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Impact of an intervention programme on knowledge, attitude and practice of healthcare staff regarding pharmaceutical waste management, Gaza, Palestine



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ABSTRACT

Objectives: To assess knowledge, attitude and practice (KAP) of healthcare staff regarding pharmaceutical waste management; and to determine the impact of an educational programme on the KAP survey items.

Design: Pre–post-test intervention study.

Methods: The pre-intervention phase was performed using a sample of 530 out of 1500 healthcare workers. A predesigned interview questionnaire was used to assess KAP. Next, an educational programme was designed and offered to a subsample of 69 healthcare workers. KAP were re-assessed for the programme attendees using the same interview questionnaire, both immediately (post-test) and six months after the end of the programme (follow-up test). The parametric paired sample t-test was used to assess the difference between pre-test and follow-up test results.

Results: Poor knowledge and poor practice levels (scores 50%) detected in the pre-intervention phase were found to improve to satisfactory levels (scores $\geq 75\%$) in the follow-up phase. Attitude was found to be positive (score $\geq 75\%$) in all phases of the study. **Conclusion:** The educational programme led to a significant improvement in KAP of healthcare staff regarding pharmaceutical waste management ($P < 0.001$).

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Introduction

Pharmaceutical waste (PW) consists of expired, unused, spilt, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and need to be disposed of appropriately. This also includes discarded items used in the handling of pharmaceuticals, such as bottles, boxes, gloves, masks, connecting tubing, and drug vials.¹ In a healthcare facility, PW is generated for various reasons including cessation of patient medication, spills/breakages and expiration of drugs before use.² Generally, PW is discharged down the drain or sent to landfill. This may take place due to poor knowledge about the potential negative impacts of PW on human health and the environment. These impacts could occur directly through contact with healthcare staff or indirectly through contamination of soil, ground water and surface water.³

Concerning the impacts of PW on human health, many cytotoxic drugs used in chemotherapy are known to be carcinogens, mutagens or teratogens. Nurses, pharmacists, waste handlers, storehouse employees and laundry workers could be at risk of exposure to these hazardous drugs.^{4,5} In 1979, a hospital-based study reported signs of mutagenicity in the urine of oncology nurses.⁶ Other side-effects were also reported, including an increase in spontaneous abortion, child malformation and abnormal menstrual cycles.⁷ In a study conducted in 14 German hospitals, the urinary concentrations of certain cytotoxic drugs (cyclophosphamide, ifosfamide, doxorubicin, epirubicin and platinum) were monitored. The study results revealed that 40% of pharmacists and oncology workers had one of the tested drugs in their urine. The same study also documented the existence of drugs in the urine of workers who did not handle these hazardous drugs but were potentially exposed through contamination of work surfaces, clothing or drug containers.⁸ Furthermore, platinum was detected in the air of the antineoplastic drug preparation room, and in the blood and urine of nursing staff who helped patients to administer cisplatin.⁹

Regarding the impacts of PW on the environment, a variety of pharmaceuticals have been discovered in surface, ground and drinking waters in the USA.¹⁰ Pharmaceutical residues detected included pain killers, cholesterol regulators, anti-septics, chemotherapeutic agents, antibiotics and hormones.¹¹ Chemical residues discharged into the sewerage system may have adverse effects on the operation of biological sewage treatment plants, or toxic effects on the natural ecosystems of receiving waters.¹ Similar problems may be caused by pharmaceutical residues.¹²

Knowledge, attitude and practice (KAP) studies aim to collect information on what is known, believed and done by a particular population in relation to a specific topic.¹³ Some KAP studies have been undertaken on the management of biomedical waste in general.^{14–18} Pharmacists and nurses do not acquire information on hazardous waste management during their academic studies. In addition, safety personnel and heads of environmental services may not recognise the active ingredients present in pharmaceutical products. It is thus recommended that they should be given in-service education regarding proper handling of PW, especially that resulting from chemotherapy.³

In Gaza, rapid population growth (annual growth of 4.8%) has been associated with public service expansion, including healthcare services.¹⁹ According to the Ministry of Health, 317.6 m³ of PW was disposed of in 2011.²⁰

This study had two objectives: (1) to assess the KAP of healthcare staff in five major governmental hospitals in Gaza with regard to PW management (PWM) using a KAP survey; and (2) to determine the impact of an intervention programme on the KAP survey items.

Methods

This pre–post-test intervention study was conducted in 2014. It consisted of three phases: pre-intervention phase; intervention phase; and post-intervention phase.

Pre-intervention phase

The pre-intervention phase was conducted in five governmental hospitals in Gaza: European-Gaza; Nasser; Al-Aqsa; Al-Shifa and Kamal Adwan. These hospitals were selected as they are the five largest hospitals in Gaza, and serve the greatest number of patients. The study population consisted of various healthcare staff working at the selected hospitals (administrators, pharmacists, nurses and waste workers). Doctors were not included as they are not involved in any waste management steps. The sample size was calculated using the StatCalc module of Epi-Info version 7, with a population size of 1500, expected frequency of KAP score of 60%,¹⁵ using a dominating effect of 1.8 and five clusters. This yielded a sample size of 530. Based on the proportion of healthcare staff within each hospital, a proportional allocated sample was taken as follows: 88; 107; 55; 227 and 53 staff members from European-Gaza, Nasser, Al-Aqsa, Al-Shifa, and Kamal Adwan Hospitals, respectively. These staff members were selected randomly at each hospital.

A questionnaire, predesigned by the researchers, was used to assess KAP of the study sample regarding PWM. The questionnaire was developed based on the World Health Organisation's (WHO) guidelines for safe healthcare waste management,¹ and on the US Environmental Protection Agency's best management practices for unused pharmaceuticals² by transforming theoretical content into questions/statements. The questionnaire included four main sections: the first concerned the demographic data of the participants; and the second; third and fourth sections were formulated to test their knowledge, attitude and practice regarding PWM, respectively.

Twelve questions were used to assess knowledge, while practice was assessed using nine questions. Attitude was assessed through 21 statements, presented on a three-point Likert type scale with 'agree', 'neutral' and 'disagree' responses. A score was computed for each question and statement, and adjusted to a percentage. Scores <50% demonstrated a poor level of knowledge or practice, or a negative attitude. Scores between 50% and <75% represented a fair level of knowledge or practice, or a neutral attitude. Finally, scores ≥75% were considered satisfactory in terms of knowledge and practice, and represented a positive attitude.

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