

CHEMOTHERAPY SPILLS MANAGEMENT POLICY

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Introduction

Health policy refers to decisions, plans, and actions that are undertaken to achieve specific health care goals within a society (World Health Organization [WHO], 2013). Health policy analysis is of increasing interest to sociologists in the areas of medical sociology and health services research (Atlantic International University [AIU], 2012). Chemotherapy spills management is containment and safely handling any unintentional, uncontained dispersal of chemotherapy (Oncology Nursing Society, 2005).

Chemotherapy is a cancer treatment that uses drugs to destroy cancer cells; it is also called chemo (National Cancer Institute [NCI], 2008). Today, there are many different kinds of chemotherapy, so the way the patient feels during treatment may be very different from someone else (NCI, 2008). Cancer chemotherapy drugs can cause mutagenesis, teratogens, carcinogenesis, and sterility when administered to humans; the risk varies with the specific drug and its concentration, and with the frequency and duration of exposure (NCI, 2008).

Chemotherapy agents are considered life-saving chemicals because of their ability to eradicate certain malignant diseases as well as increase disease-free survival for patients with cancer (Nurse.com, 2013), but studies have found that through occupational exposure to antineoplastic drugs, healthcare providers are at risk for harmful effects (Nurse.com, 2013). As more and more chemotherapy is given in outpatient clinics and at home, it is extremely important that caregivers and patients understand the risks and hazards that household members may be exposed to (Care giver, 2013). Cancer nurses have long known that exposing themselves to chemotherapy can be harmful to their health. That is why they follow strict standards published by the Occupational Safety Health Administration (OSHA) and the Oncology Nursing Society (ONS).

Abstract

Chemotherapy agents are considered life-saving chemicals because of their ability to eradicate certain malignant diseases as well as increase disease-free survival for patients with cancer; chemotherapeutic agents have been classified as hazardous by the National Institute for Occupational Safety and Health. Chemotherapeutic agents are therapeutic agents which are known to be toxic to cells through their action on cell reproduction and are primarily intended for the treatment of neoplastic disorders. As more and more chemotherapy is given in outpatient clinics and at home, it is extremely important that caregivers and patients understand the risks and hazards that household members may be under. Accidental spill of chemotherapy agents may occur during manufacture, transport, distribution, receipt, storage, preparation, and administration, as well as during waste handling and equipment maintenance and repair. Oncology nurses should receive specific training which includes principles of chemotherapy administration, safe handling of cytotoxic drugs, classes of chemotherapeutic agents and cell kinetics, anaphylaxis, spill, and extravasation management, management of chemotherapy side effects and patient teaching, use of N95 mask to prevent inhalation of chemotherapy, and add putting in sharp container in case chemotherapy is prepared in a glass bottle, how to remove the PPE in consequences, and how to clean CTX in case of exposure to the body.

Key words: chemotherapy spills, chemotherapy management, policy, hazardous agents.

These guidelines include safeguarding against drugs that are found in the urine, vomit and stool of chemotherapy patients. When you care for someone who's receiving treatment in the home or outpatient clinic, you need to be careful about coming into contact with chemotherapy and the patient's body fluids; each area where cytotoxic chemotherapy is stored, prepared or administered should have a cytotoxic spill kit for all health care providers, patients and their families (Care giver, 2013).

Oncology nurses should complete a theoretical post-graduate course in chemotherapy administration from an accredited institution which includes principles of chemotherapy administration, safe handling of cytotoxic drugs, classes of chemotherapeutic agents and cell kinetics, anaphylaxis, spill, and extravasation management, management of chemotherapy side effects and patient teaching. Various surveys have been published.

As a result, comprehensive guidelines and safety precautions, especially for handling of hazardous drugs, have been elaborated on and adopted during the last three decades. Despite these efforts, recent studies have revealed that contamination of the workplace (safety cabinets and isolators, work tops, floors, vials, equipment etc.) with antineoplastic drugs still frequently occurs (Thikla et al., 2012).

Step 1

Study conducted in Mansoura University in 2010, revealed poor safety and significant adverse events among nurses handling cytotoxic drugs. Therefore, there is a need to improve the safety of the work environment; make available protective equipment; develop standard practice guidelines for oncology nurses; implement good planning and design of the workplace; provide adequate specialized equipment (such as cytotoxic drug safety cabinets) and personal protective equipment; establish clinical pharmacy practice; and integrate health monitoring programs that include the assessment and counseling of prospective nurses before they commence any work involving cytotoxic drugs and related waste (Elshamy, Hadidi, El-Roby, Fouda, 2010).

