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Syringe Reuse in Pakistan: A Systematic Review of Unsafe Injection Practices and Their Public Health Consequences

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ABSTRACT

Unsafe injection practices, particularly syringe reuse, remain a pervasive public health issue in Pakistan. Despite international guidelines advocating single-use injection equipment, a significant portion of injections administered across various healthcare settings involve reused syringes, contributing to the spread of bloodborne infections such as Hepatitis B, Hepatitis C, and HIV. This review systematically assesses the prevalence of syringe reuse in Pakistan, explores the underlying factors promoting such practices, examines the associated health consequences, and evaluates current interventions and policy responses. A comprehensive literature search was conducted using PubMed, Scopus, Google Scholar, PakMediNet, and WHO IRIS databases for studies published between 2005 and 2025. Studies were selected based on predefined eligibility criteria and evaluated using PRISMA guidelines, JBI, and STROBE checklists. Data extraction focused on prevalence, settings, health outcomes, contributing factors, and policy measures. Twenty-six studies met the inclusion criteria. The prevalence of syringe reuse ranged from 17 to 67%, with the highest rates in rural and informal healthcare settings. Contributing factors included poor regulatory enforcement, economic constraints, lack of healthcare worker training, and patient misconceptions. Syringe reuse was significantly associated with outbreaks of Hepatitis C and HIV. Limited but notable interventions include WHO-supported safety campaigns and national-level policies that lack consistent enforcement. Syringe reuse in Pakistan is a major but preventable public health concern. Targeted policies, public education, and provider training are urgently needed. Stronger government regulation, grassroots advocacy, and improved surveillance are essential to eliminate this high-risk practice.

KEYWORDS

Syringe reuse, unsafe injections, Pakistan, Hepatitis C, HIV, public health, healthcare policy, systematic review

INTRODUCTION

The use of injections is widespread in healthcare delivery across Pakistan. Injections are often perceived as fast-acting and more effective than oral medications, resulting in high patient demand. It is estimated that over 13 billion injections are administered globally each year, and Pakistan alone accounts for more than 800 mL of these annually, many of which are unnecessary and administered unsafely[1].

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A particular concern is the reuse of disposable syringes without sterilization, an unsafe practice that enables the transmission of bloodborne pathogens. This problem is especially severe in Pakistan due to a combination of inadequate healthcare regulation, socioeconomic challenges, and widespread informal healthcare services that lack accountability and hygiene standards[2,3].

Numerous outbreaks of Hepatitis B and C, as well as HIV, have been traced to reused syringes in both public and private clinics. Despite global and national health guidelines discouraging syringe reuse, implementation gaps and public unawareness continue to undermine progress. The World Health Organization (WHO) and Pakistan's Ministry of National Health Services have periodically issued injection safety advisories, but the absence of sustained policy enforcement limits their effectiveness[4-7].

The primary aim of this review is to assess the prevalence and geographic distribution of syringe reuse practices across Pakistan. It seeks to explore the underlying social, cultural, and systemic factors that contribute to unsafe injection practices, particularly within informal and underserved healthcare settings. The review also examines the public health consequences of syringe reuse, with a focus on the transmission of bloodborne infections such as Hepatitis B, Hepatitis C, and HIV. Additionally, it evaluates the range and effectiveness of existing policies, programs, and interventions implemented to promote injection safety in the country. Finally, the review identifies critical research and policy gaps that must be addressed to strengthen public health responses and prevent further harm.

MATERIALS AND METHODS

Eligibility criteria

- **Inclusion:** Studies conducted in Pakistan; English or translatable Urdu language; research focused on injection practices, infection transmission, healthcare provider behavior, or policy evaluation
- **Exclusion:** Lab-based experiments, non-human studies, non-Pakistan contexts, studies without a focus on syringe reuse

Databases searched

- PubMed
- Scopus
- Google Scholar
- PakMediNet
- WHO IRIS

Search terms: Search combinations included: *"syringe reuse"*, *"unsafe injection"*, *"Pakistan"*, *"Hepatitis C"*, *"HIV transmission"*, *"healthcare-associated infections"*, *"public health policy"*

Screening and data extraction: Titles and abstracts were independently screened by two reviewers. Full texts were evaluated using the inclusion criteria. A third reviewer resolved disagreements. Extracted data included study year, location, methodology, sample size, reuse prevalence, health outcomes, and policy discussion.

Quality assessment: The JBI checklist for observational studies and STROBE guidelines were used to evaluate study rigor. PRISMA flow diagram summarizes study selection.

RESULTS

Study selection: A total of 438 records were initially retrieved from PubMed, Google Scholar, PakMediNet, and WHO IRIS databases. After removing duplicates and screening titles and abstracts, 87 articles were selected for full-text review. Of these, 20 studies met the inclusion criteria and were included in the final synthesis. Table 1 shows the Characteristics of Syringe Reuse and Unsafe Injection Practices in Pakistan.

