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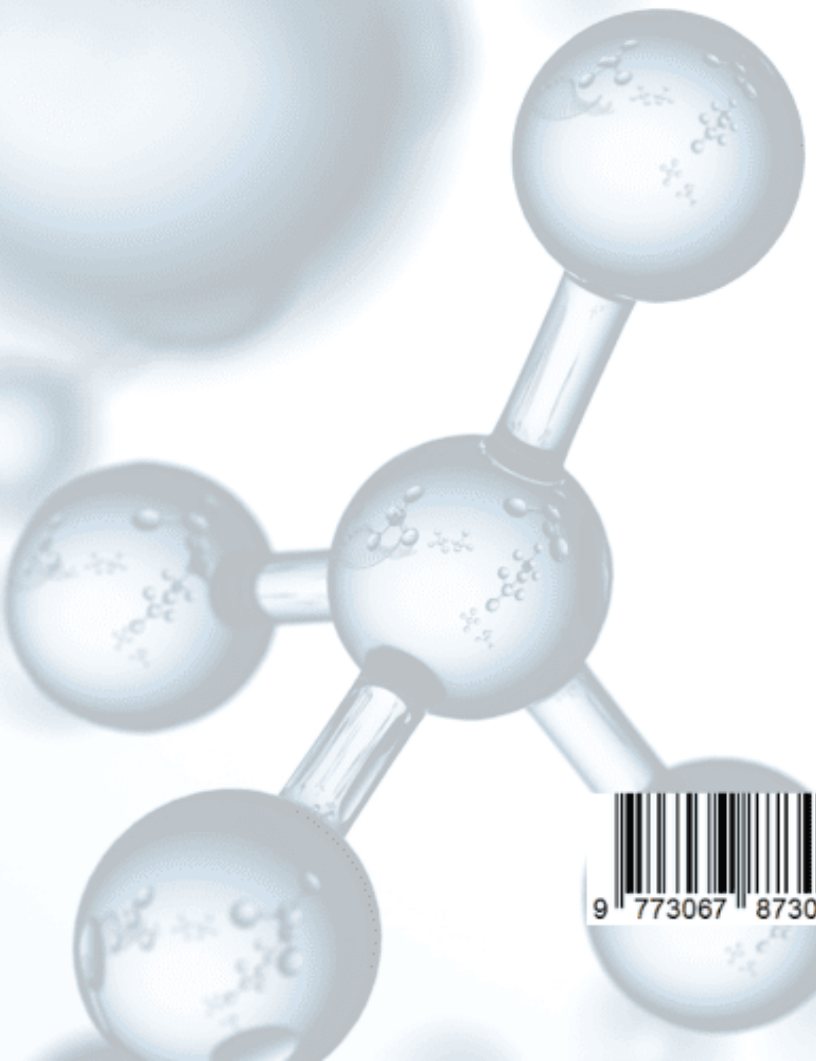

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Original Article

Improving Adherence to Venous Thromboembolism Prophylaxis Guidelines in Medical Inpatients: A Single-center, Prospective, Closed-loop Clinical Audit in a Medical Department

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ABSTRACT

Background: Venous thromboembolism (VTE) is a major cause of preventable morbidity and mortality in hospitalized patients. Evidence-based guidelines recommend systematic risk assessment and appropriate prophylaxis; however, adherence in routine clinical practice remains inconsistent.
Methods: A prospective, closed-loop clinical audit was conducted in the Department of Medicine at Khyber Teaching Hospital. Adherence to the National Institute for Health and Care Excellence guideline NG89 for VTE prevention was evaluated through a baseline point-prevalence audit of 237 adult medical inpatients. This was followed by a targeted educational intervention consisting of structured teaching sessions for interns and residents. A re-audit of 237 patients using identical inclusion criteria and data collection methods was conducted four weeks after the intervention.
Results: Baseline adherence to NICE NG89 recommendations was 54% (128/237). Following the educational intervention, adherence increased to 89% (211/237), representing an absolute improvement of 35 percentage points.
Conclusion: A focused educational intervention was associated with improved adherence to NICE NG89 VTE prophylaxis recommendations during the re-audit period. These findings suggest that structured educational strategies may improve guideline-based practice in resource-limited settings. However, the short follow-up period and pre–post design without a control group introduced the possibility of Hawthorne and secular effects, and longer-term sustainability was not assessed.

