

Awareness on the impact of disposable syringes re-use and benefits of Auto-disable (AD) syringes in health care professionals and students in Karachi, Pakistan

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ARTICLE INFO

Article history:

Received on: 22/10/2012

Revised on: 09/11/2012

Accepted on: 25/12/2012

Available online: 29/12/2012

Key words:

Disposable syringes, Auto-disable (AD) syringes, health care professionals, Karachi, Pakistan.

ABSTRACT

Karachi is the most advanced and populated city of Pakistan with approximately 20 million residents. The good health care practices awareness among health professionals especially use of syringes is an important role player for the control of disease spread by re-use of syringes. A quantitative approach involving a cross sectional survey based study, was carried out among four different categories of health personnel. A total of 200 participants were asked to fill a structured questionnaire (Doctors, Nursing staff, Lab technicians, and graduating health care students with a sample size of 50 for each group). A large proportion of participants were aware of the impact of re-use of disposable syringes and emphasized on the need for proper disposal system existence to eradicate the issue. The study results also showed that about 71 % of the health professionals had awareness on Auto-disable syringes use and around 29% had no knowledge about AD syringes. About 79 % of health care professionals agreed that AD syringe would reduce needle sharing and would help to cut down Hepatitis B, C and HIV.

INTRODUCTION

The arrival of disposable syringes in the 1950s was expected to be a solution for medical quandaries due to improper sterilization practices (Drucker *et al.*, 2001). But the possibility of their being used repeatedly was much greater than other available syringe types and was therefore inevitable. It is a distinct fact that administering injections using un-sterilized procedures (specifically syringes) can result in transmission of infectious diseases which may ultimately be life threatening like Hepatitis B, C and HIV (Hersh *et al.*, 1993; Quigley *et al.*, 1997; Quigley MA *et al.*, 2000). According to an estimation, syringe reuse may lead to 21.7 million Hepatitis B, 2 million transmission of Hepatitis C, and around 96,000 HIV infections per year (Janjua, 2003; WHO 2002).

Most of the developing countries have improper and unsafe injection practices (Whyte, 1982; Vander Geest, 1982). Recipients of injections and healthcare workers using them, both

are prominently in danger not only due to these injection practices but also because of the erroneous disposal and inefficient waste management system for used injection equipment.

This can prove to be hazardous to every individual and local community, hence, highlighting the role of Auto-disable syringes that are designed to prevent reuse and promote safe syringe disposal. Once the syringe is used it disables automatically due to presence of an internal one way valve or other mechanisms depending on the selected type.

Following are the prominent types of AD syringes (Catlin and Crook, 2000)

Soloshot™ and Soloshot™ FX syringes from BD

A germ-free paper package. The SoloShot FX clip-on needle can only be attached to Soloshot FX syringe container. This prevents the needle re-use with other type of syringes. It is less tiring for vaccination of large groups because of longer syringe length. The fixed-needle design is helpful for reducing dead space in the syringe and reduce the vaccine wastage.

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K1™ Auto-Disable syringes from Star Syringe, Ltd.

Must be triggered before use. The K1 syringes usually having a small, plastic tab or 1 or 2 small twist tabs that must be removed. This will assure that the syringe is un used.

Destroject® Auto-Disable syringe from Bader

The plunger of this syringe can be pushed one time only.

Univec™ Auto-Disable syringe from Univec, Inc.

It has similar age and properties as Soloshot and destroject.

Uniject™ prefill injection device from BD

It can be used only one time. The prefilled device ensures an accurate dose. Because of less plastic in this type the waste is reduced. Vaccine wastage is reduced because of unit-dose device.

Vaccination is another important component of health sector in Pakistan and it is our responsibility to ensure safe and effective immunization. Everyone is familiar with the possible health risk and adverse effects brought forward by unsafe vaccination programs (like transmission of viruses). Improper administration of vaccines or abuse of waste products produced from immunization creates a bare possibility for the transmission blood-borne pathogens. As Auto-Disable syringes have the quality of restricting its use to only one time, it evidently stops the transmission of blood-borne pathogens among the vaccine recipients (Bradley *et al.*, 2003). It is not only adults who are the target of unsafe immunization practices but a high population of children are also affected, becoming carriers of blood borne diseases like Hepatitis B (Murakami *et al.*, 2003). WHO has been striving for the last 30 years to ascertain vaccine safety and for this it plans to include Safe Injection Global Network (SIGN) for the implementation of advanced and newer injection devices like auto-disable syringes (Jodar *et al.*, 2001; Philippe, 2004). Another concern arises regarding the accuracy of dose in vaccine delivery. Hence injection technologies that circumvent the ability of man to make errors are of exceptional value (Clement *et al.*, 2004). Again auto-disable syringes are on the upfront regarding this matter because it also consists of some types that provide fixed volume filling. Pakistan has a high prescription rate for parenteral therapy, placing it at the top of the list for usage of injection among the developing countries. The estimated range for injections used per person was 8.2 to 13.6, out of which 94.2% were unnecessary (Sehar, 2012) adding another clause to this issue, and eventually increasing the probability of contaminated syringe use. Therefore, it justifies utilization of auto-disable syringes even more so in this country where syringe disposal and reuse is a serious issue. Still the country is facing several hindrances with its economy and logistics in order to comply with the policies recommended for AD syringes introduction. These developing countries generally lack in maintaining established guidelines for the purchase, distribution, and large volume of general disposable syringes waste management. Moreover, the health officials have not evaluated pragmatic ways to determine the method most suitable to

