Cancer Caregivers’ Safe Handling of Contaminated Excreta with Antineoplastic Drugs: More Research is Needed

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Abstract

Antineoplastic drugs are a key component to treating cancer. Although antineoplastic agents are toxic to the body’s cells, they are therapeutic for oncology patients because they kill the rapidly dividing neoplastic cells. During treatment, oncology patients’ excreta (sweat, urine, vomit, feces) is contaminated with antineoplastic drugs and can, therefore, expose others, including their caregivers to the antineoplastic agents. While guidelines exist for safe handling for healthcare professionals, there is limited research concerning caregiver safe handling of contaminated excreta in the home setting. Without clear guidelines and educational materials for the caregivers to follow, they are at an increased risk of antineoplastic exposure and possible drug side effects such as infertility, skin rashes, and miscarriages (CDC, 2018).

Keywords: antineoplastic drugs, cancer, caregivers, education, excreta, side effects
Antineoplastic drugs are used to treat cancer because they disrupt the cancerous cells at different phases of DNA synthesis. The ability for antineoplastic agents to target cancerous cells is enhanced by their rapid proliferation. Although antineoplastic agents are generally successful at killing the cancerous cells, they are not selective and can kill other fast-growing, healthy cells in the body. This characteristic categorizes these drugs as hazardous. Drugs considered to be hazardous exhibit one or more of the following characteristics: carcinogenicity, teratogenicity or other developmental toxicity, reproductive toxicity, organ toxicity at low doses, or genotoxicity (NIOSH, 2016).

This becomes particularly dangerous when an individual who does not have cancer is exposed to an antineoplastic agent. Exposure can occur through multiple routes, including excreta contaminated with antineoplastic drugs. Excreta is defined as “excreted matter, such as urine, feces, or sweat” (The American Heritage Stedman’s Medical Dictionary, n.d.). This definition can also be expanded to include vomiting. This means that an oncology caregiver can come into contact with excreta contaminated with antineoplastic metabolites during their daily routine of caring for the patient. Without clear guidelines and educational materials for the caregivers to follow, they are at an increased risk for antineoplastic drug side effects such as infertility, skin rashes, and miscarriages (CDC, 2018).

The purpose of this paper is to analyze the current research regarding oncology caregivers’ education about safe handling of contaminated excreta with antineoplastic drugs. This paper will highlight the gap between safe handling guidelines for healthcare professionals and guidelines for caregivers.
For the purposes of this paper antineoplastic drugs, hazardous drugs, and cytotoxic drugs are used synonymously. In addition, in sections concerning a caregiver, I am referring to a family member who provides direct care to the cancer patient receiving treatment with antineoplastic agents.

**Methods**

To begin, I met with my honors project advisor to identify and refine a research question of interest. I had previous experience exploring nurse and nurse aide exposure to excreta contaminated with antineoplastic drugs on a faculty research project, where an interest in caregiver education about safe handling of contaminated excreta was developed.

CINAHL, PubMed, and Embase were used as the primary sources for data collection. The following search terms and their synonyms were used: chemo, antineoplastic, anti-cancer, excreta, urine, feces, vomit, sweat, safe handling, safety, drug-handling, precaution, caregiver, family, home, and outpatient. Inclusion criteria incorporated articles written in English, a full text article available, and published from January 1, 2007 to December 31, 2017. Articles were excluded if they did not address caregiver exposure to contaminated excreta from antineoplastic drugs.

Initially, 789 articles were identified using the search terms, inclusion, and exclusion criteria. Titles, abstracts, and key words were reviewed, narrowing the results to 21 articles that had possible relevance to caregiver risk and education about safe handling of contaminated excreta. Articles that simply mentioned contaminated excreta and did not explain or produce recommendations were eliminated. A final sample of four articles was identified (Appendix A, Table A). Table A displays each article by author, title, year published, database used, and a summary of the article. One guideline was identified and included from scanning reference
sections of relevant papers and one guideline was identified by my Honors Advisor (Appendix A, Table B).

