

CHEMOTHERAPY SAFE HANDLING: POLICY ANALYSIS

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Introduction

Health policy is defined as a set course of action undertaken by governments or health care organizations to obtain a desired outcome (Cherry & Jacob, 2007).

Health policy analysis is defined as an interdisciplinary approach that analyzes current health policy and proposes various alternatives for developing future health policy without pushing a single solution set - rather, it considers the perspectives of economics, political science, management, communications, technology, and public health (McLaughlin & McLaughlin, 2008).

Chemotherapy has an important role in cancer treatment (Green et al., 2009). The National Institute for Occupational Safety and Health (NIOSH, 2004) has categorized chemotherapy as hazardous drugs. Hazardous drugs pose a potential health risk to personnel who prepare, handle, administer, and dispose of these drugs (Itano & Toka, 2005).

Some patients who have been cured of cancer develop secondary malignancies believed to be linked to exposure to their initial chemotherapy regimen. If patients receiving potentially curative chemotherapy are at increased risk of developing secondary cancers, what is the risk to health care workers who prepare and administer these agents? (Green et al., 2009). Although health care workers are exposed to much lower doses than cancer patients are, low-dose exposure over long periods can have long-term health effects (Moretti et al., 2011).

Potential routes of exposure are:
1- direct contact - skin and mucus membrane contact and absorption, inhalation, or ingestion (e.g., contaminated food), accidental needle stick.

Abstract

Chemotherapy has an important role in cancer treatment. The National Institute for Occupational Safety and Health categorizes chemotherapy as hazardous drugs. Hazardous drugs pose a potential health risk to personnel who prepare, handle, administer, and dispose of these drugs. Chemotherapeutic agents pose any one of the following characteristics: genotoxicity, carcinogenicity, teratogenicity, or fertility impairment. The risk for exposure-related cancers is increased in health care workers who handle chemotherapy and in female health care workers who become pregnant; there are also the potential hazards of spontaneous abortions, stillbirths, and teratogenic effects on unborn fetuses. Patients receiving chemotherapy and their family members, can also be exposed to the hazards of chemotherapy drugs when they handle contaminated equipment or body fluids. Several studies carried out at hospital units have shown detectable levels of cytotoxic agents in the air, on surfaces, on gloves, and on different parts of the body. The presence of these drugs in the urine of hospital personnel has been widely studied. Thus, it is important for everyone who prepares, handles, administers, and disposes of chemotherapeutic agents to review and analyze the policy of safe handling of cancer chemotherapy drugs and waste.

Key words: chemotherapy, safe, administration, policy, analysis.

2- Indirect contact - body fluids and excreta of clients who have received antineoplastic agents within the past 48 hours (Itano et al., 2005).

Significantly higher frequency of DNA damage - has been analyzed using the alkaline single cell gel electrophoresis technique (comet assay) - in lymphocytes of nurses handling antineoplastic drugs compared to unexposed controls; the DNA damage was, however, found to be significantly lower in nurses using compulsory personal protection equipment during their work (Moretti et al., 2011).

Thus, it is important for everyone who prepares, handles, administers, and disposes of chemotherapeutic agents to review and analyze the policy of safe handling of cancer chemotherapy drugs and waste.

Step 1

Verify, define and detail the problem

Issue statement

Does the policy of safe handling of cancer chemotherapy drugs and waste in Albashir hospital provide a safe environment and prevent hazardous effects to health care workers?

Scope of problem

Chemotherapeutic agents pose a potential health risk to personnel who prepare, handle, administer, and dispose of these drugs; chemotherapeutic agents pose any one of the following characteristics: genotoxicity, carcinogenicity, teratogenicity, or fertility impairment (Itano, Toka, 2005).

Chemotherapy, because of its relatively narrow therapeutic index, is often associated with a greater risk of adverse events (AEs) than other medications, and when used in combination, may result in an even greater incidence of AEs (Goodin et al., 2011). Potential effects of exposure to hazardous drugs: 1- short term- occur within hours or days after exposure: contact dermatitis, alopecia, local skin or mucus membrane irritation, blurred vision, allergic response, dizziness, gastrointestinal (GI) tract problems, headache. 2- Long term- occur within months or years after exposure: liver damage, chromosomal abnormalities, increased risk of cancer, reproductive risks (Itano et al., 2005). Green et al., (2009) reported that the risk for exposure-related cancers increased in health care workers who handle chemotherapy and in female health care workers who become pregnant; there are also the potential hazards of spontaneous abortions, stillbirths, and teratogenicity effects on unborn fetuses. Patients receiving chemotherapy and their family members can also be exposed to the hazards of chemotherapy drugs when they handle contaminated equipment or

