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Abstract

Background: Unsafe injection practices put patients and providers at risk of infectious and noninfectious adverse events. A 2001 Ministry of Health survey on injection practices in Oman indicated that, while overall standards were good, in some areas there was a need for improvement.

Aim: We aimed to evaluate injection safety practices to determine whether facilities meet the requirements for practices, equipment, supplies and waste disposal, and to identify unsafe practices.

Methods: We conducted a national cross-sectional survey in 2007 using the World Health Organization tool to evaluate injection safety practices. Using 2-stage cluster sampling, 80 government and 61 private health facilities were randomly selected and evaluated.

Results: There was no shortage of injection equipment nor evidence of attempts to sterilize disposable devices. Care providers immediately disposed of the used needle/syringe in sharps containers. Phlebotomy devices were taken from sealed packets in 96% of facilities. In private facilities, 66.3% of the care providers were fully immunized against hepatitis B. Wearing a new pair of gloves for phlebotomy was observed in only 46% of government and 38% of private health facilities. Many health facilities lacked alcohol-based handrub.

Conclusions: Many injection safety aspects were satisfactory. However there are still opportunities for improvement. Actions are required to make alcohol-based handrub and appropriate sharps containers available and to provide hepatitis B vaccine and training to health care workers in all facilities.

Keywords: Blood-borne viruses, injection safety, assessments tool, Oman, Eastern Mediterranean Region

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Introduction

Injections are the most common health care procedure; it is estimated that 16 billion are administered each year (1), with several billion given every year in low- and middle-income countries (1,2,3). The World Health Organization (WHO) has estimated that 2 million needle-stick injuries occur annually to health care workers worldwide; these can result in transmission of hepatitis B and C and HIV infection (4,5). Therefore, addressing the safety of injection–related practices and risk factors and making prophylactic care available are the best precautions against accidental transmission.

Injections are safe when they pose no threat to the recipient, the provider or the community (6). This requires the use of sterile needles, clean preparation surfaces, and immediate and proper disposal of used devices as well as an effective and safe method of final disposal to avoid

infectious and noninfectious adverse events. The adequacy and appropriateness of injection equipment, the use of sharps containers, the level of staffing, and the incidence of recapping, the awareness of risk, and the effectiveness and availability of training also affect risk of transmission of infections (6,7).

Substantial efforts have been made by the international community, under the leadership of the Safe Injection Global Network (SIGN), to reduce the risk of unsafe injections worldwide (8). Significant progress was made in reducing the number of unsafe injections in developing countries from 2000 to 2010 (from 1.35 to 0.16 per person per year). However, the number remained high in the countries of the WHO Eastern Mediterranean Region, with 0.57 unsafe injections per person per year. In sub-Saharan Africa and Latin America, the average figure for 2010 was only 0.04–0.05 unsafe injections per person per year (9).

In 2001, the Ministry of Health in Oman conducted a national survey of injection practices in 78 government health facilities across the country. The findings of the study suggested that overall standards were good; however, in some areas, there was a need to improve the situation. Examples of areas identified by the 2001 study and requiring further strengthening, including increasing awareness regarding the Ministry of Health injection safety policy, streamlining request procedures for injection supplies and safe final disposal of sharps (10).

We assessed the injection practices in both governmental and private health care facilities for phlebotomies, lancet procedures and intravenous (IV) injections and infusions. The main objectives of this study were to determine whether facilities meet the requirements for practices, equipment, supplies and waste disposal. Secondly, we aimed to identify unsafe practices that posed a risk to patients, providers and the community.

Methods

Study design

In this cross-sectional study, facilities were randomly selected through a 2-stage cluster sampling design (11). We used the 2007 WHO revised tool for the assessment of injection safety (12). The study was implemented in 2007 over 2 phases: The first phase was the preparation and piloting, and the second was conducting the study, entry and analysis of data and reporting.

Study sites and sampling

At the time of the survey, Oman was administered through 8 regions and 2 governorates

(currently Oman is divided into 11 governorates) and we used these for sampling purposes. The regions were divided into 61 wilayat (districts). We assessed injection safety in 2 representative samples, one in the public health sector and the second in the private health sector. In the public health sector, a representative sample was selected from the 52 governmental hospitals and the 152 health centres. Population data were obtained from the most recent estimate (13). Prior to sampling, wilayat which had less than 10 health facilities were regrouped with the immediately adjacent one to form larger units. This provided a sampling frame of 16 clusters, from which a sample of 8 clusters was selected (first-stage sampling) with probability proportionate to population size (14). All health facilities in the selected clusters were listed and a sample of 10 (1 regional hospital and 9 health facilities) was drawn using a simple random sampling technique using a table of random numbers (second-stage sampling).