In addition, any caregiver education materials that addressed safe handling of contaminated excreta at UNC Hospitals were identified. To my knowledge, there is one available educational resource concerning caregiver safe handling of contaminated excreta. The *Safe Contact with Patient Body Waste During Hazardous Drug Therapy* pamphlet created by the UNC Pediatrics Patient Education Team (2013) was obtained from the Comprehensive Cancer Support Program (CCSP), which is a central location that patients can go to obtain information about their diagnosis, side effects, and survivorship. Refer to Appendix B for a copy of the handout.

**Results**

During the 21st century, the Food and Drug Administration approved a wide range of new oral antineoplastic agents resulting in an increased amount of at-home chemotherapy treatments. This change in treatment increased the risk of caregiver exposure to contaminated excreta. In addition to the increased use of oral chemotherapy, the treatment regimens in the home have become long term. Oral chemotherapy is often given until the patient is not clinically benefitting or until the risk outweighs the benefit. Consequently, this increases the probability that a caregiver will be exposed to the antineoplastic metabolites in the patient’s excreta (Cass, Connor & Tabachnik, 2017).

Antineoplastic agents may be eliminated from the body as active or inactive metabolites in sweat, saliva, urine, stool, or emesis (Goodin et al, 2011). Yuki, Sekine, Takase, Ishida, & Sessink (2012) studied three patients and their family members who were undergoing cancer treatment. They found that cytotoxic drugs were detected in urine samples of each family
member who lived with a patient who was receiving chemotherapy. Areas in their homes that were suspected to be at high risk for metabolites were also swabbed. The areas in the home with the highest levels of cytotoxic drugs were the toilet seat, floor around the toilet, bathroom doorknob, and sink faucets. It was also found that bed sheets were contaminated with trace antineoplastic agents. To decrease the risk of exposure, Cass et al (2017) recommended the following: minimize the number of individuals coming in contact with the contaminated excreta, avoid all direct contact with feces, urine, and body fluids excreted by the patient, wear gloves when handling contaminated items, wash hands thoroughly before and after glove application, double-flush the toilet after use, and wash the patient’s clothes and bed linen separately from other items.

Trovato and Tuttle (2014) found that patient education concerning safe handling is not standardized and it was unclear if and to what extent patients and caregivers were informed about safe handling procedures.

The UNC Pediatrics Patient Education Team (2013) created the Safe Contact with Patient Body Waste During Hazardous Drug Therapy pamphlet to educate patients and their caregivers about contaminated excreta. This tri-fold handout defines body waste, addresses when waste is unsafe, suggests tips for handling body waste, highlights differences for handling body waste in the home, and offers tips for patients who wear diapers and briefs (Appendix B).

**Discussion**

The increased use of antineoplastic agents for cancer treatment served as the catalyst for research to decrease healthcare workers’ exposure to hazardous drugs. There are multiple national guidelines and hospital policies for healthcare professionals to follow in order to decrease their risk of exposure to antineoplastic agents. These protocols address the risk of
exposure throughout packaging, administration, clean up, and handling excreta. In contrast, there is a significant lack in educational materials and guidelines for caregivers to follow in order to decrease their risk of exposure to contaminated excreta. This fact, combined with the strict policies used in healthcare facilities to protect healthcare professionals, identifies a gap in practice. This gap potentially puts caregivers at risk for both acute and chronic health effects such as rashes, adverse reproductive outcomes, and possibly leukemia and other cancers (CDC, 2018). When looking at this from a broad prospective, the lack of education and research can increase the number of people using the healthcare system. In other words, while we are treating one patient, we are potentially harming a few more due to the lack of systematic guidelines.

