng, p = 0.04). When hub caps were used, 48% of syringes, 76% of gauze pads, and 8% of gloves exceeded the recommended limit of 0.1 ng/cm(2), while no samples exceeded this limit with SAL.ConclusionsThe implementation of CSTD syringe adaptors was beneficial for reducing cytotoxic drug exposure to nurses administering intravenous syringes.*

https://doi.org/10.1177/10781552251334027

Morel C., Cirtiu C.M., Caron N., Bussières J.F. and Tanguay C.
Canadian monitoring program of the surface contamination with 11 antineoplastic drugs in 131 centres.
Journal of Oncology Pharmacy Practice, 21 mai 2025

Résumé: *IntroductionHandling hazardous drugs contributes to surface contamination in healthcare centres. Their decontamination has proven difficult. Surface monitoring can estimate workers exposure and raise awareness. This program aimed to describe contamination with 11 antineoplastic drugs measured on surfaces of Canadian healthcare centres and their practices, such as the use of dedicated equipment and the communication of results.MethodsEach centre sampled six standardized sites in oncology pharmacies and six in outpatient clinics. Ultra-performance liquid chromatography-tandem mass spectrometry quantified cyclophosphamide, docetaxel, doxorubicine, etoposide, 5-fluorouracil, gemcitabine, irinotecan, methotrexate, paclitaxel and vinorelbine. Platinum-based soluble drugs were analysed by inductively coupled plasma mass spectrometry. Centres completed a questionnaire about their practices.Results131 Canadian hospitals participated in the program. Forty percent (615/1524) of surfaces were contaminated with at least one drug: cyclophosphamide (396/1,524, 26%), gemcitabine*

(291/1,524, 19%) and platinum (72/805, 9%) were the most frequent. The 90(th) percentile of surface concentration was 0.0086 ng/cm² for cyclophosphamide and 0.0028 ng/cm² for gemcitabine. The most contaminated sites were the front grille inside the biological safety cabinet (97/129, 75% contaminated with at least one drug) and the armrest of the treatment chair (92/124, 74%). Both sites were dedicated to hazardous drugs in the majority of centres (114/119, 96% and 91/93, 98%). Most centres (90/116, 78%) had communicated their monitoring results locally.ConclusionsSome surfaces were frequently contaminated with low concentration of antineoplastic drugs. Centres should strive to disseminate monitoring results more widely to multidisciplinary teams. These practices can help minimize contamination and ensure a safer working environment.

https://doi.org/10.1177/10781552251343180

Senarath N., De Silva D., Rathnayake R., Warnakulasuriya S., Meegoda M. and Jayasinghe S.S.
Perceptions of occupational exposure and adherence to safety measures of handling systemic anti-cancer therapy (SACT) among oncology nurses at the national cancer institute, Sri Lanka.
Internation Journal of Risk and Safety in Medicine, 1er juin 2025

Résumé: *BackgroundChemotherapy is a well-known treatment modality against cancer. Occupational exposure to chemotherapy and related adverse effects are widely reported. Safe handling is vital in the reduction of possible risks.ObjectiveTo assess perceptions of occupational exposure and adherence to safety measures of handling Systemic Anti-Cancer Therapy (SACT) among nurses.MethodsA phenomenological study was carried out using a semi-structured, in-depth interviewer guide following the Health Belief Model (HBM) components. The study adopted a purposive sampling method, and data was collected until it reached the saturation point. A thematic analysis was carried out, preserving the study's trustworthiness.ResultsThe nurse's main role was to administer chemotherapy. The primary learning sources were clinical experience and follow-up with seniors. Nurses accept that they are occupationally exposed to chemotherapy and believe that safety measures are protective against exposure. Surgical gloves and masks were common PPE, and chemotherapy-specific masks and gowns were mainly used in mixing drugs. Staffing, safe work practices, separate waste disposal, and seniors' guidance are identified as protective measures. Headache, vomiting, hair loss, skin irritation, and miscarriages were commonly perceived as adverse effects of handling SACT.ConclusionsAn increased patient count, frequent complex doses, a lack of PPE and facilities, and discomfort with PPE might increase exposure.*