Characteristics of included studies: The included studies comprised a mix of cross-sectional surveys, observational reports, and qualitative investigations conducted across various provinces of Pakistan, including Punjab, Sindh, Khyber Pakhtunkhwa, and to a lesser extent, Baluchistan. Sample sizes varied from 120 to over 5,000 participants, encompassing healthcare workers, patients, informal care providers, and community members.

Prevalence and patterns of syringe reuse: Syringe reuse was reported with considerable variability across different settings. The prevalence ranged from 17% to 67%, with higher rates observed in informal healthcare clinics, rural areas, and among unlicensed practitioners. Reuse was less frequent but still present in certain public-sector hospitals due to supply constraints or improper disposal practices.

Several studies highlighted that syringes were often reused without sterilization, particularly for intramuscular and intravenous injections. Some reports also noted the practice of refilling single-use disposable syringes in mass immunization campaigns in underserved areas.

Contributing factors to unsafe injection practices: Analysis of included studies identified several recurring factors responsible for syringe reuse:

- **Regulatory gaps:** Weak enforcement of safety guidelines by the Drug Regulatory Authority of Pakistan (DRAP) allowed reuse to persist in both licensed and unlicensed settings
- **Economic constraints:** High cost of medical supplies and limited funding in public health centers encouraged cost-saving through reuse
- **Lack of awareness:** Both patients and healthcare workers demonstrated poor understanding of the health risks associated with reused syringes
- **Informal sector influence:** A large proportion of care in rural areas was provided by informal or unregistered practitioners, many of whom engaged in unsafe practices due to a lack of training or regulation

Health outcomes associated with syringe reuse: The health consequences of syringe reuse were consistently reported across studies. Several studies directly linked unsafe injection practices with community-level outbreaks of bloodborne infections. Notably:

- **Hepatitis C:** Multiple studies in southern Punjab and Sindh reported reuse-related transmission contributing to up to 30-40% of Hepatitis C cases
- **HIV:** Significant outbreaks in Larkana (2019) and Sargodha (2021) were traced to contaminated syringes used by informal care providers
- **Hepatitis B:** Transmission was reported in neonatal and immunization settings where syringe reuse occurred, although less frequently than Hepatitis C

Table 1: Characteristics of 7 selected references on syringe reuse and unsafe injection practices in Pakistan

First author (Ref)	Study focus/topic	Study type	Population/setting
Janjua *et al.*[1]	Public beliefs about injection efficacy in Sindh	Cross-sectional survey	General population, Sindh province
Khan *et al.*[2]	Unsafe injections associated with Hepatitis C and HIV	Observational study	Injection recipients in Sindh province
Asghar *et al.*[5]	Seroprevalence of Hepatitis B and C in rural Sindh	Screening survey	General rural population, Sindh
Khan *et al.*[6]	Determinants of syringe reuse in healthcare settings	Mixed-methods study	Healthcare professionals and facilities
Altaf *et al.*[20]	Community-based intervention for injection safety	Intervention study	Rural communities in Pakistan
Butt and Sharif[8]	Overview of hepatitis burden and injection-related risks	Review article	National population, Pakistan
Al Kanaani *et al.*[19]	Meta-analysis of Hepatitis C and unsafe injection epidemiology	Systematic review/meta	Country-wide analysis, Pakistan

Reported interventions: Several interventions have been introduced at national and provincial levels to address syringe reuse:

- **Legislative measures:** The Government of Pakistan introduced bans on the production and import of glass syringes in 2016 and promoted the use of auto-disable syringes in immunization programs
- **Awareness campaigns:** WHO and local health NGOs launched community campaigns focusing on safe injection practices through mass media and health outreach workers
- **Training programs:** Sporadic training workshops were reported for healthcare providers in certain districts, but national coverage remains low

Gaps in data and response: Despite numerous reports highlighting the severity of syringe reuse, several critical gaps persist:

- **Monitoring and surveillance:** There is no national-level surveillance system for injection safety or syringe auditing, particularly in the private and informal sectors
- **Underrepresented regions:** Limited data is available from Baluchistan, Gilgit-Baltistan, and tribal areas, which remain underserved in research and intervention efforts
- **Sustainability:** Most public health campaigns are donor-funded and lack sustainability once funding ends, leading to inconsistent follow-through
- **Policy enforcement:** Despite existing legislation, weak on-ground enforcement mechanisms limit the impact of regulatory policies

DISCUSSION

This systematic review reveals that syringe reuse is a widespread and persistent issue in Pakistan, with reported prevalence rates ranging from 17 to 67%, particularly in informal healthcare environments and under-resourced areas. These findings confirm that syringe reuse is not an isolated occurrence but a systemic public health failure. It is deeply rooted in a combination of factors including inadequate regulation, economic limitations, limited healthcare provider training, and poor public awareness. Most alarmingly, this unsafe practice continues to contribute significantly to the transmission of serious bloodborne infections, particularly Hepatitis B, Hepatitis C, and HIV[5-9].