The study conducted by Yuki et al (2012) clearly displayed that the metabolites excreted from a patient who is undergoing treatment puts caregivers and anyone cohabiting the home of the patient at risk. The traces of cytotoxic agents in the caregivers’ urine samples, and around frequently used areas in the home, signify the need for strict guidelines and education in order to keep everyone in the household safe.

The third edition of Safe Handling of Hazardous Drugs (Oncology Nursing Society, 2017) provides great detail concerning caregiver safety when handling contaminated excreta in the home. The guideline acknowledges the gap in practice between safe handling in the healthcare setting versus safe handling in the home. The need to cater education to the caregiver’s learning style is addressed. It is suggested that the educational materials be presented verbally and in writing to allow the caregiver to have the opportunity to refer back to the information while in the home. Furthermore, the guideline acknowledges that hazardous drug metabolites are excreted in a patient’s excreta for at least forty-eight hours. There is evidence of some hazardous drugs being excreted for up to five days. Caregivers should be aware of this fact
CAREGIVER SAFE HANDLING

and be knowledgeable about the following recommendations: wear disposable, chemo-safe gloves when handling excreta, use a separate toilet or clean the toilet with sanitizing wipes after each use, and wash hands with soap and water after contact with contaminated excreta.

Considering the low level of research on this topic, the Safe Contact with Patient Body Waste During Hazardous Drug Therapy pamphlet made by the UNC Pediatric Patient Education Team (2013) is quite advanced. The team recognized the risk for caregivers when handling contaminated excreta, took the guidelines from within the hospital, and produced a pamphlet that is both tangible and easy to read. The pamphlet does not require a high health literacy level because it defines words such as body waste, urine, stool, chux and hazardous. In addition, pictures are included as reminders and to reinforce the information being taught. Some of the main points for handling body waste at home are as follows: put the toilet lid down and flush twice after the patient uses the restroom, wear gloves when touching sheets, towels, or clothes, wash the patient’s soiled laundry separately, and clean the toilet after each use if the patient is unable to do it themselves. Refer to Appendix B for a copy of the handout.

**Recommendations**

Based on the evidence presented in this paper, more research on patient and caregiver education about safe handling of contaminated excreta is recommended. The need for strict guidelines, such as those in place for safe handling of contaminated excreta in the healthcare setting, is apparent. The safe handling information should be presented to the caregiver verbally, in writing, and a route that best suits their learning style. Tailoring the information to their learning style will help the caregiver retain the information. Presenting the information in writing will allow the caregiver to refer back to the information at a later date. This step is important because when a patient is diagnosed with cancer they are given a great deal of information that is
most likely foreign to them. They are taught about their diagnosis, what blood counts are and what they mean, the treatment, the medications, and potential side effects. When caregiver safety is added to this list, it can become overwhelming for the patient and caregiver, especially considering they are receiving this information at an emotional time. This decreases their ability to absorb and learn the information, which puts greater emphasis on the need for a tangible educational resource.

Key recommendations for caregiver safe handling of contaminated excreta with antineoplastic drugs are presented in Appendix C Table 1. It is important to note that a patient’s excreta is considered contaminated for at least forty-eight hours after the administration of an antineoplastic agent. Caregivers should always wear chemo-safe, disposable gloves when handling excreta, flush the toilet with the lid down, sanitize the toilet seat, and wash hands with soap and water after contact with the patient’s excreta.

**Conclusion**

This paper reviewed a variety articles and guidelines concerning caregiver safe handling of contaminated excreta with antineoplastic drugs. The strict guidelines in place for healthcare workers’ safe handling of contaminated excreta compared to the variable guidelines for caregiver education when handling contaminated excreta, signifies an obvious gap in practice. In order to narrow this gap, further research concerning caregiver exposure to contaminated excreta with antineoplastic agents is needed. Standardized guidelines and educational materials should be developed and implemented in order to protect caregivers from antineoplastic drug exposure. This subject will be ever-evolving due to the nature of cancer treatment and educational materials should be reviewed and updated with each new study and guideline published.
References


