Improving Compliance With Personal Protective Equipment Use Through the Model for Improvement and Staff Champions

Kerry Ann Hennessy, MSN, RN, AOCN®, and Judy Dynan, MSN, RN, OCN®, CNL

Although the known risks of exposure to hazardous drugs have been well documented and disseminated, certain barriers remain in the use of personal protective equipment (PPE) by nurses administering chemotherapy. At Dana-Farber Cancer Institute, a program was developed that incorporated not only monitoring and reporting compliance of the use of PPE, but also engaged the staff in audit and reporting activities. Compliance rates improved dramatically over time and have remained at high levels.

Kerry Ann Hennessy, MSN, RN, AOCN®, is a clinical nurse specialist and Judy Dynan, MSN, RN, OCN®, CNL, is a staff nurse, both at Dana-Farber Cancer Institute in Boston, MA. The authors take full responsibility for the content of the article. The authors did not receive honoraria for this work. No financial relationships relevant to the content of this article have been disclosed by the authors or editorial staff. Hennessy can be reached at khennessy2@partners.org, with copy to editor at CJONEditor@ons.org.

Key words: personal protective equipment; hazardous drugs; safe handling

Digital Object Identifier: 10.1188/14.CJON.497-500

The first reported risk to humans handling antineoplastic drugs was published in a study that found mutagenic activity in the urine of nurses working in oncology units (Falck et al., 1979). This finding led to the hypothesis that merely handling chemotherapeutic agents leads to exposure and absorption. Some years later, this hypothesis was validated in a study demonstrating an association between the degree of skin contact or exposure and the presence of acute symptoms experienced by nurses (Valanis, Vollmer, Labuhn, & Glass, 1993). Inadvertent exposure to these drugs has serious health consequences. Common acute symptoms include nausea, vomiting, headache, dizziness, hair loss, and liver damage. In addition, long-term effects have been documented, including increased chromosomal alterations, hepatotoxicity, and abnormal reproductive outcomes (Martin, 2005).

The National Institute for Occupational Safety and Health (NIOSH, 2004) defined recommended exposure limits as concentrations of substances that are without adverse effect. To date, no identified threshold limits exist for workplace exposure to hazardous drugs. According to the American Society of Health-System Pharmacists (2006), hazardous drugs include chemotherapy, hormones, anesthetic agents, and antiviral agents that have one or more of the following attributes: carcinogenicity, teratogenicity or other developmental toxicity, reproductive toxicity, organ toxicity at low doses, genotoxicity, and structure and toxicity profiles of new drugs that mimic existing drugs determined hazardous by this criteria.

Despite increasing awareness of known exposures and adverse outcomes, resistance to the use of safe-handling systems or their components continues. This resistance may be based on denial of risk, insufficient information, lack of policy enforcement or regulation, or lack of provision of safe-handling devices. An exploration of barriers may be helpful in allaying myths and misconceptions and empower nurses to take more responsibility for their own safety and that of others.

Risk of Exposure

In general, exposure risks for nurses are related to the preparation, transport, administration, and disposal of chemotherapy waste and bodily fluids. In addition, exposure risk is present when handling and opening drug cases and packages prior to preparation. Except for treatments given intramuscularly or subcutaneously, accidental injection is much rarer because of the use of needle-free administrations. The highest risk of exposure for nurses is associated with preparation and administration, primarily through inhalation of aerosolized drug, direct contact (through eyes, skin, or mucosa), and ingestion of an improperly handled drug.

In an article regarding the safe handling of hazardous drugs, Polovich (2004) highlighted a 1999 report by the Department of Commerce estimating that 5.5 million healthcare workers are in a position to be exposed to hazardous drugs in the workplace. Since then, NIOSH (2008) has estimated that the number of workers at risk of exposure is closer to 8 million. That estimate includes employees who directly purchase, store, prepare, deliver, administer, and discard chemotherapy, as well as those who risk exposure by working in the vicinity of these drugs.

Current Guidelines

The NIOSH (2004) recommendations fall into three categories: Assess the hazards in the workplace, handle drugs safely, and use and maintain equipment properly. The recommendations also provide more detailed guidelines for appropriate use of personal protective equipment (PPE), receiving and storage of...
a drug, drug preparation and administration, use and maintenance of ventilated cabinets, waste disposal, spill control, and medical surveillance. The use of closed-system transfer devices should be considered whenever available, as they limit the potential for generating aerosols and exposing preparers to needle sticks (NIOSH, 2004).

Polovich (2011, 2014) recommended the following procedures for preparation, administering, disposal, and spill cleanup:
- Double glove with chemotherapy-tested gloves
- Wear a disposable, single-use, lint-free gown.
- Use a NIOSH-approved respirator for procedures that pose an inhalation risk.
- Wear a face shield or mask and goggles for procedures that pose a splash risk.