In searching many search engines, the most popular were multiple databases:

1. By searching via Science Direct, using key words: spills management, N95 mask, chemotherapy spills management an article was found: Impact of two particle measurement techniques on the determination of N95 class respirator filtration performance against ultrafine particles. (2012) Journal of Hazardous Materials.
2. Another article found in Science Direct, using key words: competence spills management, chemotherapy course, an article was found: Exploring the work of nurses who administer chemotherapy to children and young people. (2013) European Journal of Oncology Nursing

3. An article was found in Centers for Disease Control and Prevention (CDC): Health hazard evaluation report: chemotherapy drug exposures at an oncology clinic - Florida. By Department Of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. NIOSH [2012]

The purpose of this paper is to review and analyze the chemotherapy spill policy in King Hussein Cancer Center in order to identify issues and suggest alternative solutions and to determine the effectiveness of chemotherapy spill management policy in King Hussein Cancer Center, and provide safe practice in dealing with chemotherapy spills to protect the employees that deal with this hazard.

Problem statement: the question - does the chemotherapy spills management policy in KHCC provide safe practice to people dealing with chemotherapy spills?

The objectives of this policy analysis are:

1. To apply all steps for policy analysis.
2. Detect to what extent chemotherapy spills management policy is effective in KHCC.
3. Find out alternative solutions for problems and improve the policy.
4. Provide comprehensive precaution for personnel dealing with chemotherapy.
5. Identify strengths and weaknesses of KHCC policy and improve the weaknesses.

The challenge and struggles of this policy analysis are to convince the company of the need for new recommendation and editing of the policy, because while the hospital adheres in its value to change, edit, and develop the policy especially administrative employees, other conflicting issues are economic status because at KHCC there is shortage in budget in this period of time. Other conflicting issues convince the employees that for those dealing with chemotherapy the need to change behaviours during dealing with chemotherapy. After finishing the policy analysis the author will meet the stakeholders in order to discuss the conflicting issues and work to resolve them.

In research conducted in Egypt in 2010 to study the effect of chemotherapy on staff that prepare and administer chemotherapy, where two groups were divided into control group using appropriate PPE, and interventional group, the result of the study is as follows: abortions (31.4% vs. 10.3%), infertility & sub-fertility (14.3% vs. 3.4%), premature labour (14.3% vs. 17.2%), soft tissue injuries due to spills and splashes (14.3% vs. 0.0%), and developmental and behavioral abnormalities among the children of the nurses (8.6% vs. 3.4%). There was

poor use of protective equipment in the study group (Elshamy et al., 2010).

The people who are concerned in this policy, government hospitals, healthcare institutions, nurses, pharmacists, physicians, families and transporters of chemotherapy personnel, need optimal guidelines to deal with chemotherapy on evidence, and deal with it in a correct way if chemotherapy spills, to prevent harmful side effects that could happen. PPE precaution should be taken from administrative employees who have the legitimate power according to the authority in the hospital. Nurses, physicians, pharmacists, families, and transporters should be informed about precautions during preparation and dealing with chemotherapy, and asked about any questions that staff are confused about.

Step 2

King Hussein Cancer Center (KHCC) was established in Jordan, Amman in mid-1980 as a private hospital. The first name for the center was "Al-Amal Center" which means "The center of hope". Their mission is to provide state-of-the-art comprehensive cancer care to the people of Jordan and the Middle Eastern region. It is composed from many departments, pediatric, medical, and surgical, leukemia, Bone marrow Transplant (BMT), palliative, and clinics for chemotherapy administration.

King Hussein Cancer Centre Chemotherapy Spill Management Description

The purpose of KHCC policy for spill management is to provide guidelines for management of spilled cytotoxic agents. Definition of spill management is containment and safely handling any unintentional, uncontained dispersal of chemotherapy. Then defined is the spill kit and its equipment: spill kit is a pre prepared kit used for management of spilled chemotherapy. According to the second step in policy analysis in this part the author will define the objective and goals, and identify desirable and undesirable outcomes, and evaluate policy in terms of administrative ease, costs and benefit, effectiveness, equity, legality, and policy acceptability.

The goal of this policy is to provide optimal guidelines to staff who deal with chemotherapy, and fill the gap in chemotherapy spills management policy in KHCC to prevent the harm that results from spills.

The desirable outcome is providing new recommendations and convincing stakeholders to provide safe guidelines and precautions during dealing with chemotherapy.

Regarding undesirable outcomes the company refuses to apply new recommendations to the policy, and refuse the staff's wish to comply with the recommendation.

