

# A Call to Action for Hazardous Drug Safety: Where We Have Been and Where We Are Now

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**Background:** The dangers associated with handling hazardous drugs (HDs) have been well documented. Contamination of the healthcare environment, which can occur during compounding and administration, may lead to drug absorption by healthcare workers. Studies have proven that HD exposure causes numerous side effects and chromosomal aberrations.

**Objectives:** This article examines the complex issues surrounding HD safety, including workplace culture, current guidelines, and misconceptions regarding the risks associated with exposure. Discussions include suggestions for creating a workplace culture where HD safety is an expectation, along with an update on laws and significant impending changes.

**Methods:** Historical data and current research are presented.

**Findings:** Although improvements have been made in the use of personal protective equipment, studies indicate that nurses continue to be unnecessarily at risk. Inability to fully understand the dangers, a lack of organizational safety culture, and the general inability to enforce guidelines continue to be challenging. Fortunately, a number of upcoming changes will help to build momentum for increasing nursing safety.

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Key words: chemotherapy; staff development/education; cancer program safety; drug delivery systems/devices; healthcare and cancer care policies

Digital Object Identifier: 10.1188/16.CJON.20-04AP

The risks associated with hazardous drug (HD) handling have been well documented in the literature, dating back more than 35 years (Centers for Disease Control and Prevention, 2004; Crudi, Stephens, & Maier, 1982; Lorente et al., 2000; Sorsa, Hemminki, & Vainio, 1985). Although HD exposure has been linked to a number of acute side effects, most research has focused on the reproductive consequences. Figure 1 contains a summary of exposure side effects. Many HDs also are classified as carcinogens by the International Agency for Research on Cancer (2015). Known and probable carcinogens are listed in Figure 2.

## Mutagenicity

McDiarmid, Oliver, Roth, Rogers, and Escalante (2010) examined damage to chromosomes 5, 7, and 11 in 109 hospital employees. These chromosomes were selected for analysis because

they have been associated with therapy-related acute myeloid leukemia (Pedersen-Bjergaard, Andersen, Christiansen, & Nerlov, 2002; Rogers & Emmett, 1987). The study cohort included 63 oncology nursing and pharmacy employees, and 46 employees who did not handle HDs as a control group. Damage was detected on chromosomes 5 and 7 more often in staff who handled HDs versus those who did not ( $p = 0.01$ ). The study also demonstrated that increased damage was associated with increased handling, particularly with alkylating agents, such as cyclophosphamide (Cytoxan<sup>®</sup>), where the risk of damage was 8.54 times greater than control ( $p = 0.01$ ) (McDiarmid et al., 2010). Based on studies that have shown an increased risk of cancer (Blair et al., 2001; Escobar, Smith, Vasishta, Hubbard, & Zhang, 2007; Fransman et al., 2014; Ratner et al., 2010), and considering one of the fundamental theories of oncogenesis rests on the development of genetic mutations (Eggert, 2010), it would seem prudent to do whatever is necessary to prevent mutations whenever possible.