

Strategies and challenges for safe injection practice in developing countries

Sudesh Gyawali^{1,2}, Devendra Singh Rathore³, P Ravi Shankar⁴, Vikash Kumar KC⁵

¹Department of Pharmacology, Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal, ²PhD Scholar, Suresh GyanVihar University, ³Department of Pharmacy, Rajasthan Pharmacy College, Jaipur, India, ⁴Department of Pharmacology, KIST Medical College, Lalitpur, ⁵PN Multiple Campus, Pokhara, Nepal

ABSTRACT

Injection is one of the important health care procedures used globally to administer drugs. Its unsafe use can transmit various blood borne pathogens. This article aims to review the history and status of injection practices, its importance, interventions and the challenges for safe injection practice in developing countries. The history of injections started with the discovery of syringe in the early nineteenth century. Safe injection practice in developed countries was initiated in the early twentieth century but has not received adequate attention in developing countries. The establishment of "Safe Injection Global Network (SIGN)" was an milestone towards safe injection practice globally. In developing countries, people perceive injection as a powerful healing tool and do not hesitate to pay more for injections. Unsafe disposal and reuse of contaminated syringe is common. Ensuring safe injection practice is one of the greatest challenges for healthcare system in developing countries. To address the problem, interventions with active involvement of a number of stakeholders is essential. A combination of educational, managerial and regulatory strategies is found to be effective and economically viable. Rational and safe use of injections can save many lives but unsafe practice threatens life. Safe injection practice is crucial in developing countries. Evidence based interventions, with honest commitment and participation from the service provider, recipient and community with aid of policy makers are required to ensure safe injection practice.

Key words: Injection, injection providers, interventions, sharp waste, strategies

INTRODUCTION

Injection is an important health care procedure used worldwide for administration of drugs. Billions of injections are used worldwide for curative care and for

immunization.^[1] In developing countries, approximately 16 thousand million injections are administered - a rate of 3.4 (range 1.7-11.3) injections per person per year.^[2] Majority of the injections are unnecessary^[2,3] and are not used safely. Reuse of injection equipment in the absence of sterilization is common.^[4,5]

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OBJECTIVES

The objectives of this review are to:

1. Review the history and status of injection practice
2. Highlight importance of safe injection practice and
3. Mention interventions and highlight the challenges towards safe injection practice in developing countries.

Address for correspondence:

Sudesh Gyawali, Department of Pharmacology, Manipal College of Medical Sciences, P.O. Box: 155, Deepheight, Pokhara, Nepal.
E-mail: sudeshgy@hotmail.com

HISTORY OF INJECTIONS

Closed system of blood circulation, discovered by William Harvey in 1626, paved the way for significant studies on the effectiveness of certain drugs administered by the intravenous route. In the early 1660s, experiments conducted at the Royal Society of London, showed opium, antimony and tobacco oil were effective even on intravenous administration.^[6] Before this, it was believed that a drug can only produce its action when present in the gastro-intestinal tract and administered orally.

Syringe was invented in the year 1848.^[3] Alexander Wood (1853) introduced hollow needle to deliver opioids^[7] and within a few years syringe became a very valuable medical instrument to inject a number of drugs. In the early nineteenth century handmade syringe of glass and metal were available at very high cost (approximately US\$ 50). The popularity of the syringe increased as it was used to inject penicillin. As the demand and use of the syringe increased, mass production of syringes led to decrease in the price. Due to continuous development in technology during 1950-60, the sterilizable glass syringe was replaced by the disposable syringe.^[3]

In the early twentieth century, safe injection initiatives began in developed countries when it was proved that non-sterile injections transmitted a pathogen that caused jaundice. The safe injection initiatives have been very effective in developed countries but have not received the required attention in developing countries.^[8]

Unsafe injection practices which can transmit Hepatitis B, Hepatitis C, Human immunodeficiency virus (HIV) and other blood borne pathogens have resulted in substantial burden of preventable blood borne viral diseases (BBVDs).^[8-10] The transmitted BBVDs remain silent for many years so the threat can be overlooked.^[9]

The unnecessary and unsafe use of injections drew increasing concern among international agencies such as the World Health Organization (WHO) and national health officials and policy makers, doctors and other health workers to develop collaboration between worldwide organizations and individuals sharing a common interest. To ensure the safe and appropriate use of injection worldwide, in 1999, WHO established an international alliance, the "Safe Injection Global Network" (SIGN).^[11]

INJECTION AND ITS USE

Injection is regarded as a powerful tool to heal disease,^[3,7] especially in developing countries. Patients are pleased and may feel that they have obtained the best care when they are administered injections.^[12] Health workers get financial

and status rewards by using injections. Hence a mutually reinforcing cycle exists between the patient and the injection provider which is responsible for frequent use of injections.^[8,12]