Chemotherapy spills management policy is clearly defined in terms of purpose, responsibility, content, and procedure, but it is limited in dealing with chemotherapy spills just to specific staff, and satisfies itself with policy reading to other staff, and they decreased in importance specific training and educational courses regarding spills management and actual practice to deal with it. This may well lead to decrease its effectiveness, since the policy used protective facemasks while other studies have shown that N95 Mask is more effective in chemotherapy spills, but the policy is legal since its applied from a specific person in hospital, and the policy is based on references, guidelines, and safe practice in dealing with chemotherapy. It's easily administered because policy explains procedure and a clear stated definition, purpose and steps of procedure but is limited to specific staff to deal with spills, not generalized to all staff who have access to chemotherapy. The cost will increase if hospitals work up specific courses for all staff that have access to chemotherapy. The policy provides safe guidelines to deal with chemotherapy and meets all policy criteria for this reason we can consider it acceptable politically.

Step 3

After extensive searching many options and alternative solutions were found to provide protective and comprehensive guideline during dealing with chemotherapy spills; the KHCC policy provides the correct way to deal with chemotherapy spills, but needs some modification to be comprehensive, and to provide educational courses about chemotherapy spills to all employee with access to CTX, use of N95 mask to prevent inhalation of chemotherapy, and put sharp containers in case the chemotherapy is prepared in a glass bottle. The KHCC policy didn't explain how to act in case of the staff being exposed and contact with chemotherapy drugs. In addition KHCC policy didn't explain how to remove the PPE in consequences. The first two points are according to the educational course and N95 mask. There is evidence in the literature review to use it, but the other alternative sharp container, removes PPE in consequences, and how to clean CTX in case of exposure to the body. This is my point of view and my opinion, as I have read many policies.

Step 4

After considering a wide range of options, and suggested alternatives, each alternative will evaluate in many aspects: administrative ease, costs and benefits, effectiveness, equity, legality, and policy acceptability. The first alternative prepares a special course regarding chemotherapy spills management to be available to all staff who access chemotherapy: nurses, pharmacists, physicians, transporters of chemotherapy, and housekeeping, not limited to specific people to deal with chemotherapy spills, and sufficiency with policy reading, and act it in practice, and role play how to deal with chemotherapy spills. The second alternative is using

Step 5

Table 1

Alternatives	Strengths	Weaknesses
Specific course and training	Provide safety comprehensive practice, and act with CTX spills	Expensive on Hospital, increase number of educators.
N95 Mask	Prevent inhalation of CTX product	Expensive
Sharp container	To prevent injury resulting from glass	Big size, cannot but in spills Kit
Consequences of PPE removing	Decreases and prevents exposure of the body to CTX	
How to deal in case exposed the body to CTX	Decreased harm that could result from CTX spills on Body	

Table 2

Alternative	Legality	Equality	Effectiveness	Administrative Ease	Costs and Benefits	Political Acceptability
Specific course and training	Legal	Equal to staff that are concerned	Effective	Not Easy	Not cost effective, expensive	Accepted
N95 Mask	Legal	Equal	Effective	Easy	N95 expensive, not cost effective	Accepted
Sharp container	Legal	Equal	Effective	Easy	Cost effective	Accepted
Consequences of PPE removing	Legal	Equal	Effective	Easy	Cost effective	Accepted
How to deal in case exposed the body to CTX	Legal	Equal	Effective	Easy	Cost effective	Accepted

Table 3

Alternative	Article
N95 Mask. Impact of two particle measurement techniques on the determination of N95 class respirator filtration performance against ultrafine particles	(Mostof et al., 2012)
Provide special course dealing with spills management. Exploring the work of nurses who administer chemotherapy to children and young people	(Gibson et al., 2013)

facemask N95 instead of normal facemask, because it's effective rather than normal and provides a close fit on mouth and nose to prevent inhalation of chemotherapy. The third alternative, the spill Kit didn't contain a sharp container. The sharp container should be available in the Kit as a basic component to put glass pieces in the sharp container instead of putting it in a blue bag that could lead to injury to other personnel. The fourth alternative of how to remove the PPE in consequences to decrease the body exposed to chemotherapy drug, for example don't remove the eye goggles and wear gloves after finishing cleaning the chemotherapy. to decrease the chance to have chemotherapy reach the eye. Regarding the last alternative the KHCC policy didn't explain how to deal with the case of chemotherapy contacting the hand or eyes, in other words a safe practice to remove the chemotherapy on the body during cleaning, because any delay could lead to harmful injury.

According to expected outcomes the stakeholders in KHCC will agree on new alternatives, will add N95 mask, sharp container, instruct on how to deal in case the CTX is exposed to body, and how to remove PPE in the right manner, but the argument about special courses is not addressed because it needs increased numbers of educators in KHCC, and needs a lot of coordination among multidisciplinary teams.