introduce AD syringes into a national immunization program to maximize advantages and minimizing expenditure simultaneously (Paul *et al.*, 2003). In a joint statement, WHO–UNICEF–UNFPA–IFRC has urged that AD syringes should be used by all countries by the end of 2003, for administering all vaccinations (WHO/V&B/99.25). Yet, there has not been any prominent progress for the promotion of its usage in Pakistan. This situation lead to our research objective which was to determine the awareness among health care professionals about impact of re-use of disposable syringes and awareness of Auto-Disable syringe, its advantages and their views regarding its implementation.

SUBJECTS AND METHOD

In view of the objective of study and observations made after reviewing the literature, quantitative approach was used to collect the data by designing a questionnaire. A cross sectional study was carried out among four different categories of participants those are main stakeholder of study for syringe use. The categories were doctors, Nursing staff, Lab technicians, and graduating health care students. Study design of data collection is shown in Figure 1. A total of 600 health professionals approached out of which 200 participated in this survey. Each category of participants has answered 50 questionnaire forms.

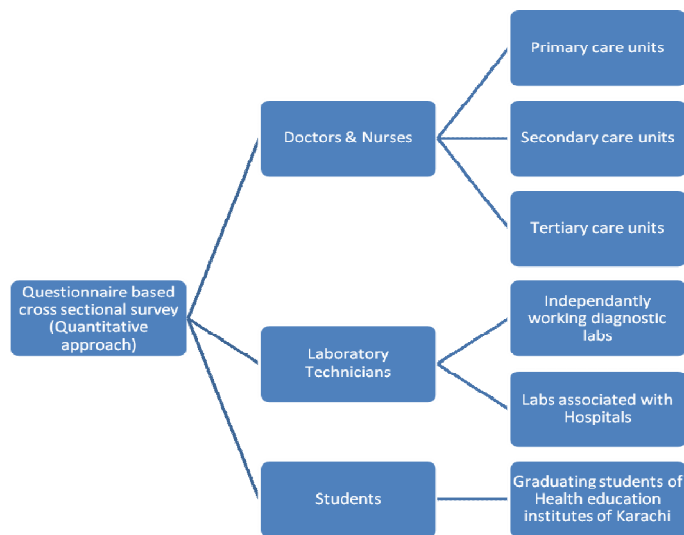


Fig. 1: Study Design for Data Collection.

Questionnaire layout

The participants were required to fill a structured questionnaire comprising of 27 questions. It covered two major aspects of syringes use those were general understanding and awareness of disposable syringe re-use and awareness of auto-disable syringe and their benefits. Questions also encompass the issues such as disposable syringe use, their disposal system in Pakistan, the possibility of re-using a syringe and its possible impact, transmission of infectious disease through needle sharing and efficiency of immunization programs regarding their safety, use of Auto-disable syringes, their use in the prevalence of

controlling the diseases like HIV, HCV and HBV and the possibility of a law to regulate such type of AD syringes in future. In addition to these questions, personal profile of respondents such as name, age group, occupation and affiliated institute was asked. Name and affiliated institute declaration was optional because it may cause reluctance to give actual information. An additional space was provided for comment and feedback.

Informed consent

The objective of the study was explained and verbal consent was obtained. It was also informed that the data will be used for survey purpose only. Every participant filled the questionnaire on their own, except for 10 nursing staff and 18 laboratory technician who were interviewed as well to assist them in filling the questionnaire.