Despite the growing knowledge of risk, the need to remove or reduce it, and the implementation of safer procedures and safer equipment, many nurses still choose to avoid or even refuse to use PPE when administering chemotherapy. Polovich and Clark (2012) identified that a person’s idea of perceived risk is a key factor in use of PPE. The relevance of interpersonal influence on following policy also is discussed. Other factors identified as barriers to use were inconvenience, limited availability, and consideration of expense of PPE (Polovich & Clark, 2012).

### Personal Protective Equipment Initiative

In 2009, a project was initiated at Dana-Farber Cancer Institute to examine the PPE use of nurses in a busy ambulatory oncology practice. What started as a project for a graduate nursing student turned into a process of continuous improvement, including assessment of PPE practice, staff education, and the implementation of best practices to keep staff, patients, and the environment safe from exposure to hazardous agents. The goal was to improve compliance with established standards and hospital policy regarding PPE use by nurses administering chemotherapy in the outpatient setting.

In March 2010, numerous observations of staff handling, administration, and discarding of chemotherapy were completed in various infusion areas by the graduate nursing student and a clinical nurse specialist (CNS). Compliance rates were 30%–40%, which was lower than expected. The duo proposed an initial comprehensive education intervention regarding the hazards and standards of exposure to chemotherapy. The session was mandated for all staff to ensure that awareness of the risk could be eliminated as a barrier. In addition to the educational program, a panel of infusion nurses, an occupational health nurse, a clinic assistant, and a pharmacist were present to discuss other potential and actual barriers experienced in the practice environment. Although the goal of education and awareness was achieved, a substantive change in practice did not occur postintervention.

When the performance data was reported to the Nurse Executive Committee on Quality, the CNS and nurses involved in the work received additional support to prioritize and improve staff performance. Using the framework for the Model for Improvement (Langley, Moen, Nolan, Norman, & Provost, 1996), a continuous process of tests of change, performance measurement, and feedback was put into place to improve performance (see Figure 1).

### Personal Protective Equipment Compliance Improvement Process

In September, 2010, a monthly audit process was instituted using a standardized tool with measurement and feedback provided to staff (see Figure 2).
The process consisted of observations of individual nurses’ compliance with the PPE standards. The audits were standardized in all infusion areas and performed by the CNS for the area. The importance of measurement and real-time feedback on performance are cornerstones of effective improvement work, and this approach had a significant impact on the success of the authors’ efforts.

A safe-handling awareness campaign was initiated in March 2012 by staffing a table with information in front of the institution’s cafeteria for two days and by offering quizzes, prizes, and demonstrations of new protective gowns. This event occurred at the same time that new, impermeable gowns (previously trialed by staff) were being stocked on each unit. The event served as another consciousness-raising tactic to affect a change in behavior.

In October 2012, descriptions of proper PPE use and compliance to hospital policy, as well as a review of spill-management techniques, were incorporated into the Department of Nursing’s 2012 competency skills day. Responsibility for unit-based observations by the CNSs was transferred to the staff on each location.

---

**FIGURE 2. PPE Observation Tool**

Note. Courtesy of Dana-Farber Cancer Institute. Used with permission.
unit in December, 2012, as was the electronic entry of the audit data. The purpose of this was to promote unit-based ownership of PPE compliance and to support a peer-monitoring program. The results of each unit’s audits were shared with staff and tracked within the Department of Nursing’s quality program. These performance metrics also began to be reported quarterly to the Nurse Executive Committee for Quality.

Education and consciousness-raising activities continued with the Dana-Farber Cancer Institute Nursing Council’s sponsorship of several chemotherapy safe-handling lectures by a visiting scholar in the field. The lectures were informative, reinforced the work being done across the units, and were well received by staff. Observations at the unit level continue to be performed by staff and the performance data is consistently at the 90% or higher level.

Conclusions

Key components of the sustained success of this initiative are staff education and ownership of the required changes, peer-performance monitoring, leadership support and prioritization of the work, staff involvement in product review and selection of the PPE, and continuous monitoring and feedback regarding performance. The message of commitment to staff, patients, and environment safety has been consistent in the organization. The fact that all involved in patient care have a responsibility to maintain the standard is well-established and accepted. Audit results are posted on patient care units and available to staff and patients. Patients are now speaking up when they see a situation where PPE should be used.

References


Do You Have an Interesting Topic to Share?

Quality provides readers with an update on innovative work in the area of practice and care delivery. Length should be no more than 1,000–1,500 words, exclusive of tables, figures, insets, and references. If interested, contact Associate Editor Anne H. Gross, PhD, RN, FAAN, at anne_gross@dfci.harvard.edu.

ONS Strategic Sponsors

ONS would like to thank our Strategic Sponsors for their support of ONS.

Proud sponsors of ONS—committed to improving outcomes for patients and their families.