

# Unsafe injection practices in Gujarat, India

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## ABSTRACT

**Introduction:** The objective of this study was to obtain comprehensive data on injection practices, especially about safety issues, among health services providers and residents in the Anand district of Gujarat, India.

**Methods:** The study was a cross-sectional study. Stratified random sampling method was used to select primary healthcare facilities, and the field method of randomisation was used to select families in the general population in the catchment areas of the selected health facilities. Thus, 182 health facilities and 510 families (2,080 population) were covered in the study.

**Results:** Almost 77 percent of service providers had unsafe injection practices, including the use of a boiling pan for sterilisation, recapping of needles and exposure to body fluids. The proportion of unsafe injection practices was higher among Government health service providers. The prevalence of needle stick injuries (NSI) among service providers was 52.2 percent and the annual incidence of NSI was 19 percent. 21.6 percent of the population studied had received one or more injections in the past one year, and the average number of injections per head per year in the present study was 0.2.

**Conclusion:** The study revealed a high proportion of unsafe injection practices in the district studied, but a low average number of injections per head per year in the community. Serious issues regarding injection safety need to be addressed urgently. There is a need to develop local guidelines for injection usage and implement a community-based educational programme for the people.

**Keywords:** needle stick injury, patient safety, unsafe injection practices

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## INTRODUCTION

Injections are probably the most common of all medical procedures. About 16 billion injections are administered

each year in developing and transitional countries.<sup>(1)</sup> Most of these are unnecessary therapeutic injections. The vast majority of the injections (~95%) are given in curative care. Immunisation accounts for around 3% of all injections.<sup>(1)</sup> In some situations, as many as nine out of ten patients presenting to a primary healthcare provider receive an injection, of which over 70% are unnecessary or could be given orally. Patients prefer injections because they believe them to be more effective. They also believe that doctors regard injections to be the best form of treatment. In turn, doctors over-prescribe injections because they believe that this satisfies patients best, even though patients are often open to alternatives. In addition, giving an injection sometimes justifies charging a higher fee for the service provided. Many injections administered in the world are unsafe.

Unsafe injections cause a substantial proportion of infections with bloodborne pathogens.<sup>(2)</sup> Hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV) cause chronic infections that lead to disease, disability and death a number of years after the unsafe injection. It may also precipitate poliomyelitis and leads to complications like injection abscesses, septicaemia and nerve damage. At risk of infection are injection recipients and healthcare workers through contaminated needles and syringes, and the community at large through exposure to contaminated sharps waste. A recent study indicated that each year, unsafe injections cause an estimated 1.3 million early deaths, a loss of 26 million years of life, and an annual burden of US\$ 535 million in direct medical costs.<sup>(3)</sup>

The World Health Organisation defines “a safe injection” as one that does not harm the recipient, does not expose the provider to any avoidable risk, and does not result in any waste that is dangerous to the community.<sup>(4)</sup> Unsafe injection practices in developing countries have been reported to occur in 15%–50% of cases. A few Indian studies have described unsafe injection practices.<sup>(5-7)</sup> However, data from Gujarat is minimal. The present study was carried out with an objective to obtain comprehensive data on injection practices from a district of Gujarat, especially about safety issues among health service providers and the Gujarat residents.

## METHODS

The study was a community-based cross-sectional study conducted in Anand district, Gujarat state, India.

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Anand district consists of 356 villages and ten urban areas covering 1.86 million population, according to the 2001 census. The district covers eight blocks, viz. Anand, Petlad, Sojitra, Umreth, Borsad, Ankav, Khambhat and Tarapur. It was decided to focus the study on the primary level healthcare facilities, where the majority of injections are usually administered. The sampling strategy included three steps; viz. selection of (a) primary healthcare facilities by stratified random sampling method; (b) health service providers (doctors or vaccinators) by simple random sampling from the centres selected; and (c) the families in the general population in the catchments areas of selected health facilities by field method of randomisation. Thus, 182 health facilities and 510 families (2,080 population) were contacted for the study purpose, after approval was obtained from the relevant ethical committees.

Information was collected through two different pretested questionnaires for service providers and selected families in the community. An unsafe injection was defined according to the manual prepared by Programme for Appropriate Technology in Health (PATH) (Table I).<sup>(8)</sup> In the selected health facility, the purpose of the study was first explained to each study participant in the local language and oral consent was obtained. After obtaining oral consent, the pre-tested questionnaire was administered to service providers of the selected health facilities and the selected head of family in the community. It was intended to explore the injection practices, knowledge about universal aseptic precautions (UAP), biomedical waste disposal, infections transmitted, etc. for the service providers. For the community, information regarding numbers of injections received in the past one year, type of injection equipment and any hazards due to the injection, was collected. The study was conducted between June and October 2004. The data was analysed via the Statistical Package for Social Sciences version 11.0 (SPSS Inc, Chicago, IL, USA). The 95% confidence interval (CI) was calculated for all point estimates and chi-square test was used as the test of significance.