body fluids (CNSA, 2003). Several studies carried out at hospital units have shown detectable levels of cytotoxic agents in the air, on surfaces, on gloves, and on different parts of the body. The presence of these drugs in the urine of hospital personnel has been widely studied. This has led several organizations to develop guidelines or recommendations with the aim to improve safety during the handling of antineoplastic drugs and reduce risk of contamination in the workplace (Moretti et al., 2011). In addition chemotherapeutic agents may be used for diseases other than cancer, such as Lupus, and multiple sclerosis. In some hospitals these drugs are being administered by nurses without proper training or being chemotherapy certified which may increase exposure to chemotherapeutic agents for healthcare providers (Polovich, 2004). Many institutions introduced and implemented policies and procedures designed to minimize occupational exposure and consequent risks associated with handling cytotoxic drugs including economic impact. Health care institutions would have to value the significant expense to comply with this policy and the real cost must be weighed against the potential high cost of the treatment of the health care workers.

No relevant policy analysis was found regarding safe handling of chemotherapy.

Search resources and associated search terms were Science Direct Database, PubMed, and Google scholar, using keywords: chemotherapy, safe handling, policy, cancer, hazardous drugs, in multiple combinations.

Purpose

This paper aimed to provide policy analysis for safe handling of cancer chemotherapy drugs and waste in one governmental educational hospital (Albashir hospital) in order to identify issues and propose alternative solutions, alternative policy recommendations for this issue by using a six-step policy analysis model which will verify and define the problem through implementing, monitoring and evaluating this policy.

Hospital administrative staff may refuse the change because of the persistent nursing shortage problem, inability of the health ministry to hire additional numbers of staff, the change requires more staff, and the cabinet for the preparation of chemotherapy is not accommodated in the hematology department. One of the alternatives is to specialize a room for chemotherapy preparation. A containing safety cabinet is not necessary to be in the same department if it is not accommodated, so there is an urgent need to seek the help of Biomedical Engineering and Architecture staff, and to put this issue as first priority for administrative staff; it could be near the department.

If policy of safe handling of cancer chemotherapy drugs and waste is not applied excellently and with great caution, the health care workers and even health

care institutions will be in fear of unsafe handling of chemotherapy drugs and waste mentioned previously in this paper. Consequences of chemotherapy unsafe handling will affect primarily the patients; and delay may occur and affect nurses and health care institutions, therefore there is need to improve the safety of the work environment; make available protective equipment; develop standard practice guidelines for oncology nurses; and equipment (such as cytotoxic drug safety cabinets).

All people who are affected by unsafe handling of chemotherapy directly or indirectly are concerned in this policy analysis. The government, healthcare institutions, healthcare professional/workers, and patients and their families. The government (Ministry of Health) have to fund health care institutions to make a safe environment for safe handling of chemotherapy including safety cabinet in specialized room and also have to hire additional numbers of staff. The health care institution has the responsibility to adopt policies that respond to the needs of patients and health care workers, and maintain the physical environment, patient and staff education and training.

Health care workers have to update their information regarding chemotherapy and safe handling and to seek a safe environment and specialized equipment for the preparation of chemotherapy and disposal of waste.

Step 2

The purpose of the policy is to delineate appropriate handling of cytotoxic agents and safe dealing and handling of its waste products, in addition to ensuring quality patient care and optimal occupational safety during the administration of chemotherapy drugs. It is the policy of the radiotherapy department to apply best safety practice in handling of cytotoxic agents and its waste products to assure staff, and patient safety. Policy will be evaluated in terms of administrative ease, costs and benefits, effectiveness, equity, legality, and policy acceptability. The desirable outcomes are providing new recommendations for stakeholders and to be applied and hence ensure safe practice and build a safe environment in the whole health care institution. The undesirable outcomes are resistance to change by health care workers; they not aware of the importance and seriousness of safe handling of chemotherapy, and the inability to assign more staff in the oncology department by health care institutions because the alternatives will cost them.

Safe handling of cancer chemotherapy drugs and waste policy is clearly stated in terms of purpose, values, and responsibility, definitions, and guidelines, and mostly covers all safety practices, is relatively easy to administer, is cost effective, is not equal for all departments, is legal and accepted but not easily accessible.

Step 3

The policy mostly covers all safety practices, but need to be comprehensive, clear, unified for all departments, and some aspects must be added because of their importance.