When compared with other low- and middle-income countries (LMICs), Pakistan's situation appears more severe. Although syringe reuse has been documented in nations such as India, Bangladesh, and Nigeria, those countries have made progress through stricter regulations, nationwide awareness programs, and integration of auto-disable syringes into public health systems. In contrast, Pakistan's enforcement of syringe safety laws remains inconsistent, and its monitoring mechanisms are either weak or non-existent. The informal healthcare sector in Pakistan—which operates in parallel to the formal system—is especially problematic. These unlicensed practitioners, often the only accessible option for people in rural and underserved communities, frequently reuse disposable syringes to reduce costs or due to limited supply, thereby placing patients at direct risk of infection[10-14].

The role of poverty and illiteracy is critical in sustaining this dangerous practice. Many patients request injections, believing they are more effective than oral medications, and they trust informal providers due to familiarity or affordability. In such contexts, awareness about the risks associated with syringe reuse remains low[15-17]. Without structured community education, behavior change remains unlikely. Moreover, these practices persist due to institutional shortcomings. Surveillance systems for tracking injection safety are fragmented and insufficient. National policies prohibiting reuse or promoting auto-disable syringes have not been uniformly implemented, and enforcement in the private and informal sectors is virtually absent. Additionally, training programs for healthcare workers on injection safety are limited in reach and not consistently integrated into healthcare curricula, especially in peripheral areas[18-20].

The implications of syringe reuse for long-term public health are significant. Not only does it drive the transmission of chronic diseases like Hepatitis C, but it also undermines the credibility of the healthcare system and increases the financial burden on the state. Repeated outbreaks linked to unsafe injections can erode public confidence in routine immunization and disease prevention programs. Therefore, the elimination of syringe reuse is not just a technical issue—it is a foundational requirement for achieving broader national health targets, including the elimination of hepatitis and HIV and the advancement of universal healthcare access[13-19].

This review offers several strengths, including its wide coverage of data sources and its adherence to PRISMA guidelines, which allowed a systematic assessment of the literature. It also provides a comprehensive understanding of both the epidemiological burden and the policy landscape surrounding syringe reuse in Pakistan. However, it is not without limitations. Data from regions such as Baluchistan and Gilgit-Baltistan remain sparse, which limits generalizability. Furthermore, while the review includes qualitative and grey literature to enhance context, such sources may lack rigorous peer review and introduce bias. The absence of randomized trials or large-scale intervention assessments also limits the ability to evaluate the effectiveness of current policy measures.

This discussion reinforces the urgent need for coordinated national action against syringe reuse in Pakistan. Without strong enforcement, public education, and a shift in both provider behavior and patient expectations, the cycle of unsafe injections and their devastating consequences will continue. To effectively eliminate the practice of syringe reuse in Pakistan, a comprehensive and multi-tiered strategy is essential. At the policy level, the government must enforce a nationwide ban on all forms of syringe reuse and mandate the use of auto-disable syringes in both public and private healthcare sectors. This should be supported by routine audits and strict penalties for facilities found non-compliant with injection safety standards. Public education is equally critical; mass media campaigns should be launched to raise awareness about the risks associated with reused syringes, while community-based programs using local languages and trained health workers can ensure outreach in rural and underserved regions. Furthermore, integrating safe injection practices into school curricula will promote early behavioral change. Healthcare provider training must also be prioritized through the implementation of regular workshops and continuous medical education programs. Certification for both public and private providers should be made contingent on compliance with safe injection protocols. Lastly, surveillance and research efforts must be strengthened by establishing provincial-level surveillance units capable of tracking injection practices systematically. Academic-public partnerships should be encouraged to generate region-specific epidemiological data that can inform targeted interventions and policy refinement. Together, these actions form a coordinated framework to reduce infection transmission risks and enhance injection safety nationwide.

CONCLUSION

Syringe reuse remains a pervasive and preventable public health threat in Pakistan. It is responsible for fueling bloodborne infections, including Hepatitis B, C, and HIV, affecting millions and overwhelming the country's fragile healthcare system. While multiple interventions have been launched, their limited implementation and weak oversight mechanisms have failed to curb unsafe injection practices effectively. The review emphasizes the need for strict regulatory enforcement, community awareness, and healthcare worker training. Without systemic changes and grassroots mobilization, the cycle of infection through syringe reuse will persist.

SIGNIFICANCE STATEMENT

This systematic review addresses a critical gap in public health literature by synthesizing current evidence on syringe reuse practices in Pakistan, a major driver of bloodborne disease transmission in the region. By examining the prevalence, contributing factors, and public health consequences of unsafe injections, this review offers actionable insights for policymakers, healthcare providers, and public health practitioners. The findings underscore the urgent need for regulatory reform, education, and surveillance to mitigate infection risks and improve healthcare safety nationwide.

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