In the private health sector, and due to the number of injections, only hospitals, medical complexes and dental clinics were retained. Sampling was done in the 8 geographical clusters randomly selected for the public health sector survey. In each of these geographical clusters, 1 hospital was randomly selected if there was at least 1; for the 2 other categories we considered that a medical complex with a dental clinic represented 1 unified health structure. If the medical complex did not have a dental clinic, the closest dental clinic to this medical complex was enrolled. Replacements was also chosen for the few health facilities which did not administer injection procedures.

Data collection tool

Data were collected using the questionnaire of the revised WHO Tool C for the assessment of unsafe practices (12); this used a combination of interviews and structured observations to estimate the risk of infection associated with unsafe practices for each type of procedure. The aims were to assess whether a facility meets the requirements for safety, to identify unsafe practices and to estimate the proportion of health care facilities in which practices are safely (or unsafely) performed. The assessment includes a checklist, and responses are mostly categorical options in order to both standardize the assessment and simplify data management and analysis. It was designed to target public and private facilities providing primary care, including first and second level hospitals.

Piloting

The study was piloted in 5 health facilities in Muscat, both public and private. Consequently, we modified the language of some questions in the survey questionnaire to make it clearer to both investigators and interviewees. These 5 facilities were not included in the survey.

Data collection and analysis

A research team of 32 fieldworkers were trained on data collection and interviewing. They were grouped into 9 teams; each was responsible for one of the 8 clusters (2 teams collected data from one of the cluster as facilities were situated far apart in that cluster). Data were collected using a combination of structured observation and interviews. Data collectors conducted the observations for the facility, worksites, supplies and practices according to a core set of checklist items. Observation included facility infrastructure and the following practices: injection, blood collection, IV injection and infusion, sterilization and waste disposal. Fieldworkers were instructed to observe 1–5 observations for each of the procedures related to the assessment. All of the observations had to be compatible with the standard/best practice to consider the procedure safe. Data collectors were instructed to spend at least 3 hours in the facility before concluding that a procedure was not observed. They would not ask for a procedure to be performed if it was not already a planned part of the patient's treatment. Data collectors interviewed the provider and his/her immediate supervisor. Monitoring and supervision were provided by the principal investigators and co-investigators; an item-by-item check ron consistency, plausibility and completeness of the data collection forms was done and appropriate corrections were made on-site.

Data entry and management were done using Epi-Data, version 3.1, and Stata, version 6.0. Data analysis was done separately for the public and private health sectors. We calculated the proportion of facilities having the desired response for each item and the confidence interval (CI) or the statistical range of the proportion of facilities having that characteristic. Due to differences in the number of injection procedures between clusters, adjustments were done by assigning weights in each cluster for both public and private health sectors taking into account the number of procedures. Binomial confidence intervals were computed using Stata. The cluster-sampling design was taken into account by computing the Kish design effect, the value by which the variance is underestimated compared to the variance obtained from simple random sampling (15), and by using the design effect to make the appropriate corrections to the 95% CI.

Ethical considerations

Informed consent was obtained from the health care workers in the selected facilities. Fieldworkers had been trained to tactfully intervene to prevent potential harm if they were about to witness injection practices that were of particular danger to the recipient.

This study was approved by the Research Ethics Committee of the Ministry of Health, Oman.

Results

Assessment of risks to patients

Of the 141 health facilities surveyed, 80 (57%) were in in the public health sector and 61 (43%)

in the private sector (Table 1).

Details of the safety assessment observation for patients and providers are given in Table 2. There was no evidence of attempts to sterilize disposable injection devices and all facilities were equipped with running water and cleansing soap. In most of the facilities we surveyed no needles were left in the diaphragm of multi-dose vials (95%, (CI) 89–99%). However, infectious (non-sharps) health care waste was observed outside of their specific containers in 32% of public and in 40% of private facilities. Alcohol-based handrub was available in 35% of governmental and 18% of private facilities (Table 2).

No sterilizable (reusable) needles or syringes were used in either public or private facilities for vaccinations or therapeutic and family planning injections. Syringes and needles were taken from a sterile packet in 96%, 98% and 100% of public facilities for vaccinations, therapeutic injections and family planning respectively and in 100%, 98% and 100% of private facilities. For injections that require reconstitution, all syringes and needles were taken from a sealed packet in both public and private facilities. The diluents used for reconstitution were from the same manufacturer that made the vaccine in all the surveyed public and private facilities. On the other hand, it was reported that only in 32% of the public and 40% of the private facilities providers cleansed the access diaphragm of multi-dose vials with antiseptic before inserting a needle into the vial. Using a clean barrier to protect fingers when opening a glass ampoule was not common practice, and was observed in 54% of public and 77% of private health facilities (Table 3).

