

Injection Waste Disposal in India

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Abstract: *From its general use in 1920s and worldwide use after World War II injection application has revolutionized the health care. One cannot forget the revolution brought about by the discovery of penicillin in the management of infections by use of syringes just after the Second World War. Its discovery led to better and more effective use of medicines. Initially the syringes were used for curative medicines only. On research in the areas of preventive health care the use was extended to immunization, which is quite a large chunk of use of injection. It is estimated that about 16 billion injections are administered worldwide. 95 % no doubt are for therapeutic use but the rest 5% are for immunization & investigation purposes (1). Till the early '60s only the glass syringes were used for injections. The glass syringes gave way to plastic syringes, and its universal use in India can be said to be in the early '80s. Now management of injection waste remains a problem in the developing countries due to inadequate implementation of management technique, poor work culture, loose monitoring and lackadaisical approach.*

Keywords: Injection, Waste Disposal, Infection, Immunization

1. Introduction

The plastic syringes were brought to use to minimize nosocomial infection. This strategy succeeded in the developed world but not in the developing countries due to defective practice of plastic syringes. The waste syringes are perceived as a source of income by the waste handlers in India. There are studies which have revealed that about 30 to 50 % of used glass syringes find their way back to the shops after washing and wrapping. Suburbs of any city have 'BASTIES' where this activity takes place. The used syringes are culled out from the heap of medical waste by rag pickers and taken to the vendors for repacking. This has become a thriving industry (2). In Delhi, it is said to be an industry worth Rs 50 million per year. Hospital waste, and specifically the injection waste, have great potential to cause infection and spread of diseases. Population explosion and density has reduced the natural barrier, and the generation of waste of all type has increased exponentially largely due to population growth and urbanization.

2. Discussion

Hospital acquired infections are more tenacious and more difficult to deal with as the infective organism by and large are the mutated variants. The percentage of MRSA has shown a sharp increase from 1% in '1960s to 4 % in 1969, to 10% in 1984, and 75% in 1999 as claimed by a study carried out in UK (3). Similarly mutated variants have entered the underground water reservoirs. Mutated variants have been found in the aquifer where tetracycline was used in the food for the Livestock in the USA (4). Researchers even claim that HIV virus is a mutated variant of otherwise non - virulent Simian - Immuno - Deficiency - Virus (SIDV) as a result of serial injections administered in Uganda & Somalia to fight yaws during 1950s (5). It has been claimed that the mutation may have taken place by serialization. As an accepted practice the syringes were not disinfected considering the poverty of the country.

Statistics of injections as per WHO report (1) reveals that: -

- Each person in the developing world receives 1.5 injections per year,
- Hospital patients receive 10 to 100 times more injections,
- At least 50% of all injections are unsafe,

- There is convincing link between unsafe injection, and transmission of Hep B&C, Lassa virus, malaria, and recently
- AIDS has been linked to unsafe injections,
- 20 % of all fresh cases of Hep B in the developing world is due to unsafe injections,
- One billion injections world over are given in course of childhood vaccination program.
- Some more information of injuries caused by injection waste is as follows: -
- In PD Hinduja hospital Mumbai, 194 cases of needle stick injury were reported from Jan 1988 to Sept 2000. The cross section of staff affected were 79 (40%) Attendants, 77 (39.6 %) Nurses, 18 (9.2%) Doctors, 20 (10.3%) Lab technicians. . On source analysis revealed that 110 were known sources and 84 were unknown sources (6).
- In Britain, in 1917 an outbreak of Malaria among soldiers was attributed to injection treatment for Syphilis (7).
- Outbreak of Jaundice following injections in 1940s and 1960s amongst RAF personal who received multiple immunization clearly linked infection with injections for which syringes were reused after changing the needle only (7).

It is thus evident that injection wastes play a very dominant role in the incidence of communicable diseases. Each year unsafe injections cause an estimated 1.3 million early deaths – loss of 26 million years of life, and an annual burden of US \$ 535 million in direct medical cost (8).

With the universal Immunization against Hep B in the offing, a massive increase in the quantum of injection waste is expected. As it is 4.2 billion Injections are given in India out of about 16 billion injections per year - worldwide. Addition of injection waste from the immunization program is going to make the disposal of the injection waste even more complex. India is adding 16 million to its population every year. Thus 48 million injections per year will be required under the universal immunization program. This will result in fresh calculation to the percentage of injection waste, which stands at only 1% of total waste of a health care facility. It is true that AD syringes are going to be used in the program, but the perception that use of AD syringes

answer to all the problems related to management and safe disposal of waste plastic syringes may be misplaced. It must be appreciated that due to negative pressure being generated in the lumen of the syringe a small portion of body fluid is bound to remain as remnant. If the AD syringes are buried this infected remnant will remain and over a period of time will surface as a potent source of infection. The organism contained in the fluid if any, may proliferate & mutate. Autoclave treatment may not be effective since there will be no place for the steam to enter that miniscule space. Burning plastic syringes cannot be eco - friendly, and will not be an option without causing harm to individuals or the environment. Shredding without disinfection has its associated hazard to the waste handlers since infection if any in the remnant may cause harm by aerosol formation. Moreover a major portion of the injection waste will be in the rural area, where awareness about infection control will be poor to non - existent.