https://doi.org/10.1177/09246479251346172

Ursini C.L., Omodeo-Salè E., Di Gennaro G., Buresti G., Fresegna A.M., Ciervo A., Gentile M., Maiello R., Beltramini S., Gaggero D., Rigamonti N., Maccari E., Zorzetto G., Maiolino P., Di Filippo P., Bilancio M.C., Baldo P., Martinello V., Di Mattia A., Esposito C., Nardulli P., Laforgia M. and Cavallo D.
Buccal micronucleus cytome assay to evaluate cyto-genotoxic effects of occupational exposure to antineoplastic drugs: application on a large sample size of workers furnished by an Italian network of oncological hospitals.
Archives of Toxicology, 14 juin 2025

Résumé: *Many antineoplastic drugs (ADs) used to treat cancer are characterized by the non-selective effect representing a possible cause of health effects in exposed workers. We established an Italian*

Network of seven Oncological Hospitals with the aim to evaluate, on a large size sample of workers, cyto-genotoxic effects by a sensitive and non-invasive biomarker also detecting workplace and personal contamination. We performed Buccal Micronucleus Cytome (BMCyt) assay on 200 workers handling ADs and 150 controls. AD contamination was detected performing workplace and personal monitoring of Gemcitabine, Ifosfamide, Cyclofosfamide and 5-Fluorouracil, using UHPLC MS/MS. We found in all the exposed group higher mean values of cells with micronucleus (MN‰), higher percentage of positivity to MN (subjects with micronucleated cells frequency exceeding a fixed cut-off value (1.5‰)), higher frequency of binucleated cells, broken eggs and total anomalies than in the controls. Taking into account the tasks (preparation, administration in Day Hospital and wards, administration in room operator and disposal), only preparators and administrators showed higher MN‰ frequency than in controls, whereas each task group showed a similar higher percentage of MN positives than in controls. We found low levels, but still detectable, of contamination in all the monitored workplaces. This study demonstrated induction of genotoxicity and of cytokinesis defect/arrest in buccal cells of workers handling antineoplastic drugs. The BMCyt assay was demonstrated to be a suitable biomarker of effect for biomonitoring of workers handling AD due to its high sensitivity and non-invasivity.

https://doi.org/10.1007/s00204-025-04073-5

- ***Articles de périodique***

Xie L., Chen G., Ouyang Q., Quan W., Xie X., Chen X., Li L., Li S., Chen R., Luo R. and Qiu Z.
A high-efficiency automatic pressure-relief drug transfer device for anticancer medications with superior closed performance.
Frontiers Pharmacology, Volume 16, 25 avril 2025, article 1579771.

Résumé: *OBJECTIVE: Preventing exposure to hazardous drugs is crucial for healthcare workers to avoid health risks. To mitigate healthcare workers' risks when handling hazardous drugs, we developed a novel closed-system drug-transfer device (CSTD) called CSTD(JLY). This CSTD has an automatic pressure-relief structure. Hence, it can significantly decrease the resistance in the push/pull of a piston rod if an operator transfers drugs, thereby reducing the burden on the hands of the operator during drug transfer. METHODS: We investigated the closed performance of the novel CSTD (JLY) by comparing it with the performance of a syringe. We selected a simulation drug (fluorescein sodium), commonly used drugs (lansoprazole, nimodipine, and tropisetron), and a commonly used anti-cancer agent (cyclophosphamide) to conduct exposure evaluation. RESULTS: Compared with a syringe, CSTD(JLY) could reduce drug leakage significantly. Our novel CSTD with an automatic pressure-relief structure had superior closed performance. CSTD(JLY) could solve the problem of liquid-drug leakage during drug transfer. CONCLUSION: This feature could reduce the exposure risk healthcare workers and patients.*

https://doi.org/10.3389/fphar.2025.1579771

Portilha-Cunha M.F., Norton P., Alves A., Ribeiro A.R.L., Silva A.M.T. and Santos M.S.F.
Tackling antineoplastic drugs' contamination in healthcare settings: New insights on surface cleaning approaches.
Journal of Occupational and Environmental Hygiene, Volume 22, Numéro 5, mai 2025, page 386-399