1. Introduction

Venous thromboembolism (VTE), encompassing deep vein thrombosis and pulmonary embolism, is a leading cause of preventable morbidity and mortality among hospitalized patients [1]. Hospital-acquired VTE contributes substantially to the healthcare burden worldwide and is associated with prolonged hospital stay, increased treatment costs, and significant mortality [2–4]. Medical inpatients are particularly vulnerable due to factors such as reduced mobility, acute inflammatory illness, infection, heart failure, and multiple comorbidities [5].

The National Institute for Health and Care Excellence (NICE) guideline NG89 provides evidence-based recommendations for preventing hospital-acquired VTE in adults. The guideline recommends that all patients aged 16 years and older admitted to hospital should undergo documented VTE risk assessment, followed by appropriate pharmacological or mechanical prophylaxis where indicated, unless contraindications are present [6]. Despite the availability of such guidelines, studies from multiple healthcare systems have demonstrated persistent gaps between recommended practice and real-world clinical implementation [7–9].

In many low- and middle-income healthcare settings, several structural barriers may limit consistent implementation of guidelines. These include reliance on paper-based documentation systems, absence of electronic clinical decision support tools, heavy clinical workloads, and variable awareness of guideline-based risk assessment among junior physicians responsible for admission documentation [10–12]. In our institution, prescribing decisions regarding VTE prophylaxis were primarily dependent on individual clinician judgment, with no standardized risk-assessment checklist or routine audit mechanism in place.

Quality improvement methodologies, including closed-loop clinical audit and targeted educational interventions, have been increasingly utilized to bridge this implementation gap. However, most published interventions rely on electronic decision support systems or complex institutional policies, which may not be feasible in resource-limited settings. Therefore, this study aimed to evaluate whether a simple, education-based quality improvement intervention could improve adherence to NICE NG89 VTE prophylaxis recommendations among medical inpatients at a tertiary care hospital.

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2. Methods

This study was designed as a prospective, closed-loop clinical audit, reported in accordance with SQUIRE 2.0 guidelines [13]. The project consisted of a baseline audit of current practice, implementation of a targeted educational intervention, and a re-audit using the same methodology to assess changes in adherence.

2.1. Setting

The project was conducted in the Department of Medicine at Khyber Teaching Hospital, a tertiary-care teaching hospital that provides inpatient medical services for a large regional population. The Medicine and Allied Departments admit more than 150,000 patients on an annual basis [14].

2.2. Study Population and Sampling

Data were collected using a point-prevalence sampling approach. All adult medical inpatients present in the medical wards at the time of each audit cycle were eligible for inclusion. Patients aged under 18 years were excluded. Each patient was counted once per audit cycle, and repeat admissions were not counted multiple times within the same audit period.

Both the baseline audit and the re-audit included 237 inpatients, ensuring comparable sample sizes between the two assessment periods.

2.3. Standard of Care

Adherence was assessed according to recommendations from NICE guideline NG89 (2018), which requires:

- Documented VTE risk assessment for all hospitalized adults
- Appropriate pharmacological or mechanical prophylaxis for patients identified as at risk
- Documentation of contraindications to pharmacological prophylaxis when present

Appropriate prophylaxis was implemented in accordance with the NICE guideline NG89 recommendations. Pharmacological prophylaxis was considered appropriate if eligible at-risk patients received low-molecular-weight heparin (LMWH), specifically enoxaparin 40 mg subcutaneously once daily, initiated within 24 hours of admission. Dose adjustment to 20 mg once daily was considered appropriate in patients with significant renal impairment (estimated glomerular filtration rate <30 mL/min/1.73 m^2). Unfractionated heparin (5000 units subcutaneously two or three times daily) was accepted as an alternative where LMWH was contraindicated or unavailable.

Mechanical prophylaxis was considered appropriate in patients with contraindications to pharmacological prophylaxis and included the use of graduated compression stockings or intermittent pneumatic compression devices where available.