One widely held presumption in support of the use of disposables is that it is important in control of infection. Yet infection control studies don't indicate a constant and consistent reduction in nosocomial infection where disposables replaced the re - usable (7). In fact if at all, there may have been increase in the incidence after the plastic syringes replaced glass syringes in India. There has been no comparative study conducted anywhere in India to prove that use of plastic syringes has indeed brought down the incidence. Now, that may be possible, as the State Govt of MP have decided to switch back to glass syringes (9).

Sharps waste may be only 1% of the total health care waste (10) but is most potent source of spread of infection. Additional 48 million injections per year for universal immunization in India will jack up the total injection waste to 4.2 billion + 48 million per year. The expenditure for proper treatment of this waste has not been calculated simply because there is no proper disposal being practiced in India. Bio - medical waste, including the injection waste can be seen strewn all over in the dumping areas with municipal waste, and in many hospitals. Dumping infected waste with general MSW infects whole waste, thus increasing the infected waste 10 times, or to 100% from merely 1 - 2%. If one tries to calculate expected expenditure on the treatment of injection waste it may be a futile exercise as no definite figure of the waste being generated from all health care facilities are available. But the budgetary requirement to treat the injection waste generated out of the universal immunization program can be calculated since the number of injections required to be administered is known. If all PHCs are planned to have a reasonable system of waste disposal it would cost about Rs 40, 000 per PHC. India has over 23, 000 PHCs, 3000 CHC, and over 1, 000 district level hospitals. The budgetary requirement would thus be over Rs one billion. The injection waste cannot be burned, nor an effective autoclaving of AD syringes be ensured. So the question arises whether this expenditure is going to be worthwhile? Is it likely to achieve the intended result? Is it therefore going to be cost - effective? For example, if this measure is going to be harmful to either the environment or the human health then it can be said to be not cost - effective. Damage to the environment may not appear apparent but it is there. Harm to the human health, or even

the animal health will have a value & cost. Impact on health of individuals & the environment and will have to be reckoned to appreciate the cost - effectiveness of any measure.

Health has gradations, and lowered standard has its own disadvantages, on physical & mental health. The health of a rag picker who gets exposed to the danger of needle - stick injury or harmful fumes or smoke cannot be of the same standard as that of a white collar worker. Then there is the cost of treatment, either as OPD or in patient, resulting in loss of man - days & extended occupancy of hospital beds. If the cost of these are taken into reckoning cost to the society on account of improper waste disposal would be enormous. A study done in UK (NHS) on Hospital Acquired Infection (HAI), indicated loss of 8.7 million man - days, and additional expenditure of about 1 billion Pounds per year on account of treating cases of hospital acquired infections (11). It is relevant since improper waste disposal (including injection waste) is responsible for increasing incidence of hospital acquired infection.

30% incidence of Hep B & C can be attributed to reuse of plastic syringes. With the immunization program against Hep B, 48 million additional injections will be required every year. This will translate to Rs 3.2 billion per year. One time investment of Rs 1.2 billion will be required for disposal equipment. With this kind of money a safe system to ensure injection safety can be developed. At the same time there is a lot of merit in the concept of going back to glass syringes.

Before starting the immunization program health care experts as a task group should suggest best, cheapest, and safest way to disposal of injection waste in India.

3. Suggestions and Recommendations

Change from glass syringes to plastic syringes took place in 70s in India. The first case of HIV/AIDS was detected in 1982. One needs to ponder whether there could be a link between introducing plastic syringes in healthcare and appearance of AIDS in India! It is certainly not that the plastic syringes by themselves may have caused this situation, but improper treatment (disinfection) and disposal of the waste plastic syringes may have contributed. It is therefore suggested that:

- Comparative study be undertaken to see the difference in transmission of infections in a centre where only glass syringes is used, and at a centre where only plastic syringes are used,
- Bacteriological study to determine infections carried in used plastic syringe waste,
- Develop protocol for plastic syringe waste in the rural areas covering PHC and CHC,
- Regular awareness programme for waste handlers at hospitals and other healthcare facilities in urban as well as in the rural healthcare facilities,
- Greater and universal use of protective clothing and gear,

- Effective monitoring and control by healthcare authorities besides pollution control boards and committees,
- Periodic waste management audit by independent specialist organisation or body of specialists in biomedical waste management.

References

- [1] 'Unsafe Injections in Developing World and Transmission of Blood - Borne Pathogens - A Review, Bulletin of the WHO, 1999, 77 (10)
- [2] Krishnamoorthy et al, 'Hospital Waste Handlers & Labor Rights' (1999)
- [3] 'Epidemic MRSA in UK' - Hazel M Aucken et al, "Laboratory of Hospital Infection, Central Public Health UK" as Reported in the Souvenir – VI National Conference on Hospital Infection Control, Feb 2 - 4, 2001, P - 54.
- [4] 'The Hindu' (Daily News Paper), Jun 14, 2001.
- [5] Drucker, EM, et al 'The Injection Century', 'The Lancet' (Dec 8, 2001 Issue).
- [6] Mehta, A, et al 'Post Needle – stick Injury Surveillance', Souvenir VI National Conference on Hospital Infection Control (Feb 2 - 4, 2001, P - 35).
- [7] Bulletin of the WHO, 1999, 77 (10).
- [8] Miller MA & Pisani E, WHO Bulletin, Vol 77, No 10, P 801 - 811.
- [9] 'Hospital Management' - 'Pharmabiz Hospital Review' Feb 16 - 28, 2003, Issue.
- [10] 'WHO Fact Sheet' No 253, Oct 2000.
- [11] Rosalind Plowmen et al. 'The Socio - economic Burden of hospital Acquired Infection' – Dept of Health, UK