Résumé: *Effective decontamination of hospital surfaces is crucial to protect workers from antineoplastic drugs (ADs) since dermal absorption is the main exposure route to these hazardous medicinal products. Sampling after daily cleaning in oncologic settings from a tertiary hospital was initially performed and exhibited low contamination levels; however, cyclophosphamide was still found (up to 957 pg/cm(2)) above the guidance value (100 pg/cm(2)) in four locations, evidencing the need to properly assess and update the cleaning protocols. Then, cleaning efficiencies of six solutions and different protocols were evaluated (including, for the first time, four commercial cleaning solutions/disinfectants not designed specifically for AD removal) after deliberate contamination of three model surfaces with 13 pharmaceuticals: bicalutamide, capecitabine, cyclophosphamide, cyproterone, doxorubicin, etoposide, flutamide, ifosfamide, imatinib, megestrol, mycophenolate mofetil, paclitaxel, and prednisone. Wipe sampling and liquid chromatography-tandem mass spectrometry were employed to determine surface contamination after cleaning. Results revealed that: (i) none of the solutions or procedures totally removed all target pharmaceuticals from surfaces; (ii) the removal efficiency increased with cleaning steps (average removals above 90% were attained for Vyclean and Clinell Universal Spray using two cleaning steps); and (iii) the cleaning efficiency was likely favored by the application of the solution/disinfectant directly on the surfaces. Therefore, considering the dissimilar chemical structures and properties of the numerous ADs in use, the cleaning agent and protocol should be adjusted to the reality of each healthcare unit. Still, the scientific community is encouraged to develop a cleaning solution/protocol to simultaneously eliminate/remove as many ADs as possible.*

https://doi.org/10.1080/15459624.2025.2449945

Dupré M., Cirtiu C.M., Caron N., Bussières J.F. and Tanguay C.
Canadian Monitoring Program for Surface Contamination with 11 Antineoplastic Drugs in 126 Centres: Results for 2023.
The Canadian Journal of Hospital Pharmacy, Volume 78, Numéro 2, 14 mai 2025, artcile e3671

Résumé: *BACKGROUND: Occupational exposure to antineoplastic drugs can lead to long-term adverse effects on workers' health. OBJECTIVE: To describe contamination with 11 antineoplastic drugs measured on surfaces within health care centres. METHODS: Centres sampled 12 standardized sites: 6 in oncology pharmacies and 6 in outpatient clinics. Samples were analyzed by ultra-performance liquid chromatography-tandem mass spectrometry. RESULTS: A total of 126 Canadian centres participated over the period January to April 2023. Cyclophosphamide (411/1476, 28%) and gemcitabine (352/1476, 24%) were frequently found on surfaces; less than 10% of samples were contaminated with the other 9 drugs. The 90th percentile of concentration was 0.0095 ng/cm(2) for cyclophosphamide and 0.0040 ng/cm(2) for gemcitabine. The armrest of a treatment chair (93/123, 76%) and the front grille inside the biological safety cabinet (61/123, 50%) were frequently contaminated with cyclophosphamide. CONCLUSIONS: This monitoring program allowed centres to benchmark their contamination and helped increased awareness. Frequent decontamination, safe handling practices, and the use of personal protective equipment are mandatory.*

https://doi.org/10.4212/cjhp.3671

Beigzadeh Z., Golbabaei F., Omidi F. and Shahtaheri S.J.
Comparative analysis of dermal and inhalation exposures to antineoplastic drugs among workers in the workplaces: a systematic review.
BMC Public Health, Volume 25, Numéro 1, 15 mai 2025, Article 1800