The alternatives are: a) unify the policy for departments dealing with chemotherapy, mainly radiotherapy/medical oncology department (solid tumor) and hematology floor, b) safety cabinet in specialized room for chemotherapy preparation in hematology floor, c) that chemotherapy should be administered only in oncology departments even for non-cancer patient, d) RNs who didn't receive specific education and training regarding chemotherapy are not privileged to deal with chemotherapy.

Experts from Albashir hospital were consulted. Most of them showed acceptance and interest. It's planned to propose and consult on this policy analysis with the policy development committee.

But the question again is, does the policy of safe handling of cancer chemotherapy drugs and waste in Albashir hospital provide a safe environment and prevent hazardous effects to health care workers?

Step 4

For the evaluation of the policy we should identify the major missing factors that lead to occupational hazards in the work place, and then find the best alternatives that may strengthen the policy and protect the health care workers from hazards of unsafe handling of chemotherapy. Chemotherapy is mainly administered in Albashir hospital in two departments: radiotherapy/medical oncology department (solid tumors), and in hematology floor (blood cancers mostly). In the radiotherapy department there is a safety cabinet in a specialized room where the preparation is being done, but in the hematology floor there is no safety cabinet in a specialized room because the safety cabinet does not accommodate the chemotherapy preparation room in the new building where the hematology floor is, besides it is not stated in the policy that chemotherapy preparation should be in the chemotherapy preparation room inside a safety cabinet. Also the policy is made for the radiotherapy/medical oncology department (solid tumor) as mentioned in the definition; the policy should be the same for departments that deal with chemotherapy. also during my work I noticed that chemotherapy is prescribed for non-cancer patients outside the chemotherapy department; a real example is once a nurse came to me in the hematology floor from medical floor and he showed me a medication (cyclophosphamide) for a patient with Behçet's disease and he asked me is this chemotherapy? How is this medication prepared? How is this medication administered? So we should add to the policy that chemotherapy should be administered only in the

oncology departments even for non-cancer patients, because in non-oncology departments there is no specialized chemotherapy preparation room, and non-oncology nurses didn't know how to deal with chemotherapy safely. Staff with minimal experience or no experience may be responsible for handling hazardous drugs in units or areas that do not normally care for cancer patients with chemotherapy management. Specific training is required to prepare those staff before assigning them to such a procedure (Brown et al., 2001). So we can add to the policy that RNs who have not received specific education and training regarding chemotherapy are not privileged to deal with chemotherapy; some local hospitals apply this point, but it is not clearly stated in their policies. Education and training should focus on risks of exposure based on strong evidence from research findings. All these alternatives will ensure safe handling of chemotherapy.

Table 1: Appropriate methods of applying alternatives and expected outcomes

Alternative	Appropriate method for applying it	Expected outcomes
Unify the policy for departments dealing with chemotherapy	Distribute the same policy for departments that deal with chemotherapy	- Departments that deal with chemotherapy have the same safe environment - Nurses can work in both departments - Equity will be met
Chemotherapy preparation room containing safety cabinet in the hematology floor	Seeking the help of Biomedical Engineering and Architecture, and to put this issue at first priority for administrative staff	- Safe environment - Eliminate hazards of chemotherapy - Equity will be met
Chemotherapy should be administered only in oncology departments even for non-cancer patients	Circulate this point to all physicians and to the admission office through meetings	- Create safe environment in the whole health care institution - Eliminate hazards of chemotherapy to non-oncology nurses and patients - Equity will be met
RNs who didn't receive specific education and training regarding chemotherapy are not privileged to deal with chemotherapy.	Theoretical part in nursing development unit, it could be one day, and one day practical	- Increase the orientation of nursing staff regarding this issue - Minimize errors that may occur with chemotherapy

Step 5

Table 2: Alternative solution

Alternatives	Administrative Ease	Cost and Benefit	Effectiveness	Equity	Legality	Acceptability
Unify the policy	Easy	Cost effective	Effective	Yes	Legal	Acceptable
Safety cabinet in the hematology floor	Not easy	It already exists, but fitting it will cost	Effective	Yes	Legal	Acceptable
Chemotherapy should be administered only in oncology departments	Easy	Cost effective and highly beneficial	Effective	Yes	Legal	Acceptable
Specific education and training	Not easy	Depends on level and type of training	Highly effective	Yes	Legal	Acceptable