In 86% of public and 76% of private facilities; phlebotomies were prepared on a clean, dedicated table or tray (Table 4). Cleaning skin at the puncture site with antiseptics before skin puncture was observed in 87% of the public and only 63% of the private facilities. In both public and private facilities, devices used for phlebotomies were taken from a sterile packet in 96% of the facilities.

In 88% of the public and 81% of the private facilities, preparation for lancet procedures was done on a clean, dedicated table or tray (Table 5). Lancets were taken from a sterile packet, in approximately 96% of the public and in 92% of the private facilities.

Intravenous injection/infusion devices were taken from a sterile packet in 93% of the public facilities but in only 73% of the private facilities (Table 6). On the other hand, palpation of the venepuncture site by providers (after skin preparation with an antiseptic) was reported in 51% of

public and 63% of private health facilities. Cleansing the IV port with antiseptics before access was observed in 75% of public but only 39% of private health facilities. Appropriate access of the IV port (i.e. no injections were administered directly into IV bags, plastic bottles or IV tubing), was reported from 39% of the private health facilities vs 61% of the public health sector (Table 6).

Interview with provider

The providers interviewed had not experienced needle-stick injury in the previous 6 months in 80% of facilities in both the public and private sector (Table 7). Around 86% of interviewed providers in governmental and only 66% of private facilities have been fully immunized by hepatitis B vaccine. Only 58% of providers in public and 21% in private health facilities received training on injection safety in the previous 2 years.

Assessment of risk to care providers

There was ≥ 1 puncture-resistant, leak-proof sharps container in all rooms where phlebotomies were performed in the governmental facilities, but in less than 90% of the private facilities. Open containers for sharps disposal were still seen in both public (26%) and private (44%) health facilities (Table 2).

After vaccinations, all care providers immediately disposed of used needles/syringes in an appropriate sharps container (Table 3). On the other hand, after therapeutic injections comparative values are 94% of public and 73% of private facilities. Recapping of syringes in vaccination rooms was observed in 9% of public and 38% of private facilities. For therapeutic injections, recapping was observed in 6% of public and 36% of private facilities.

Wearing a new pair of gloves for a phlebotomy was observed in only 46% of public and 38% of private health facilities (Table 4). Two-handed recapping of any needles after performing phlebotomy was observed in 73% of public but only 38% of private health facilities. Blood was transferred from a syringe/needle directly into a vacuum tube using a 2-handed technique in 71% of public but only 40% of private health facilities. Immediately after procedures, the provider disposed of non-sharps infectious waste in the specific container in 91% of public but only 58% of private health facilities (Table 4).

Providers appropriately secured the patient and the intended puncture site so that the patient could not move during the procedure in 89% and 97% of public and private facilities

respectively. Proportion of facilities surveyed in which the provider disposed sharps in appropriate sharps container, immediately after the procedure, is 93% and 80% for public and private facilities respectively. Appropriate disposal of non-sharps infectious waste was observed in 92% of public and 66% of private facilities (Table 5).

Providers appropriately secured the patient and the intended puncture site in 91% of both public and private facilities (Table 6). Wearing a new pair of gloves for each IV injection was practised in 44% of public and. 65% of private health facilities, while wearing new gloves for each time an IV infusion was started or IV catheter was changed was reported in 53 % of public but only 24% of private facilities. Nevertheless, 2-hand recapping of needles after IV injections/infusions was observed in 40% of private and in only 11% of public facilities.

Risk to the community

Sharps containers awaiting final disposal were completely closed in only 53% of private facilities and in 82% of facilities in public sector. Sharps containers awaiting final disposal were stored in a locked area, in only in 50% of facilities in private and 72% in the public sector.

Discussion

The main findings of the study indicate that shortage of injection equipment was rare and no evidence of attempts to sterilize the single-use injection equipment was observed. We also found that all syringes and needles were taken from a sealed packet in all health facilities. Additionally, the used needle/syringe were immediately disposed of in the appropriate sharps containers.

On the other hand, the situation in regard to IV injections and infusions was less satisfactory compared to other injections, phlebotomy and lancet procedures for both sectors, especially for private facilities. Although all facilities were equipped with running water and cleansing soap, alcohol-based handrub was available in only a few facilities. Ministry of Health intervention would be required to make alcohol-based rub available for public health care facilities and to promote it as standard in private facilities as well. It is important to note that in more than 95% of private health facilities, neither ‘injection safety’, nor “health care waste management” policy or guidelines were available.