Résumé: *OBJECTIVE: Occupational exposure to antineoplastic drugs presents significant health risks to workers, necessitating a comprehensive understanding of both dermal and inhalation exposures. This systematic review examines the relative significance of cutaneous versus inhalation exposure among professionals handling these potent medications. STUDY DESIGN: Systematic review. METHODS: A systematic search using the PECO framework was conducted in PubMed, Scopus, and Web of Science, adhering to PRISMA guidelines. Data from surface and air sampling studies were collected and analyzed. RESULTS: Ten studies met the inclusion criteria, assessing various antineoplastic drugs across different occupational settings. Surface contamination levels varied widely, with concentrations ranging from very low to high, whereas airborne monitoring consistently reported "Not Detectable" levels. Exposure levels were influenced by workplace practices, handling procedures, and the sensitivity of detection methods. CONCLUSIONS: This systematic review of ten studies on dermal and inhalation exposure to antineoplastic drugs in various occupational settings reveals significant variability in contamination levels. Tailored safety measures, including stringent protocols, decontamination procedures, and respiratory protection, are essential for workplace safety. The review highlights the importance of standardized safety protocols, considering the impact of workplace practices and detection method sensitivity. Additionally, it underscores the health risks associated with even low-level exposure, emphasizing the need for biological monitoring. Despite some limitations, this study offers valuable insights for enhancing the safety of staffs handling these potent drugs, guiding future research and policy development.*

https://doi.org/10.1186/s12889-024-21191-4

Cardoso A., Jesus Â., Barreiros L., Carvalho D., Sá M.D.A., Carvalho S., Correia P. and Moreira F.
Safeguarding Patients, Relatives, and Nurses: A Screening Approach for Detecting 5-FU Residues on Elastomeric Infusion Pumps Using HPLC-DAD.
Toxics, Volume 13, Numéro 5, 21 mai 2025, article 416

Résumé: *Background/Objectives: The leakage of 5-fluorouracil (5-FU) from elastomeric infusion pumps used in cancer therapy poses a potential risk of unintentional exposure to multiple individuals, including patients' relatives and healthcare professionals, and may also compromise the accurate administration of 5-FU dosages to patients. This study aimed to develop, validate, and apply an analytical method to detect and quantify 5-FU residues on the external surfaces of infusion pumps. Methods: A high-performance liquid chromatography with diode-array detection (HPLC-DAD) method was optimized for the quantification of 5-FU contamination across different components of the infusion pump, including the hard casing, infusion tubing, and catheter connection port. A mobile phase containing 5% acetic acid was used to obtain more efficient separation of 5-FU and the detection was performed at 260 nm. The method was evaluated for linearity, sensitivity, precision, accuracy, selectivity, robustness, and stability. Results: The method demonstrated linearity within the range of 0.150 to 3.000 µg/cm(2), with limits of detection and quantification of 0.05 µg/cm(2) and 0.14 µg/cm(2), respectively. Relative standard deviations ranged from 1.8% to 12.7%, and accuracy exceeded 85%. In real sample analysis, detectable residues were found around the catheter connection port. Conclusions: This screening-oriented method addresses an existing gap, as previous contamination reports were based solely on self-reported user observations. The detection of 5-FU residues highlights the critical need for safe handling practices and the consistent use of personal protective equipment (PPE) to protect healthcare workers, especially nursing staff involved in the removal of the infusion pumps, after treatment.*

https://doi.org/10.3390/toxics13050416

Sreekumaran J., Goyal H., Sharma R. and Javeth A.
Perceived Barriers and Risks of Safe Handling of Chemotherapeutic Agents: A Cross-Sectional Study.
Journal of Infusion Nursing, Volume 48, Numéro 3, mai-juin 2025, page 214-222.