## RESULTS

Almost 77% (95% CI 73.9–80.1) [all figures in parenthesis immediately after any estimates in percentages reflects the 95% CI] of service providers had unsafe injection practices. Table II shows the relevant sociodemographical distribution of the service providers. Factors like qualification of service providers and years of experience in the medical field had no association with safe injection practices. But it was observed that the proportion of unsafe injection practices was higher among Government health setups (84%) compared to private health facilities

**Table I. Examples of unsafe injection practices.<sup>(8)</sup>**

<p><b>Practices that can harm recipients:</b></p> <ul style="list-style-type: none"> <li>• Reusing syringe or needle.</li> <li>• Sterilisation without supervision or monitoring with time, steam and temperature indicators.</li> <li>• Changing the needle but reusing the syringe.</li> <li>• Giving an injection when there are safer alternatives.</li> <li>• Keeping freeze-dried vaccine more than six hours after reconstitution.</li> <li>• Attempting to sterilise injection equipment without prior cleaning.</li> <li>• Attempting to sterilise and reuse disposable syringes.</li> <li>• Boiling injection equipment in an open pan.</li> <li>• Using only disinfectants on contaminated syringes and needles to prepare them for reuse.</li> <li>• Loading syringes with multiple doses and injecting multiple persons.</li> <li>• Applying pressure to bleeding sites with used material or a finger.</li> <li>• Vaccinating infants in the buttocks.</li> <li>• Leaving a needle in the vial to withdraw additional doses.</li> <li>• Mixing (decanting) two partially-opened vials of vaccine.</li> <li>• Flaming needles.</li> <li>• Mixing ten-dose vials of vaccine with a single-dose of diluents.</li> <li>• Using a jet injector with a reusable nozzle.</li> <li>• Storing medication and vaccine in the same refrigerator.</li> <li>• Touching the needle.</li> </ul> <p><b>Practices that can harm healthcare workers:</b></p> <ul style="list-style-type: none"> <li>• Recapping needles.</li> <li>• Placing needles on a surface or carrying them any distance prior to disposal.</li> <li>• Sharpening blunt or blocked needles for reuse.</li> <li>• Reaching into a mass of used syringes or needles (for cleaning or sorting waste).</li> </ul> <p><b>Practices that can harm the community:</b></p> <ul style="list-style-type: none"> <li>• Leaving used syringes in areas where children can play with them.</li> <li>• Giving or selling used syringes to vendors who will resell them.</li> <li>• Leaving used syringes in areas accessible to the public.</li> </ul>
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(71%). About 71% (67.6–74.4) of service providers were still using a boiling pan for sterilisation. The recapping of needles after use was practised by 17% (14.2–19.8) of service providers. Around 63% (59.4–66.6) were still vaccinating infants via injections in the gluteal region, and there were 65.4% (61.9–68.9) of service providers who had exposure to body fluids. The prevalence of needle stick injuries (NSI) among service providers was 52.2% (48.5–56.0). The annual incidence of NSI was 19% (16.1–21.9).

**Table II. Sociodemographical distribution of injection practices of service providers.**

	Safe (%)	Unsafe (%)	Total (%)	$\chi^2$	p-value
Healthcare facilities				4.06	0.04*
Government health centres	13 (16.0)	68 (84.0)	81 (100)		
Private health centres	29 (28.7)	72 (71.3)	101 (100)		
Qualification				1.43	0.48
Allopathic doctors	2 (20.9)	83 (79.1)	105 (100)		
Other than allopathic doctors	11 (30.6)	25 (69.4)	36 (100)		
Vaccinators	9 (22.0)	32 (78.0)	41 (100)		
Experience (years)				0.08	0.40
0–10	9 (21.4)	33 (78.6)	42 (100)		
> 10	33 (23.5)	107 (76.5)	140 (100)		

\* p-value is statistically significant

Knowledge about various aspects of injection practices was studied. Only 50% of service providers had knowledge about UAP. That NSI can transmit HBV infection was well known among service providers (94%, 92.2–95.8), but knowledge about HIV and HCV transmission was poor. According to the service providers, 93% (90.3–94.3) of them were using disposable syringe needles for injections. Auto-disable injection equipment for immunisation and/or curative injections was not being used by any health service provider. Only 7% (5.1–8.9) of service providers had knowledge about it. The reasons for giving injections were emergencies (27%), patients' demand (17%), vaccinations (5%) and fear of losing the patient if an injection was not given (remaining 51%). The common conditions for which injections were given were fever, pain, injuries and infections.