Table 3: Strengths and weakness of each Alternative

Alternatives	Strengths	Weakness
Unify the policy	Easy, Effective, legal, meet equity, Nurses can work in all oncology departments	Expensive on Hospital, increase number of educators.
Safety cabinet in the hematology floor	Effective, meet the equity, eliminate hazards and provide safe environment	It already exists, but fitting it will cost, and then training is needed
Chemotherapy should be administered only in oncology departments	Effective, legal, create safe environment in the whole health care institution. Eliminate hazards of chemotherapy to non-oncology nurses and patients, meets equity	Makes multi-party conflicts, and increases the load on oncology departments
Specific education and training	Effective; Increases the orientation of nursing staff regarding chemotherapy. Minimizes errors that may occur with chemotherapy through providing safety practices	Expensive; It will cost the hospital, needs more educators, not easy

Step 6

The main goal of this policy analysis is to provide standardized guidelines in order to ensure safe handling of cancer chemotherapy drugs and waste, and to fill the gap in the policy and discuss and evaluate best alternatives. The plan to implement new policy is to meet stakeholders in Albashir hospital and convince them about new recommendations, but before that I will make a brochure about chemotherapy and risks of exposure and routes of exposure and emphasizing on the importance and seriousness of safe handling of cancer chemotherapy drugs and waste, and then distribute it to all oncology staff, and I will also distribute for them a draft of a new policy and I will take their feedback by filling in a questionnaire and the table of alternative solutions evaluation in terms of administrative ease, costs and benefits, effectiveness, equity, legality, and political acceptability. I will work to publish this policy analysis in a journal to encourage health care workers and convince stakeholders to consider new solutions. Albashir hospital stakeholders should have access to the proposed recommendations.

I will recommend to designate a committee of health professionals as a monitoring system for assuring compliance with the safe handling of cancer chemotherapy drugs and waste policy, and check competencies of all oncology staff regarding safe

handling of chemotherapy frequently, monitoring and measuring safe, quality and ethical services, encouraging staff to report incidents, not for disciplinary action but for identifying problems and finding solutions.

I will use the following tables to evaluate the policy; I will give it to stakeholders and all oncology staff in the radiotherapy department and hematology department and ask them to fill in the tables (following page) :

Table templates

Alternatives	Administrative Ease	Cost and Benefit	Effectiveness	Equity	Legality	Acceptability
Unify the policy						
Safety cabinet in the hematology floor						
Chemotherapy should be administered only in oncology departments						
Specific education and training						

Alternatives	Strengths	Weakness
Unify the policy for oncology departments		
Safety cabinet in the hematology floor		
Chemotherapy should be administered only in oncology departments		
Specific education and training		

References

Brown, K.A., Esper, P., Kelleher, L.O., O'Neill, J.E.B., Polovich, M., & White, J.M. (2001). *Chemotherapy and biotherapy guidelines and recommendations for practice*. Pittsburgh, PA: Oncology Nursing Society.

Cherry, B., & Jacob, S.R. (2007). *Contemporary nursing: Issues, trends, & management* (3rd ed.). St. Louis: Mosby.

CNSA. (2003). Position statement on the minimum education and safety requirements for RNs involved in the administration of cytotoxic drugs, p.1. Retrieved November 2013, from http://www.cnsa.org.au/publications_policies_pub.htm

Goodin, S., Griffith, N., Chen, B., Chuk, K., Daouphars, M., Doreau, C., Patel, R.A., Schwartz, R., Tamés, M.J., Terkola, R., Vadrnais, B., Wright, D., Meier, K. (2011). Safe Handling of Oral Chemotherapeutic Agents in Clinical Practice: Recommendations from an International Pharmacy Panel. *Journal of Oncology Practice*, 7, (1), 7-12

Green, E., Johnston, M., Trudeau, M., Schwartz, L., Poirier, S., Macartney, G., Milliken, D. (2009). Safe Handling of Parenteral Cytotoxics: Recommendations for Ontario. *Journal of Oncology Practice*, 5, (5), 245-249

Itano, J.K., & Taoka, K.N. (Eds.). (2005). *Core Curriculum for Oncology Nursing* (4th ed.). Pittsburgh, PA: Oncology Nursing Society.

McLaughlin, C. P., & McLaughlin, C. (2008). *Health policy analysis: An interdisciplinary approach*. Sudbury, Mass: Jones and Bartlett Publishers.

Moretti et al.: A study protocol for the evaluation of occupational mutagenic/carcinogenic risks in subjects exposed to antineoplastic drugs: a multicentric project. *BMC Public Health* 2011 11:195.

National Institute for Occupational Safety and Health (NIOSH, 2004). Preventing occupational exposure to anti-neoplastic and other hazardous drugs in health care settings. Retrieved October 2013 from <http://www.cdc.gov/niosh/docs/2004-165/pdfs/2004-165.pdf>

Polovich, M. (2004). Safe handling of hazardous drugs. *Online Journal of Issues in Nursing*, 9, (3), 5.