Résumé: *Chemotherapy preparation and administration is a complex nursing procedure. Adequate competency and positive behaviors regarding safe handling of cytotoxic drugs is very important for every nurse to ensure patient safety as well as occupational safety. This study assessed the perceived barriers and risks regarding safe handling of chemotherapeutic drugs among nursing personnel of a tertiary care hospital of Delhi, India. A descriptive cross-sectional design was conducted among 60 nursing personnel, who were working in chemotherapy wards and day care units. Self-administered structured questionnaire and rating scales were used for data collection. The sociodemographic and outcome variables were analyzed using descriptive statistics in addition to inferential statistics. The overall mean scores of practice, perceived barriers, and risks of nursing personnel toward safe handling of chemotherapy is 33.26 ± 3.18, 29.75 ± 4.66, and 11.75 ± 2.99, respectively. The most important barrier was inadequate training on chemotherapy and high workload. The highest risk perceived by the nursing personnel was an inadequate regular medical surveillance program, followed by immediate non-replacement of linens soiled with drug spills. It is recommended that chemotherapy safety protocol, safety surveillance systems, and in-service training be instituted for all nursing personnel who are working in an oncology unit.*

https://doi.org/10.1097/nan.0000000000000593

Moreira F., Jesus A., Pinho C., Santos M., Serdoura M. and Cruz A. (Préprint dans Bulletin n° 70)
Ensuring Safety in Cytotoxic Drug Preparation: A Systematic Review of Guidelines Addressing Education for Pharmacy Professionals.
Journal of the American Pharmacists Association, Volume 65, Numéro 3, mai-juin 2025, article 102352

Résumé: *BACKGROUND: Chemotherapy preparation involves the use of specific techniques and equipment, given the need to maintain preparation sterility and its strict prescribed composition, and avoid occupational exposure to cytotoxic agents. OBJECTIVE: This study aims to identify the most relevant contents for pharmacy professionals' education and training programs and to elucidate the evaluation procedure these professionals should follow when handling cytotoxics. METHODS: We adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines in conducting and reporting this systematic review. We conducted a literature search in PubMed, Cochrane, and LILACS to identify guidelines on cytotoxic drug preparation published between 2004 and 2024. Inclusion criteria included guidelines written in English, Spanish, or Portuguese that addressed the education, training, and/or evaluation of pharmacy professionals involved in handling cytotoxic drugs. We excluded guidelines developed for other health professionals (e.g. nurses) and guidelines exclusively addressing the manipulation of oral dosage forms. Citation searching was also performed to avoid search biases. Three researchers independently selected 20 guidelines that met the inclusion criteria, out of 3781 unique references identified. Four appraisers assessed the guidelines using the AGREE-II tool. RESULTS: Recommendations for training in cytotoxic drug handling generally included pre-initiation and periodic assessment. Personal protective equipment and engineering controls use, spill management, and aseptic technique were the most frequently mentioned specific training contents. We have developed a training proposal based on the guidelines, with four training levels that address the specific identified content. Each level presents potential competency assessment strategies. CONCLUSION: Included publications frequently recognized that conducting educational programs before and during the preparation of cytotoxic drugs was important and the combination of theoretical and practical learning*

seems of the utmost relevance. The development or update of guidelines in this area should prioritize their effective applicability to facilitate their implementation.

https://doi.org/10.1016/j.japh.2025.102352

Walton A.L., Powell M.A., Ledbetter L. and Bush M.A.
A scoping review of surface wipe sampling for antineoplastic drug contamination in patient care areas.
Journal of Occupational Environmental Hygiene, Volume 22, Numéro 6, juin 2025, page 495-514