Step 6

Expected outcomes from this policy analysis are to develop of current policy by providing the hospital with a specific course and training to all staff with access to CTX, and exchange facemask by N95 mask, put sharp container inside the KIT or always beside it, add step to the policy how to remove PPE in consequences, finally how to deal and act in case of exposure of the body to CTX.

The main purpose of this policy analysis is to check out the effectiveness of CTX spills management in KHCC, and provide new alternatives and suggestions and elaborate possible harm to staff. The plan to implement this policy analysis is to meet stakeholders in KHCC and convince them about new recommendations based on evidence, and suggest the alternatives to provide safety and comprehensive practice in case of CTX spills, and make a draft for new policy and recommendations and to give it to all staff that access CTX, and design a questionnaire to publish and distribute to all staff about their opinion regarding the new recommendations, and other Brochures to explain the risks and harm that could result from inappropriate manner in dealing with CTX spills. The author will work to publish the new recommendation in a journal to encourage the health workers to adopt new solutions, and gather employee opinions evaluating the new alternatives and documenting such.

According to the monitor, recheck competency of all staff after one year from the last course, and inform the educators in each department to watch each CTX spills, and how to deal with them in a correct way. We may use the cameras in hospital to monitor the behaviour of staff in case of chemotherapy spills.

The policy evaluation will depend on two points: numbers of injury resulting from chemotherapy spills in comparison with previous number of injuries, and the employee satisfaction about the new recommendation, and ask about their effectiveness.

The author will use the following table (Tables 4, 5 - opposite page) to evaluate the policy. The author will give it to stakeholders and all staff that have access to CTX, and then will use table to ask them about strengths and weaknesses of each alternative:

Discussion

The purpose of this paper was to evaluate and analyze effectiveness of chemotherapy spills management policy in KHCC. There are many injuries and accidents resulting from chemotherapy spills among nurses, pharmacists, transporters, and physicians. Safety precaution and practice require dealing with chemotherapy. This will lead the stakeholders to find alternatives, suggestions, and solutions to provide health and safety practice to health care professionals and workers, and let them be updated about recommendations of the latest research to provide optimal and high quality practice to deal with chemotherapy spills. This paper provides and suggests some alternatives for chemotherapy spills management policy in KHCC to eliminate weak points and provide latest recommendations.

The alternatives in this policy are to eliminate protective facemask and instead use N95 mask, provide specific courses and education to all health care professionals who are dealing with chemotherapy spills and chemotherapy, explain in the policy how to deal with scenarios where chemotherapy contacts the body, and mention the sequences to remove the PPE after finish of cleaning the spills, and to provide sharp containers to become a basic element in PPE.

The alternatives that the author mentioned in this policy analysis are applicable and easy to add to policy, and includes N95 mask, sharp container, how to deal in cases of exposure of the body to CTX, and how to remove PPE, but the argument will be on educational courses because the KHCC in these days complains of a shortage in budget and on this point we need increased numbers of educators in KHCC. I will meet with stakeholders and discuss with them how to resolve this point.

Table 4

Alternative	Legality	Effectiveness	Cost and Benefits	Administrative Ease	Equality	Political Acceptability
Specific course and training						
N95 Mask						
Sharp container						
Consequences of PPE removing						
How to deal in case exposed the body to CTX						

Table 5

Alternatives	Strengths	Weaknesses
Specific course and training		
N95 Mask		
Sharp container		
Consequences of PPE removing		
How to deal in case exposed the body to CTX		

This policy analysis will expose to stakeholders in KHCC to act on it in practice, and to examine and explore the magnitude of the effectiveness of new alternatives.

- o Training centre in KHCC is responsible for accomplishing a special course to deal with chemotherapy spills management for all staff access with to chemotherapy, - theoretical and clinical part.

New Chemotherapy Spills Management Policy

1. Purpose:

- o To provide guidelines for management of spilled cytotoxic agent

2. Policy:

- o Chemotherapy spill kits shall be available on all nursing units where chemotherapy is routinely administered.

3. Responsibilities:

- o It is the responsibility of registered nurse (RN) to implement the approved policy
- o Head of the unit is responsible for communication and to ensure application of the approved policy and procedure.
- o Head of the unit would check the availability of prepared spill kit

4. Definitions:

- o **Spill Management:** is containment and safe handling of any unintentional, uncontained dispersal of chemotherapy

- o **Spill kit:** which contains the following (minimum) :

1. 2 blue plastic bags
2. 1 sign (chemotherapy spill)
3. 2 absorbent paper towels.
4. 2 non absorbable dry towels.
5. 2 pairs of latex gloves.
6. Eye goggles.
7. N95 Mask
8. Sharp container.
9. Disposable gown with long sleeves.
10. Small scoop and brush
11. 1 pair overshoes.