Appendix A

**Table A. Safe Handling Articles**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Year Published</th>
<th>Database Used</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trovato, A. &amp; Tuttle, L.</td>
<td>Oral Chemotherapy Handling and Storage Practices among Veterans Affairs Oncology Patients and Caregivers</td>
<td>2014</td>
<td>PubMed</td>
<td>Patient education is not standardized and it was unclear if and to what degree patients and caregivers were informed about safe handling procedures.</td>
</tr>
<tr>
<td>Goodin, S., Griffith, N., Chen, B., Chuk. K., Daouphars, M., Doreau, C., Patel, R., Schwartz, R., Tames, M., Terkola, R., Vadnai, B., Wright, D., Meier, K.</td>
<td>Safe Handling of Oral Chemotherapeutic Agents in Clinical Practice: Recommendations From an International Pharmacy Panel</td>
<td>2011</td>
<td>PubMed</td>
<td>Drugs may be eliminated from the body as active or inactive metabolites in sweat, saliva, urine, or stool. It is recommended that patients’ clothes and bed linen be handled with gloves and washed separately from other items. Toilets should be double-flushed after use, during 4-7 days after discontinuing chemotherapy. HCPs</td>
</tr>
</tbody>
</table>
Cass, Y., Connor, T., Tabachnik, A.

**Safe Handling of Oral Antineoplastic Medications: Focus on Targeted Therapeutics in the Home Setting**

2017

Embase

Oncology patients are often prescribed oral chemotherapy until the risk outweighs the benefit of treatment. This increases the possibility of caregiver exposure to contaminated excreta. Recommendations include: minimize the number of individuals in contact with excreta, avoid direct contact with linen and excreta, wear gloves,
Cytotoxic drugs were detected in all urine samples collected by each family member who lived with the patient. The areas in the home with the highest levels of cytotoxic drugs were the toilet seat, floor around the toilet, toilet door knob and sink faucets. Bed sheets were also contaminated with the drug.
<table>
<thead>
<tr>
<th>Authors(s)</th>
<th>Title</th>
<th>Year Published</th>
<th>Database Used</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health</td>
<td>NIOSH ALERT: Preventing Occupational Exposure to Antineoplastic and Other Hazardous Drugs in Health Care Settings</td>
<td>2004</td>
<td>N/A- Identified via relevant article</td>
<td>In a healthcare setting, two pairs of protective gloves and a disposable gown should be worn when handling linens, feces, or urine from patients who have received antineoplastic agents in the past 48 hours. Hands should be washed with soap and water after removal of gloves.</td>
</tr>
<tr>
<td>Oncology Nursing Society. Edited by: Polovich, M. &amp; Olsen, M.</td>
<td>Third Edition: Safe Handling of Hazardous Drugs</td>
<td>2017</td>
<td>N/A- Identified through honors advisor</td>
<td>Caregiver education materials should be presented verbally, in writing, and catered to the caregivers’ learning style. Recommendations include using a separate toilet or sanitizing the seat and rim after use. Wear disposable gloves when handling excreta and contaminated objects (linen).</td>
</tr>
</tbody>
</table>
**Appendix B**

Safe Handling Education Pamphlet (UNC Pediatrics Patient Education Team, 2013)