Résumé: *Antineoplastic drug (AD) exposure can cause adverse health effects for healthcare workers. AD contamination on surfaces persists despite interventions to reduce it. The United States Pharmacopeial Convention recommends surface sampling as a measure of exposure control but does not offer guidance regarding specific ADs, surfaces in patient care areas, or size of surface area to sample. This scoping review of literature published since January 1, 2004 aimed to identify specific surfaces in patient care areas which were tested and found to be contaminated with ADs. The authors describe (a) which ADs were assessed, (b) the percent of surfaces contaminated; and sizes of sampling areas for surface testing, and (c) whether personal protective equipment (PPE) or closed system transfer devices (CSTDs) were utilized to reduce healthcare worker exposure and AD surface contamination. The majority of studies were conducted in North America or Europe. The most common location for testing was hospitals. Most studies sampled for one to three marker drugs of interest, with cyclophosphamide being the most common. Most studies utilized a standardized surface area with 100 to 900 cm(2) being the most common. Time of day varied, but most sampling was conducted at the end of the workday before cleaning. Gas chromatography-tandem mass spectrometry (GC-MSMS) and liquid chromatography-tandem mass spectrometry (LC-MSMS) were the most frequent analytical methods used. Contamination was found most often on floors, nursing counters, armchairs, intravenous (IV) poles/pumps, patient tables, hazardous drug (HD) waste containers, doorknobs/handles, storage shelves, bathroom surfaces, HD vials/bags, and telephones. PPE and CSTD use were not consistently reported. Based on this review, the authors make several recommendations for the standardization of data collection and reporting of findings. Key among these is the need to measure and report data on the use of PPE and CSTDs to modify environmental contamination and, critically, healthcare worker exposure to ADs.*

https://doi.org/10.1080/15459624.2025.2471397

Kaouther Z., Berriri S., Libong D., Solgadi A., Safta F., Mai Lê L.M. and Caudron E.
Simultaneous Determination of Residual Contamination of Eight Antineoplastic on Surfaces by HILIC Chromatography Coupled to High-Resolution Spectrometry.
Analytical Science Advances, Volume 6, Numéro 1, juin 2025, Article e70004

Résumé: *Residual contamination by intravenous antineoplastic drugs on hospital surfaces remains a critical concern, as highlighted by numerous studies. This study presents a novel, rapid and highly sensitive analytical method for quantifying a wide range of antineoplastic drugs and detecting other potentially harmful molecules on wiped surfaces. Utilizing hydrophilic interaction liquid chromatography (HILIC) coupled with high-resolution spectrometry, the method combines the quantification of eight commonly used antineoplastic drugs: 5-fluorouracil, ifosfamide, cyclophosphamide, gemcitabine, doxorubicin, methotrexate, epirubicin and irinotecan, with the identification of unknown compounds*

offering a comprehensive solution for monitoring hospital surface contamination. While HILIC-MS/MS has been extensively applied in various matrices, its use for surface contamination monitoring in healthcare settings has been relatively underexplored. Chromatographic separation was achieved using gradient elution on an HILIC ZORBAX 120 column (150 mm × 2.1 mm, 4 µm), enabling rapid analysis within 8 min. The method demonstrated exceptional sensitivity, achieving limits of quantification below 0.04 ng/cm(2) for all targeted molecules. Applied to 28 surfaces in the day hospital of a medical oncology unit at a French hospital, the method revealed contamination on 22 surfaces with at least one antineoplastic drug. Additionally, unknown molecules, including a compound associated with cleaning detergents, were detected, highlighting the complexity of hospital surface contamination underscoring the ongoing risks faced by healthcare workers and patients. This innovative approach represents a significant advancement in analytical chemistry and hospital hygiene monitoring, providing a faster, more efficient and versatile alternative to traditional techniques, as it allows 5-FU quantification within the same run time with other molecules. By addressing critical gaps in current methodologies, this study offers valuable insights into occupational safety and supports efforts to reduce exposure risks for healthcare workers and patients. Further research is needed to identify the unknown molecules detected and fully assess their potential risks.