This study was the second formal assessment at the national level to evaluate the safety of injections, phlebotomies, lancet procedures and IV procedures. The 2001 study concluded that

the overall standards were good; however, there were some clusters of concern where safe practices need to be strengthened. This survey was conducted using the old version of Tool C, which concerns only immunization and therapeutic injection in primary health care (15,16). The particular difference between this study and the previous assessment conducted in 2001 is the inclusion of both government and private health facilities. The 2001 study assessed facilitates providing primary care services only (10).

In the 2001 study in Oman, recapped needles were observed in sharp-containers in 28% of the facilities (10). In Nigeria there was a high unsafe injection practice among Primary Health Care workers in Ilorin metropolis, with 86.7% of health facilities using needle recapping after administration of injection (17), while in Swaziland the situation was worse; changing needles in the same syringe and recapping of needles after use were observed in 31% of health facilities (18).

In our study, the providers interviewed had not experienced needle-stick injury in the previous 6 months in 80% of facilities in both the public and private sectors; this compares with the findings of the 2001 study where 17.9% of the providers had reported needle-stick injuries in the previous year (10).

In Nigeria there was a highly unsafe injection practice among primary health care workers in Ilorin metropolis, with 86.7% of health facilities using needle recapping after administration of injections (17); in Swaziland the situation was worse: changing needles in the same syringe and recapping of needles after use were observed in 31% of health facilities (18). In comparison, in our study, recapping of syringes after vaccination was observed in 9% of public and 38% of private facilities and for therapeutic injections, recapping was observed in 6% of public and 36% of private facilities.

The main limitations in this study were related to its nationwide scope, thus there was no capacity to identify disparities between regions and health districts. Additionally, some collected information, e.g. needle-stick injuries and hepatitis B immunization, were based on self-declaration by the providers.

Conclusions

Our findings indicate broad compliance with injection practices as defined by WHO. Many injection-safety aspects were satisfactory: supplies were available, single-use syringes were used and practices were reasonable. However, action is required to make alcohol-based

handrubs and appropriate sharps containers available and provide hepatitis B vaccine and training for health care workers in both governmental and private facilities.

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Évaluation des pratiques d’injection sans risque dans les établissements de santé à Oman

RÉSUMÉ

Contexte : Les pratiques d’injection dangereuses soumettent les patients et les prestataires de soins au risque de connaître des événements indésirables infectieux ou non infectieux. Une enquête du ministère de la Santé en 2001 sur les pratiques d’injection à Oman a indiqué que, si elles étaient généralement d’un bon niveau, il existait toutefois un besoin d’amélioration dans certains domaines.

Objectif : Notre objectif était d’évaluer les pratiques de sécurité des injections afin de déterminer si les établissements satisfont aux exigences en matière de pratiques, de matériel, de fournitures et d’élimination des déchets et d’identifier les pratiques à risque.

Méthodes : Nous avons réalisé une étude transversale nationale en 2007 à l’aide de l’outil de l’Organisation mondiale de la Santé pour évaluer la sécurité des pratiques d’injection. Le recours à l’échantillonnage par grappe à deux niveaux a permis de sélectionner au hasard et d’évaluer 80 établissements de santé publics et 61 établissements privés.

Résultats : Il n'y avait aucune pénurie de matériel d'injection et aucune preuve de tentatives de stériliser des appareils jetables. Les prestataires de soins jetaient immédiatement les aiguilles/seringues utilisées dans les boîtes prévues pour l'élimination des objets coupants et tranchants. Les dispositifs de phlébotomie étaient prélevés d'emballages scellés dans 96 % des établissements. Dans les établissements privés, 66,3 % des prestataires de soins étaient complètement vaccinés contre l'hépatite B. Le port d'une nouvelle paire de gants pour pratiquer une phlébotomie n'a été observé que dans 46% des établissements de santé publics et dans 38% des établissements privés. De nombreux établissements de santé n'avaient pas suffisamment de solutions hydroalcooliques.

Conclusions : De nombreux aspects relatifs à la sécurité des injections étaient satisfaisants. Il est toutefois possible d'améliorer encore davantage ce domaine. Des mesures sont requises afin de mettre à disposition des solutions hydroalcooliques et des boîtes adéquates pour l'élimination des objets coupants et tranchants et de fournir le vaccin contre l'hépatite B ainsi qu'une formation aux agents de soins de santé dans tous les établissements.

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[illegible] 2001 [illegible]

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[illegible] 2007 [illegible] 61 [illegible] 80 [illegible]

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