Nearly 21.6% (20.7–22.5) of the population in the study community had received one or more injections in the past one year. The calculated average number of injections per capita per year in the present study was 0.2. The therapeutic to immunisation ratio for injections was 4:1. The proportion of population who received the last injection by a disposable syringe and needle was 44.6% (42.3–46.9). The prevalence of injection abscess among injection receivers was almost 3%, but prevalence of minor illnesses, such as fever, itching, nausea and vomiting, was as high as 25.5%. It is worth mentioning that 90.2% of the population believed that an injection led to faster recovery.

## DISCUSSION

The study revealed 0.2 injections per head per year were administered; this is much lower than past studies from India which had shown 2.46, 2.4, 5.1 and 3 injections per head per year, respectively, in 2001,<sup>(5)</sup> 2003,<sup>(6)</sup> 2004<sup>(7)</sup> and 2005.<sup>(9)</sup> The studies from other countries also reported higher injections per head per year, i.e. 4.2,<sup>(10)</sup> 13.6,<sup>(11)</sup> 5.9,<sup>(12)</sup> and 10.9 injections.<sup>(13)</sup> This significant difference in average numbers of injections per head per year may indicate the geographical variation in injection practices. There are many sociocultural factors that determine injection usage pattern in the community. The ratio of

therapeutic to immunisation injections was 4:1 in the present study, which is similar to that in other studies in India,<sup>(7)</sup> but much less than 20:1 quoted in the WHO fact sheet.<sup>(1)</sup> This could be due improved immunisation coverage in India.

The proportion of population who received the last injection with disposable syringe needles was 44.6%, which is almost similar to the 42.9% obtained in a study in South India<sup>(6)</sup> and 49% in North India.<sup>(7)</sup> In contrast, 93% of service providers reported using disposable syringe and needles for injection; the difference indicates unsafe injection practices. Health practitioners from China reported 97% usage of disposable syringes.<sup>(14)</sup> The study revealed that an overall 77% of injections were unsafe injection practices in the district. Simonsen et al reported that 50% of injections were considered unsafe in 14 of 19 countries.<sup>(15)</sup> Other studies from North India<sup>(7)</sup> and Wulong county in China<sup>(16)</sup> had also reported almost similar numbers (77.5% and 77.1%, respectively) of unsafe injection practices. The sociodemographical factors, like qualification of service providers and years of experience, were not associated with safe injection practices. But the association of the type of health set-up and unsafe injection practices was found to be significant. Government health facilities had higher unsafe injection practices compare to private health facilities (Table II).

Rajasekaran et al reported that 87% of prescribers cited patient preference as the main reason for a high number of injections, even for minor illnesses.<sup>(6)</sup> In the present study, only 17% of service providers cited similar reasons for giving injections. This is one of the reasons for the lower injection rate per capita. Other reasons include sociocultural perception about injections among service providers and clients. Kermode cited in his paper that health service providers are influenced by popular sociocultural perceptions about injections and professional beliefs that injections are better than oral medications. They assumed that patients want injections, and if an injection is not provided during consultation, the patients will seek healthcare elsewhere, which can mean a loss of status and income.<sup>(17)</sup> There is a need to eliminate such beliefs.

The annual incidence of NSI among service providers was 19%, which was a little lower than that observed in the South India study<sup>(6)</sup> but much higher than the 2.2% observed in the developed world.<sup>(18)</sup> Over half (53%) of the service providers in Cambodia have reported NSIs in the last 12 months.<sup>(11)</sup> One of the reasons for high NSIs was the practice of recapping the needles, a practice which was observed in 17% of service providers in the present study and 58% in the Cambodian study.<sup>(11)</sup> Other reasons were high patient turnover, lack of staff, lack of resources, sterilisation practices, reuse of disposable syringes and needles, and lack of training and retraining of staff. The probability of transmission of infection through NSI is high with HBV (20%–40%), HCV (6%) and less with HIV (0.3%).<sup>(14)</sup> The present study found inadequate knowledge of service providers for transmission of HCV through NSI. The study also revealed the poor knowledge about UAP among service providers. Almost 81% of service providers knew that a biomedical waste law has been implemented by the Government of India, but very few had implemented it in their facilities.

The prevalence of injection abscesses was about 3% among injection receivers, but the prevalence of minor illnesses due to injections was around 26%. It was difficult to judge the significance of this finding because there were no other studies reported in journals. However, injection abscess is one of the indicators to measure unsafe injection practices. The problem of unsafe injection is very complex; there are many factors that determine injection safety. The sociodemographical factors are not associated with safe injection practices, but sociocultural factors play a great role. There is a need to train service providers to choose the proper type of treatment (oral or injectable) and proper method of handling of injection equipment. Imparting of knowledge is not enough. There is a need to change the behaviour of both service providers and their patients. WHO has published an injection safety policy in 2003.<sup>(19)</sup> There is an urgent need to develop a local policy on the basis of that guideline. Surveillance programmes for NSI should be incorporated in each healthcare facility and a detailed study of each NSI is essential to reduce the incidence of NSI cases. Also, a community-based education programme should be started for residents.

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