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| Table 2  Publications included in the Review rated as Levels 4 and 5 | | | |
| **Author**  **& Title** | **Brief Description** | **Associated Themes** | **Level of Evidence** |
| Oncology Nursing Society (Polovich, 2011) | Oncology Nursing Society Guidelines on Safe Handling of Hazardous Drugs: a comprehensive guideline for oncology nurses | Engineering controls (BSCs, compounding aseptic containment isolators, CTSD), administrative controls (policies, medical surveillance), work practice controls (e.g. double gloving, safe sharps disposal, avoid disconnecting bags and tubing from hazardous drug), and PPE (gloves, gown, eye and facial protection, and respiratory protection). | 4-A |
| United States Pharmacopeia (2008) | United States Pharmacopeia Chapter <797> Sterile Preparations | Addresses safe storage and compounding of hazardous drugs. PPE for compounding includes gowns, face mask, eye protection, hair cover, shoe cover, & double gloving with sterile chemotherapy tested gloves. | 4-A |
| American Society of Health-System Pharmacists (2004) | American Society of Health- System Pharmacists Guidelines | Provides recommendations for a comprehensive safety program, including policies and procedures, Material Safety Data Sheets, ventilation controls, PPE, work practices for compounding, decontamination, spill response, and waste disposal. | 4-A |
| NIOSH (2004) | National Institute for Occupational Safety and Health: Alert | Recommendations include: hazard assessment, safe handling procedures (e.g. labeling, storage), policies addressing disposal and spill response, and safe work practices (PPE, ventilated cabinets, cleaning, and medical surveillance). | 4-A |
| OSHA (1999) | Occupational Safety and Health Administration Guidelines | Work practices specific to preparation and administration addressed: PPE, disposal, spills, contamination, medical surveillance, and education/training. | 4-B |
| Sproll et al. (2012) | Development and implementation of a safe handling program in Winnipeg | Essential elements included: hazardous drug list, policies addressing PPE, preparation, transport, and administration; resources for staff, education and | 4-B |

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|  | Regional Health Authority | training. Modifications of full measures were made for cytotoxic vs. non-cytotoxic drugs. |  |
| Kaestli et al. (2013) | Development of a standardized method to generate a hazardous drug list. | Algorithm of risk for use in assessing drug toxicity against drug utilization and inform recommendations for health worker safety. This algorithm recognizes that inherent toxicity alone does not equate to exposure potential. | 5-A |
| Power & Polovich (2011) | An overview of guidelines by NIOSH, OSHA, ONS, ASHP, and  USP provided, comparing similarities and differences for health worker safety. | Essential elements included: administrative controls, environmental and engineering controls, work practice controls, PPE, and medical monitoring after an acute exposure. | 5-A |
| Nixon & Schulmeister (2009) | A review of guidelines for handling hazardous drugs, education & training, and recommendations for medical surveillance. | PPE recommendations include double gloves, gown, masks, and face protection for any exposure potential. Ongoing training strategies include annual competency through demonstration, direct observation, pharmacy and policy updates, and peer-to-peer performance evaluation. Medical surveillance recommended at hire, after known exposure, and periodically during employment. | 5-A |
| Eisenberg (2009) | A review of the risks of hazardous drug exposure, how it occurs, and protective measures to maintain safety for nurses. | Monitoring recommendations include reproductive and health questionnaires, physical examination, and laboratory tests. PPE, CTSD, and cleaning and disposal practices reviewed. | 5-A |
| Byrns & Fuller (2009) | An overview of exposure routes and recommendations for control measures. | Class II Type B2 BSCs recommended for hazardous drug preparation. PPE reinforces NIOSH guidelines, including a respiratory program to ensure proper fit-testing.  Work policies should restrict eating/drinking in areas where hazardous drugs are handled.  Monitoring should include adherence to policies, environmental wipe testing, and medical surveillance (direct measures of chemicals or metabolites). | 5-A |

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| Massoomi et al. (2008) | Development & implementation of a safe handling program in a community hospital; itemization of cost included. | Essential elements include: hazardous drug identification, CSTD in both pharmacy & nursing, waste management, and PPE. Medical surveillance suggested but not fully addressed. | 5-A |
| McDiarmid & Condon (2005) | Analyzing an organization’s safety culture provides targets for interventions to enhance compliance with safe handling | Organizational dimensions of safety include: 1) management support, 2) absence of job hindrances, 3) cleanliness/orderliness, 4) good communication among staff, 5) safety-related feedback/training, and 6) availability of PPE/equipment. | 5-A |
| Walton et al. (2012) | Review of guidelines and evidence to implement a hazardous drug control program in a nursing unit. | Policy revision, staff education, PPE changes, hazardous waste signs for body fluids, and patient education brochure | 5-B |
| Polovich (2005) | An overview of developing a hazardous drug control program. | Essential elements should address drug preparation, administration, spill/waste management, & exposure reports. Quality monitoring should include observations of PPE use. Medical surveillance should include baseline and periodic evaluations, acute exposures, and evaluations of work-related health changes. | 5-B |
| Gambrell & Moore (2006) | A root cause analysis method (SOLVE) is introduced to examine and improve non-compliance with safe handling policies. | The five step method includes 1) Situation assessment,  2) Organize the investigation, 3) Live evidence collection (e.g. interviews, quick action, physical evidence, tracking time), 4) Verify the analysis, and 5) Effective corrective action. | 5-B |