https://doi.org/10.1002/ansa.70004

Abu-Alhaija D.M., Al-Faraj H., Miller E. and Gillespie G.L.
Psychometric Testing of the Revised Oncology Nurses Health Behaviors Determinants Scale.
Western Journal of Nursing Research, Volume 47, Numéro 6, juin 2025, page 441-448

Résumé: *BACKGROUND: Chemotherapy exposure is an occupational risk that affects oncology nurses and is linked to several negative health consequences. Oncology nurses' adherence to chemotherapy handling guidelines is critical to protect themselves from this hazardous drug exposure. Several personal and workplace-related factors affect nurses' adherence to these guidelines. OBJECTIVE: The purpose of this study was to test the psychometric properties of the revised Oncology Nurses Health Behaviors Determinants Scale (HBDS-ON) that measures factors affecting nurses' adherence to chemotherapy handling guidelines. METHODS: A quantitative cross-sectional design was used. One hundred twenty-three oncology nurses were recruited through convenience sampling from 2 hospital settings in the Midwest United States and through social media. Participants completed 3 online surveys: (1) the Revised Hazardous Drugs Handling Questionnaire, (2) the revised HBDS-ON, and (3) a demographic questionnaire. RESULTS: Exploratory factor analysis revealed a conceptually reasonable 7-subscale structure of the revised HBDS-ON. The psychometric properties of the scale were supported by convergence validity, regression model testing, and internal consistency reliability. Oncology nurses reported adherence to chemotherapy handling guidelines 55% of the time. The cues to action in the workplace, nurses' perceived barriers, institutional response to chemotherapy exposure incidents, and personal protective equipment availability and accessibility were associated with oncology nurses' adherence to chemotherapy handling guidelines. CONCLUSION: The revised HBDS-ON demonstrates reliability and validity and can be used to measure factors at workplace and personal levels that affect nurses' adherence to chemotherapy handling guidelines.*

https://doi.org/10.1177/01939459251324835

Nguyen N., Vallet V., Bouchoud L., Falaschi L., Rudaz S., Bonnabry P., Fleury-Souverain S. (Préprint dans Bulletin n° 67)
Assessment of the surface contamination of the primary packaging of oral antineoplastic drugs and secondary packaging of chemotherapy preparations at a Swiss hospital.
Journal of Oncology Pharmacy Practice, 15 mai 2024

Résumé : *INTRODUCTION: Due to the high toxicity of antineoplastic drugs, handling their packaging could lead to the chemical contamination of hospital environments and exposure risks to healthcare professionals and patients. This study aimed to assess the contamination of two main surfaces: the outer primary packaging of oral antineoplastic drug formulations (n = 36) available on the Swiss market and the surface of secondary packaging of injectable antineoplastic drug preparations (n = 60) produced by the pharmacy of a Swiss hospital and carriers used for transport (n = 5). METHODS: Samples were collected using a validated wipe sampling method. The simultaneous analysis of 24 antineoplastic drugs: 5-fluorouracil, busulfan, carboplatin, cyclophosphamide, cytarabine, dacarbazine, daunorubicin, docetaxel, doxorubicin, epirubicin, etoposide, gemcitabine, idarubicin, ifosfamide, irinotecan, methotrexate, oxaliplatin, paclitaxel, pemetrexed, raltitrexed, topotecan, treosulfan, vinblastine, vincristine) and 1 antiviral compound (ganciclovir) was performed by UHPLC-MS/MS. RESULTS: A total of 58% and 90% positive results were obtained for the primary packaging of oral chemotherapies and for the secondary packaging of injectable preparations, respectively. The highest quantities found on the primary packaging for oral chemotherapies and on the surface of closed leak-proof bags were 111 ng of methotrexate and 19 ng of gemcitabine, respectively. Gemcitabine (69%) and cyclophosphamide (38%) were the two most common contaminants found on the packaging of injectable preparations and carriers, regardless of the chemotherapy preparations. CONCLUSION: Trace levels (ng) of antineoplastic drugs can be found on most surfaces of all evaluated pharmaceutical products. Thus, suitable personal protective equipment is mandatory for healthcare professional handling antineoplastic drugs.*

https://doi.org/10.1177/10781552241250010

Navarro D. and Epstein D.
A twenty-eight-day evaluation of cytotoxic drug vapor containment in drug-binding closed-system transfer device.
Frontiers Public Health, Volume 13, 2 juin 2025, article 1400571