In developing countries, injections are provided by various sectors which are divided as follows:^[3,5,13]

1. *Formal sector* consisting of doctors, nurses and other health care workers (HCWs) who are trained for providing injections and have legal right to provide the same. This sector can easily be influenced by regulatory bodies and it is easy to implement state policies. Most of the useful injections are provided by this sector but they might also sometime be involved in administering unnecessary injections.
2. *Informal sector* which includes traditional healers, Ayurveda doctors, medical shop keepers etc. They are not well trained to administer injections and have no legal rights to inject the same. They often live close to the community (clients), are easily approachable by the people and provide service round the clock. Their direct charges for the service are usually low and are generally paid after the result of the treatment is known. This sector is recognised by the state through associations. Except a few, most of the injections provided by them are unnecessary and/or unsafe.
3. *Illegal (Quacks) sector* comprises of individuals who provide injections for financial benefit. They have no sanction and training for injections and are not identified by the state. They are mostly self-taught or learn the procedure working under another person. The state finds it difficult to identify and control them. The injections provided by them are unnecessary and unsafe.
4. *Domestic sector*: The injections are administered by relatives or neighbours and generally payment is not involved. They are also difficult to identify and be influenced by the state.^[14]

A large percentage of injections in developing countries are provided by the informal sector.^[8]

SAFE AND UNSAFE INJECTION PRACTICE

An injection is said to be safe if it does not harm the recipient, does not expose the provider to avoidable risk, and does not result in wastes that is dangerous for the community.^[1,11] This is achieved by administering the injection using a sterile device (syringe, needle etc.), adopting sterile technique by a qualified and well trained person and discarding the used devices in a puncture-proof container specially designed for appropriate disposal. Any breach in the process makes the injection unsafe.^[1]

Among the unsafe injection practices in developing countries, reuse of contaminated syringe and unsafe disposal are very

common^[3,5,8,15] with rates in a study being as high as 75% in South east Asia.^[2] Unsafe disposal of used injection equipment can facilitate scavenging, repackaging and reselling.^[3,5]

Safety of recipient

The risk of harming recipient can be avoided by administering useful injection (right medication) with a new sterile single use device, and observing proper technique by qualified and well trained health workers.^[16] To ensure safety to the recipient there should be sufficient supply of quality single use devices throughout the year.^[10]

Many interventions for improving injection safety have been developed focusing mostly on the formal sector; attempts should also be made to include other sectors for better results.^[3,4,10] If interventions are carried out only in the formal sector, people may visit untrained providers from other sectors and be exposed to greater risk. This makes the implementation of the safe injection policy challenging.^[13] Hence, increasing awareness of the people about injection safety has also to be considered while planning and implementing injection policy.

Safety of the provider

The injection provider can reduce avoidable risks by disposing used syringe in a puncture proof closed container immediately after use without recapping. Needle stick injury (NSI) is commonly encountered by the provider especially during recapping. About thirty infectious diseases may be transmitted by NSI but chances of acquiring hepatitis B infection are much higher than other infections.^[17] Hence, full immunization against Hepatitis B is important to ensure safety of the provider.^[16] These interventions (proper disposing technique without recapping and vaccination) can provide protection to the healthcare worker from occupational infection with BBVDs.

The safety of the provider is of prime importance in developing countries because protected healthcare workers are confident and encouraged to practice safe injections. They may also discriminate less against patients suffering from HIV/AIDS.^[18] Unfortunately less number of health care workers in developing countries, are vaccinated against Hepatitis B^[17] and they work in adverse conditions where the chance of exposure to BBVDs is very high compared to developed nations.^[15] Furthermore, the unsafe practice is under reported.^[17] Some health workers are aware about safe practices but are unable to translate this into practice, one of the important reasons being the heavy work load.^[15,19]

Safety of the community

The injection material should be disposed according to local and international health and environmental standards so that the waste does not produce any hazard to other people.^[16] The used syringes should be immediately disposed in a specially

designed puncture proof box or segregated for disposal after burning/cutting the needle with equipment designed for the same.^[1,16]

A review from 19 developing countries showed that almost half of all injectable are disposed unsafely.^[8] For instance, medical waste was disposed unsafely without proper segregation along with household trash.^[4,14] In addition, disposal of used injection equipment without proper destruction leaves them vulnerable for scavenging and resale.^[3,5]

INTERVENTIONS AND CHALLENGES FOR SAFE INJECTION PRACTICE

Although spread of BBVDs through sexual and vertical means is decreasing, their transmission by unsafe injectable use can be assumed to be increasing.^[14] Hence, successful interventions to improve injection practices are the need of the hour, especially in developing countries. Successful implementation requires understanding of the complexities and challenges of the practice.