5. Procedure:

1. In case of chemotherapy spill and the amount is more than 10ML call for Code Green
2. Secure the area by alerting the staff that chemotherapy spill has occurred, ask the visitors to leave the area.
3. Obtain chemotherapy spill kit.
4. Put on all Personal Protective equipments (PPEs) in the spill kit.
5. Prepare the blue plastic bag.
6. Use absorbent towels; contain spill moving from outside to inside until it becomes dry.
7. Place dry paper towel.
8. Dispose of all contaminated equipments in blue plastic bag.
9. When finished with spills cleaning, remove the Gown, then overshoes, Gloves, N95 mask, then Eye Goggles to decrease possibility of contact of chemotherapy to body.
10. Wash hands.
11. Notify housekeeping for ordinary cleaning
12. Notify physician for cytotoxic agent replacement
13. Fill out event report and safety incident report if code green has been requested
14. Document in nursing notes.
15. Notify chemotherapy preparing area (pharmacy) if replacement required
16. If the spill is on a patient or staff member, remove the contaminated clothing and immediately wash the skin with soap and water for 20 minutes. If splashed in the eyes, rinse with water for 15 minutes. An eye wash or eye bath should be located in all areas where splash risk may occur.

6. Documentation Requirements:

- o Event Report.
- o Nursing Note.
- o Safety incident report

References

Mostofi, R., Noeil, A., Hagighat, F., Bahloul, A., Lara, J., Clouter, Y., (2012) Impact of two particle measurement techniques on the determination of N95 class respirator filtration performance against ultrafine particles, *Journal of Hazardous Materials*; 1(218); 51-57.

Elshamy, K., El-Hadidi, M., El-Roby, M., Fouda, M., (2010) Health Hazards among Oncology Nurses Exposed to Chemotherapy Drugs, *J Haematol Oncol*. 1(3):70-78.

Gibson, F., Shipway, L., Aldiss, S., Hawkins, J., King, W., Parr, M., Ridout, D., Verity, R., Rachel, M., (2013), Exploring the work of nurses who administer chemotherapy to children and young people, *European Journal of Oncology Nursing*. 1(17); 59-69.

James, C., Christine, W., (2012), Chemotherapy Drug Exposures at an Oncology Clinic - Florida, National Institute for Occupational Safety and Health [NIOSH], Health Hazard Evaluation Report.

Thikla, K., Jochen, T., Moritz, H., Hartmut, S., Claudia H., Andre, H., Udo, E., (2012), Application and Assessment of a Regular Environmental Monitoring of the Antineoplastic Drug Contamination Level in Pharmacies - The MEWIP Project, Published by Oxford University Press;4(57);444-455.

National cancer institute, managing physical effect. (2011). Retrieved on November/2013 from <http://www.cancer.gov/cancertopics/coping/physicaleffects/chemo-side-effects>

Nurse.com, How to Stay Safe While Administering Chemotherapy.(2010). Retrieved on November/2013 from http://ce.nurse.com/content/ce554/how-to-stay-safe-while-administering-chemotherapy/Care_givers_Keeping_Safe_at_Home_with_Chemotherapy. (2010). Retrieved on October/2013 from http://www.caregiver.com/articles/cancer/keeping_safe_at_home.htm

AFJH, Health Hazards among Oncology Nurses Exposed to Chemotherapy Drugs. (2013). retrieved on November/2013 from <http://www.afjho.com/index.php/AJOHAO/article/view/20/31>

National Cancer Institute. Chemotherapy Side Effects Sheets. (2013). Retrieved on October/2013 from <http://www.cancer.gov/cancertopics/coping/physicaleffects/chemo-side-effects>

World Health Organization, Health policy. (2009). Retrieved on November/2013 from http://www.who.int/topics/health_policy/en/

Work Place Safety and Health, NIOSH 2009. National Institute for Occupational Safety and Health. (2011). Retrieved on October/2013 from <http://www.nationalinstituteforoccupationalafetyandhealth.com>

Atlantic International University, Health Policy Analysis. (2013). Retrieved on October/2013 from <http://edu.learnsoc.org/Chapters/21%20health%20and%20medicine/9%20health%20policy%20analysis.htm>

(Naga, B., Mrayyan, M., (2013) chemotherapy spills management policy, *Middle East Journal*; 7(2); 9-21