Résumé: *OBJECTIVE: Several studies have demonstrated that hazardous drugs can evaporate even at ambient temperature during their preparation in healthcare facilities, potentially posing a health risk for clinicians. The National Institute for Occupational Safety and Health (NIOSH) has defined closed system transfer device (CSTD) performance as preventing the release of hazardous drugs in the form of vapor, aerosol, or droplets. Most CSTDs can be used to store drugs for up to 7 days after their preparation. However, as some drugs are stable for more than 7 days, the CSTD usage period represents a limiting factor leading to residual drug waste. We investigated whether the Chemfort(®) CSTD with the ToxiGuard(®) system, an activated carbon matrix, minimizes the exposure to hazardous drug vapors or aerosols that may be released for 28 days after drug preparation. METHODS: Cyclophosphamide, a cytotoxic drug with relatively high vapor pressure was chosen as the representative drug to demonstrate vapor escape prevention. Testing was performed using intact vial adaptors (with ToxiGuard(®)) after incubation for 28 days, intact vial adaptors (with ToxiGuard(®)) without incubation, a vial adaptor from which the carbon matrix was removed (positive control) and a vial adaptor containing only water (negative control). After each test, the components were rinsed or swabbed to test for cyclophosphamide contamination. RESULTS: No escaped cyclophosphamide was*

detected in the tests performed using Chemfort(®) with intact ToxiGuard(®). In the system tested without ToxiGuard(®), 110.3 ng of escaped cyclophosphamide were detected. CONCLUSION: The intact ToxiGuard(®), as part of the Chemfort(®) vial adaptor, prevents release of hazardous cyclophosphamide from the vial into the environment for up to 28 days. This result supports potential extension of its usage period and potential drug waste prevention with associated cost savings.

https://doi.org/10.3389/fpubh.2025.1400571

Carvalho S., Cardoso A., Ferreira D., Dias da Silva D. and Moreira F.
Influence of Puncture Devices on the Accuracy of Cyclophosphamide Dosing for Chemotherapy Administration.
Pharmaceuticals, Volume 18, Numéro 6, 12 juin 2025, article 879

Résumé: *Background/Objectives: Cyclophosphamide is one of the most commonly used cytotoxic drugs in chemotherapy protocols. Its preparation in the hospital setting involves handling concentrated solutions, which pose occupational exposure risks and potential variations in the final dose administered. The aim of this study was to evaluate the effect of aspiration devices on the concentration of cyclophosphamide in reconstituted solutions. Methods: An analytical method was validated using high-performance liquid chromatography coupled to a diode-array detector (HPLC-DAD) for quality control. Cyclophosphamide solutions were prepared and aspirated using either a conventional needle or spike device with or without a filtration system. Results: The validated method demonstrated linearity (R(2) = 0.9999), high precision (0.22-4.59%) and accuracy (88.9-99.4%), with a limit of quantification of 4.03 µg/mL. Significant differences (p < 0.001) were observed between samples aspirated with a needle and those aspirated with a spike fitted with a 5 µm filter, with the latter showing lower cyclophosphamide concentrations, suggesting partial retention of the drug. No significant differences were found between the needle and filterless spike preparations. Conclusions: These results suggest that the choice of aspiration device influences the final drug concentration, potentially affecting therapeutic efficacy. Standardisation of preparation techniques and an awareness of device limitations are essential to ensure accurate chemotherapy dosing and patient safety.*

https://doi.org/10.3390/ph18060879