RESULTS AND DISCUSSION

A total of 365 out of 600 approached personnel were agreed to fill the questionnaire (response factor was 60.83 %). Out of 365 individuals, 260 were aware of AD syringe. The samples were selected in such a way that from each category 50 participants filled the questionnaire and responses were recorded. The results showed that greater percentage of participants strongly agreed that Pakistan has a high ratio of syringe use due to greater prescribing of parenteral therapy among those doctors were 92%, Nurses 88%, Laboratory Technician 77% and Students response was 94% positive for this question. Individual group positive responses regarding disposable syringe use is shown in Table 1. Variation seen in the adopted method by different groups for disposal of syringes. According to the medical professional, most used method for disposal of syringe was sharp syringe box method that is approximately 71 %, waste bags method was the second largest method adopted for disposal, while plain bins and color coded bins were third and fourth option respectively and showed in Figure 2.

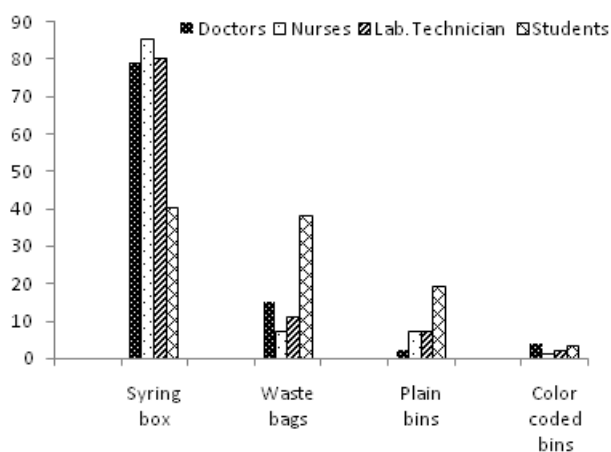


Fig. 2: Syringe disposal methods in health professionals of Karachi, Pakistan.

Greater numbers of medical personnel were not satisfied with the syringe disposal management in Pakistan as they agreed

that health care sector lack in the presence of proper Standard operating procedures (SOP) for syringe waste management. More than 65% (actual 67.02%) of the participants were of the opinion that the bulk immunization programs are not carried out safely and effectively. High positive responses were seen in their opinion when they were asked if syringe re-use was a major cause for HBV, HCV and HIV outbreaks.

The survey revealed that about 71 % of health care professionals were aware of Auto-disable syringe and their usage and remaining 29 % were having no idea about AD syringe. The details of each group is shown in Figure 3. Answers about AD syringe usage among participants those who were aware of AD syringes are shown in Table 2. Participants were 79 % positive that they prevent re-use & reduce the risk of needle sharing and would clearly help to cut down cases of HIV, HBV and HCV by preventing syringe reuse, approximately 82 % were confident that AD syringes are safe and effective for bulk immunization, approximately 84 % were agreed with the statement that AD syringes provide accurate dose and reduce workload. A high percentage of all groups agreed to have awareness and promotion campaigns for the implementation of AD-syringes in Pakistan. Participants were affirmative that a balance in finances and resources will help for manufacture of AD syringe without having extra load over health sector economy. Over all, all groups were positive towards need for a law to regulate the use of AD syringe.

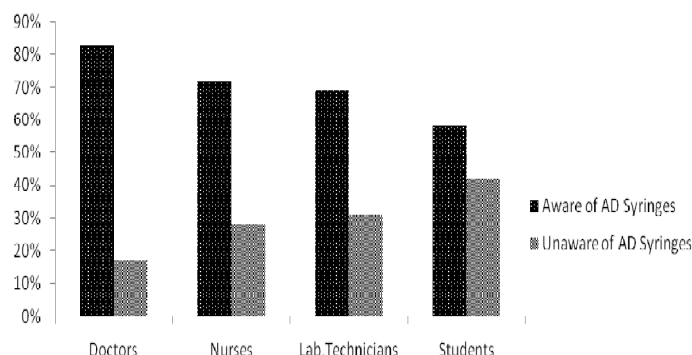


Fig. 3: Awareness of AD syringe among health professionals in Karachi, Pakistan.

Karachi is the biggest city of Pakistan where sharps disposal system has invariably been a serious issue, particularly once it involves in bulk immunization. This eventually ends up in employing of contaminated syringes and results in the spread of fatal infectious diseases like AIDS, Hepatitis B & C. Per an estimate, in Karachi, out of 8000 tons of solid waste generated a day, 0.5 % is health care, generated by 400 hundred hospitals, clinics and laboratories. According to the study of the Environment Protection Agency (EPA) waste produced by hospital, 20% of health care waste generated a day within the city is infectious waste, out of that an outsized proportion includes used syringes that become simply attainable for re-use (Altaf and Mujeeb., 2002). According to one study conducted in a city of Pakistan, 80% of the practitioners were treated every patient by

administering injections, that is 53% in rural and 28% in urban areas, as accounting the selection of injection to be a cardinal mode of treatment (Janjua, 2003). This study highlighted the extensive use of syringes in Pakistan, along with the different aspects of its improper disposal. The response for this survey was 60.79 % and the reason might be that many of approached candidates were reluctant to respond about their practices and think that it may impact their job performance evaluation although it was informed that the data will be used for survey purpose only.