Injection safety is a complex problem requiring involvement of many stakeholders from the individual public to local, state and national governments. Injection safety interventions should combine educational, managerial and regulatory strategies for better results.^[4] This integrated approach is cost effective as well and should be considered while planning interventions.^[10]

Educational strategy

The educational strategy should mainly focus on the general population (recipient) and HCWs (providers). The intervention planner should know “*what the injection means to the community?*” and obtain best available evidence of the practice^[19] before initiating the strategy. The strategy should target the general population through radio and television advertisements and HCWs through practical training in providing injections.

The strategy for the general population should focus on activities which would make the recipients aware about safe practices so that they would demand for useful and safe injections only.^[10] Care should be taken that educational strategies do not adversely affect the use of useful injections such as vaccine, contraceptive and other rational injections.^[13]

The strategies devised for HCWs should focus on identifying high risk procedures (like needle recapping, reusing syringe repeatedly by changing the needle, waste segregation, use of multi dose vial etc.)^[4] and methods (like avoiding needle recapping, waste segregation at the point of generation, reducing use of multi dose vial etc.) to avoid hazards of unsafe injection practice.^[15] Providing more time to patient

and communicating about disease and its rational treatment with emphasis on oral formulations by HCWs also helps to minimise unnecessary injections.

Managerial strategy

Well trained and well intentioned HCWs cannot practice safely unless their working environment is favourable. So, organisational commitment to safe injection practice and healthcare worker safety is essential^[15] and managerial strategies should be directed towards achieving the same. The interventions are not very expensive and even resource constrained hospitals can practice safe injections. This can be achieved by promoting a climate of safety and targeting high-risk areas and practices.^[4]

Creating a climate of safety includes formation of an infection control committee, ensuring an adequate supply of quality disposable injecting devices and sharps containers at affordable prices, promoting injection safety awareness, vaccination of workers against Hepatitis B and supervising workers with low education levels. Training in safe injection practice for both injection providers and waste handlers can be planned.^[4,19]

Regulatory strategy

It is challenging for a hospital to practice injection safely without support from local, state and national governments. The regulatory strategies of the government should be multidisciplinary addressing policies and systems, smooth and sufficient availability of quality injectable equipments, and arrangements for disposal of injection equipments. Continuous availability of sufficient quantities of injection equipment (including safety boxes) in all health facilities is the key to successful intervention.^[10]

To make the intervention effective and affordable, it can be combined with other programme like HIV/AIDS, vaccination programme, family planning etc., The planned interventions should be implemented simultaneously in the community and health system for positive results. In the health system, all sectors (formal, informal, illegal and domestic) should be targeted simultaneously. System for monitoring the policies should also be included.^[13]

When a combination of activities was implemented in the Syrian Arab Republic, the injection practice improved significantly. The feedback shows that rapid improvement in injection safety is possible. The change can be sustained by safe injection guidelines, regular supervision and nomination of a person responsible for waste management.^[10]

In developing countries, people may cooperate in implementation of practical measures to ensure injection safety rather than giving up injections (which they regard as a powerful method of healing). Hence, ensuring administration

of safer injection is easier and more effective than reducing the number of unnecessary injections. Overuse of injections can only be addressed by changing the prescribing habits of injection prescribers/providers which can be done if interventions are targeted at lower level HCWs with an alternative to injections being provided.^[13] If the informal injection providers are providing a lifesaving injection unsafely, rather than stopping them from providing the same they can be trained in safe injection practices.

Auto-disable syringe has a mechanism to immobilize the plunger or block the needle or cause the syringe to leak when a second injection is attempted hence it cannot be reused. The needle is also fixed permanently in the syringe to prevent the reuse of the needle as well. Mandatory use of auto-disable syringes for vaccination is a good step for ensuring injection safety. But associated cost and safe disposal is a serious limitation for developing countries. Although auto-disable syringe cannot be reused, the exposed needle can be risky. Moreover disposal of auto-disable syringe is also a challenge in developing countries where the infrastructure for disposal is lacking. Despite the growing awareness about the need of safe health care waste management (including disposal of injectable), compliance is lacking.^[4] So, pros and cons of each intervention, in context to the implementation region and resources should be analysed before implementation.

The healthcare workers (front line workers) should be actively involved in the planning, implementation and evaluation of new technologies and other changes in the practice, for the practical and successful implementation.^[4]

CONCLUSION

Injections have saved many lives but at the same time carry the risk of infections. So the current concern is *how to make this practice more safe and beneficial in developing nations?* Various strategies such as educational, managerial and regulatory have been discussed but challenges have to be overcome for their successful implementation. Rational use of injections, proper management and disposal of injectable products can lead to safe injection practice and for this honest commitment and participation is required from service provider, recipient and community with support from policy makers. More research to understand the problem in individual countries and regions is required to develop evidence based interventions.

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