<table>
<thead>
<tr>
<th>Tips for Handling Body Waste</th>
<th>Differences for Handling Body Waste at Home</th>
<th>Tips for Patients Who Wear Diapers or Briefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover any bedpan, urinal or basin used by the patient when transporting it to the toilet. A plastic-backed, absorbent pad (called a “chux”) should be used.</td>
<td>After the patient has used the toilet, put the lid down before flushing. Flush 2 times.</td>
<td>Wear gloves to change a diaper or brief. Wear a gown if you have one. Wear a face shield if you have one and splashing may happen.</td>
</tr>
<tr>
<td>Wear a gown and gloves when carrying a bedpan, urinal or basin filled with body waste. Wear a face shield if splashing may happen.</td>
<td>Wear gloves when touching any dirty sheets, towels, or clothes.</td>
<td>If you are in the hospital, put the patient’s diaper or brief, wipes, gown, gloves and face shield into the red biohazard trash.</td>
</tr>
<tr>
<td>Before flushing the toilet, cover the toilet opening. Do NOT flush the chux.</td>
<td>Wash the patient’s soiled laundry separate in its own load. Use soap and warm water.</td>
<td>If you are at home, put the diaper or brief, wipes, gown, gloves and face shield into a regular trash bag. Double-bag the trash by putting that trash bag into another trash bag. Throw double-bagged trash out in the regular trash.</td>
</tr>
<tr>
<td>A gown and gloves should also be worn when touching dirty sheets, towels or clothes.</td>
<td>If the patient is unable to have his or her own toilet, the toilet should be cleaned after each time the patient uses it. Wear gloves to clean the toilet.</td>
<td>Wash your hands with soap and water after changing the patient’s brief or diaper.</td>
</tr>
<tr>
<td>The chux, gown, gloves, and face shield should be put into the red biohazard trash. This is not the same as the regular trash.</td>
<td>The patient and caregiver should always wash their hands with soap and water after handling body waste.</td>
<td></td>
</tr>
</tbody>
</table>
What is Body Waste?

- Body waste is anything that exits the body from inside the body, including urine ("pee"), stool ("poop"), vomit, blood, semen, spit and tears.

When is Body Waste Unsafe?

- Some drugs, such as chemotherapy, are hazardous (haz-ur-dus)—or unsafe—to others because they can harm healthy cells.
- Patients getting these drugs may have some leftover drug in their body waste.
- Frequent skin contact with body waste can be harmful to caregivers.
- Body waste is unsafe while the patient is receiving the hazardous drug and for 2 days after each dose.

Safe Contact with Patient Body Waste During Hazardous Drug Therapy

- Patients who are getting hazardous drug treatment should not have sex or any form of sex during their treatment and for 2 days after their treatment.

Nursing or Pregnant Caregivers

- Caregivers who are pregnant or nursing should try to avoid contact with the patient’s body waste for two days after the patient has a hazardous drug treatment.

Please ask your nurse or doctor if you have any questions or concerns.

Revised by Peds Patient Education Team
07/2013; HDF 2383; FK 5.9
Appendix C

Table 1. Caregiver Safe Handling of Contaminated Excreta: Dos and Don’ts

<table>
<thead>
<tr>
<th>Dos for Safe Handling</th>
<th>Don’ts for Safe Handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be aware that the patient secretes hazardous drug metabolites in his or her excreta over hours or days.</td>
<td>Let children or pregnant women touch your body fluids.</td>
</tr>
<tr>
<td>Wear chemo-safe disposable gloves when touching excreta or any objects (linen, clothes) that have come in contact with the contaminated excreta.</td>
<td>Wear gloves with tears, holes, or for multiple uses.</td>
</tr>
<tr>
<td>Use separate toilets or wipe toilet seat and rim with sanitizing wipes after each use.</td>
<td>Use bedpans or urinals if able use a toilet.</td>
</tr>
<tr>
<td>Put toilet lid down and flush twice after use.</td>
<td>Flush the toilet with the lid up or use the toilet after the patient without flushing.</td>
</tr>
<tr>
<td>Allow patient to handle his or her own excretions when possible.</td>
<td>Allow individuals not educated on safe handling help the patient with contaminated excreta.</td>
</tr>
<tr>
<td>Wash hands with soap and water after contact with contaminated excreta.</td>
<td>Use sanitizer after contact with contaminated excreta.</td>
</tr>
</tbody>
</table>

(Goodin et al., 2011)  
(Oncology Nursing Society, 2017)