

Secom Science and Technology Foundation
Research Grant Report – Summary

Title

Establishing a regional security system to prevent environmental exposure to cancer treatment agents used for cancer patients who receive chemotherapy at home

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Summary

It is becoming more common for cancer patients to be treated as outpatients instead of inpatients. Exposure to anticancer agents can pose a danger to public safety, as these agents have been linked to acute allergies, genotoxicity, spontaneous abortion, and congenital abnormalities, among other effects. Anticancer agents can harm both normal and tumor cells. A significant proportion of still active anticancer agents can be released in urine, feces, and the breath.

Anticancer drugs are classified as hazardous drugs because of their cellular toxicity. To guarantee safety, their handling is subject to internationally recognized guidelines. These guidelines cover the safe handling of these agents during their administration, and also provide recommended procedures for handling patients' excretory products for up to 48 hours after administration. However, the excretion periods for hazardous drugs differ. Thus, it is important to take into account the period for which they maintain their pharmacological activity. Previous research has identified the risks involved for pharmacists, nurses, and other staff members who handle contaminated products associated with anticancer agents in medical institutions and exposure to contamination in medical centers. To ensure safety, there are strict procedures to be followed in these environments.

However, procedures to guard against exposure at homes or work places, where outpatients spend most of their time, are not sufficient. Although guidelines state that anyone who handles the excretory products of patients at home must use masks, gowns, and disposable gloves in accordance with the practices used in medical institutions, these guidelines are not adhered to.

Preliminary results from our research show this is not only the case in Japan, but is an important issue elsewhere. Therefore, the aim of this study was to develop a better understanding of the exact nature of contamination from anticancer agents in medical institutions, and to gather evidence on exposure to anticancer agents among family members of cancer patients in the home. Specifically, our research had the following objectives.

- 1) Monitor the degree of contamination in outpatient wards where chemotherapy is administered.
- 2) Monitor the exposure to anticancer drugs for a physician over a three day working period using biological monitoring

3) Evaluate the exposure of patients and their family members for 48 hours after treatment, and evaluate the degree of contamination at the patients' home at 48 hours after treatment.

4) Evaluate the degree of exposure by family members for seven days using biological monitoring after treatment,

For the first objective, we considered that it was important to understand not only the exposure risk for health care workers, but also for patients who are receiving treatments in outpatient departments. To this end, we observed the behaviors and movements of patients and the staff as they went about their normal workplace activities. A wipe survey found that the degree of contamination on chairs, beds, doorknobs, and other places used or touched by patients was high. Contamination by anticancer agents appeared not only to be associated with their direct handling, but also resulted from drugs adhering to surfaces and after patients used the toilet.

Medical practices were chosen for the second objective. Exposure to anticancer drugs was high for all physicians investigated. During the investigation period, none of the physician directly handled anticancer drugs and they did not directly touch the excretory products of their patients. Results from this investigation certainly point to a need to strengthen safety standards to prevent exposures to these agents.

The results of our third objective showed that a total of 35 and 16 urine samples were collected from the three patients and their family members, respectively. The drugs were detected in all samples. The results also confirmed that all family members had been exposed to anticancer drugs. At 48 hours after treatment, the area surrounding the toilet was where most contamination occurred. This again confirmed the need for safety standards to prevent exposures to patients and those who are close to them.

Results for the fourth objective, longer term exposure after treatment, showed that 64% of family members were still exposed to anticancer agents during seven days after treatment. Of special note, in two cases where the family comprised two people, both members were exposed in one case and neither member was exposed in the other case.

The harmful effects of long-term exposure to low levels of anticancer agents are unknown. The regular, repetitive nature of chemotherapy treatments required for cancer patients indicates that there is a need for safety protocols to guard against

exposure among family members and other people who interact with these patients.

Recommendations for reducing exposure to hazardous drugs post administration

- Although information is not available for all drugs, two days (48 hours) has been recommended as a time frame for use of the precaution when handling body fluid because the majority of drugs are excreted within this time (ASHP, OSHA).
- Home linens can be handled the same as other household laundry (ONS) .
- Family members or caregivers should don chemotherapy gowns and double gloves if they are handling contamination linens (ONS) .
- Contaminated linens in the home should be double washed with hot water and detergent separately from other household laundry (ONS) .
- Double flushing with a lid at home may be useful after use (ONS)
- When family members handle patients' contaminated excreta, they should wear gloves and mask (ONS) .

ASHP : American society of health-system pharmacists

OSHA : Occupational safety and health administration

ONS : Oncology nursing society