There were variations in the disposal methods among different groups and mostly sharp syringe boxes used that revealed health professionals it may be because they seem this method easy to them. Not a very high but quite a noticeable percentage of the personnel participating in study accepted the re-use of syringe after changing the needle or re-using it on the same patient. This kind of practice portrays the ease of re-using a syringe in the health care setup, which leads to the transmission of different blood borne diseases that can prove to be fatal. Response of the doctors regarding this issue was exactly the same. Although a healthier percentage of health care professionals were aware about AD-Syringes and their benefits yet their implementation has been delayed by many objections raised by the stakeholders. One of them is cost effectiveness. Considering the proportion of budget *et al.*, located for the health sector, equal importance can be given to both blood-borne disease awareness/immunization and syringe re-use prevention. This can be done by balancing the finances and

resources which can result in the manufacture of AD-Syringe in Pakistan which will clearly help economy to a noticeable extent. This poses a need for the presence of a law to endorse the use of Auto Disable Syringes in Pakistan.

RECOMMENDATION

Use of AD-syringes in Pakistan is a valid choice to fight against disease transmission and it is only proper awareness among health care personnel as well as general public and proper allocation of resources that can accomplish this mission. Entire focus should be on complete prevention of re-use of syringe but since this is not practically possible in a developing country like Pakistan, where many other major issues exists therefore a written regulatory statement in the form of a local Act or ordinance must be there to assure the use of AD-Syringes in all areas of syringe use and not just for vaccination.

ACKNOWLEDGEMENT

Authors are grateful to Professor Dr. Sumbul Shamim, Principal, Dow College of Pharmacy, Dow University of Health Sciences, Karachi for providing us the better opportunity for conducting the research. In addition, authors also thankful for the staff of teaching hospitals, laboratories and health education institutes for providing tremendous support for successful completion of this project. There is no conflict of interest.

Table. 1: Feed Back Regarding Disposable Syringe Use.

S.No	Statement	Doctors	Nursing Staff	Laboratory Technician	Health Education Students
1	Individuals who agreed that Pakistan has a high ratio of syringe use.	92%	88%	77%	94%
2	Individuals who thought that proper standard operating procedures for syringe waste management is not implemented.	54%	17.5%	40%	71.1%
3	Individuals who thought that bulk immunization programs are not carried safely and effectively in Pakistan.	76%	67.5%	40%	84.6%
4	Individuals who agreed that it is acceptable to re-use a syringe after changing needle.	14%	20%	10%	32.7%
5	Individuals who agreed that it is acceptable to re-use a syringe on the same patient	36%	37.5%	53.3%	34.6%
6	Individuals who agreed that syringe re-use is a major factor in HBV, HCV and HIV transmission.	95%	91.25%	98.33%	95.2%

Table. 2: Feedback on Role of Auto-Disable (AD) Syringe.

S.No	Statement	Doctors	Nursing Staff	Laboratory Technician	Health Education Students
1	Individuals agreed that promotion of AD syringe would reduce needle sharing and that it would help to cut down HBV, HCV and HIV spread.	91%	83%	79%	63%
2	Individuals who agreed that use of AD syringe will control disease transmission more efficiently than bulk immunization and disease awareness campaigns.	94%	97.5%	93.3%	42.3%
3	Individuals who thought that fixed volume filling mechanism in AD syringe will ensure dose accuracy and reduce workload	90%	87.5%	88%	72 %
4	Individuals who agreed that awareness and promotion for AD syringe usage would speed-up its implementation in Pakistan.	88%	90%	93.3%	75%
5	Individuals agreeing that balanced investment of finances and resources for the manufacture of AD in Pakistan would help health sector economy	98%	97.5%	100%	90.3%
6	Individuals agreeing that there is a need of a law for AD syringe use in Pakistan.	84.29%	67.5%	74 %	92.1%

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How to cite this article:

Tariq Ali, Princess Asmarah Shehzeb, Faryal Hanif, Hafsa Qureshi, Omema Owais, Sana Usmani, Madiha Batool, Falak Haider, Fawad Yousuf and Sara Arshad., Awareness on the impact of disposable syringes re-use and benefits of Auto-disable (AD) syringes in health care professionals and students in Karachi, Pakistan. *J App Pharm Sci*. 2012; 2 (12): 061-065.