Withholding pharmacological prophylaxis was considered appropriate if a valid contraindication was documented, including active bleeding, severe thrombocytopenia, recent hemorrhagic stroke, or clinically significant coagulopathy.

Timing was defined as initiation of prophylaxis within 24 hours of hospital admission.

In patients assessed as low risk for VTE according to NICE NG89, omission of prophylaxis was considered appropriate provided that risk assessment was documented.

Due to limitations in documentation and resource availability, weight-based dose adjustments and obesity-specific dosing were not consistently assessable and were therefore not included in adherence classification.

2.4. Data Collection

Data were collected for the entire month of January, 2026, through a retrospective review of patient medical records using a standardized paper-based audit pro forma developed for this quality improvement project. The proforma was designed to align with NICE NG89 recommendations and was piloted on a small sample of records to ensure clarity and consistency.

The audit tool captured:

- Patient demographics (age, sex, ward)
- Documentation of VTE risk assessment within 24 hours of admission
- Presence of recognized VTE risk factors (e.g., reduced mobility, active infection, heart failure, malignancy, prior VTE)
- Presence of contraindications to pharmacological prophylaxis
- Type of prophylaxis prescribed (pharmacological, mechanical, or none)
- Timing of prophylaxis initiation relative to admission

Data were abstracted from medical records by members of the quality improvement team who were not involved in delivering the educational intervention. Although the same abstraction methodology was used in both audit cycles, blinding of abstractors to cycle status was not feasible in this quality improvement setting. Data abstraction was performed using a standardized, pre-piloted VTE prophylaxis audit proforma accompanied by a predefined data dictionary to ensure consistent interpretation of all variables. All data collectors were members of the quality improvement team (medical residents) and underwent a brief training session prior to data collection, during which the audit tool, NICE NG89 criteria, and adherence definitions were reviewed using sample case scenarios. To enhance consistency, an initial subset of patient records (approximately 10%) was independently reviewed by two abstractors, and discrepancies were discussed and resolved by consensus, resulting in minor clarifications to the data dictionary. Following this calibration step, the remaining records were abstracted by single reviewers. Formal inter-rater reliability statistics were not calculated, which is acknowledged as a limitation.

2.5. Outcome Definition

The primary outcome measure was guideline-adherent VTE prophylaxis management. Patients were classified as adherent if one of the following conditions was met:

1. Appropriate pharmacological prophylaxis was prescribed for patients assessed as being at risk for VTE.
2. Pharmacological prophylaxis was withheld with documented contraindication.
3. No prophylaxis was prescribed for patients appropriately assessed as low risk.

2.6. Intervention

Following the baseline audit, a targeted educational intervention was implemented in February 2026. The intervention consisted of three educational sessions, each lasting approximately one hour, delivered to interns and resident physicians responsible for admission documentation and prescribing decisions.

The sessions included:

- Overview of hospital-acquired VTE and its clinical impact
- Explanation of NICE NG89 recommendations
- Practical instruction on VTE risk assessment
- Case-based discussions illustrating appropriate prophylaxis decisions
- Emphasis on accurate documentation of risk assessment and contraindications

Printed summaries of the guideline were also distributed to clinical teams to facilitate reference during routine clinical practice. The educational sessions were delivered by senior members of the quality improvement team, including senior medical residents with experience in VTE prophylaxis and guideline implementation. A total of three one-hour interactive sessions were conducted over two weeks, aligned with the department's routine teaching schedule to maximize attendance. The sessions targeted interns and residents, who are the primary prescribers in the medical wards. Attendance was recorded informally, and it was estimated that approximately 70 – 80% of interns and residents rotating through the department during the study period attended at least one session. Educational materials, including simplified NICE NG89 summaries, were also shared in print and via ward-based communication channels to reinforce learning among those unable to attend.

2.7. Re-audit

Following completion of the educational intervention, a re-audit was conducted using the same point-prevalence sampling method, inclusion criteria, and data collection tools as the baseline audit towards the end of February 2026. Following review of re-audit findings, the educational materials were retained for ongoing use and informal reinforcement within the department; however, no additional structured intervention cycle was implemented during the study period.

2.8. Data Analysis

Results were analyzed descriptively. Adherence proportions were calculated for both audit cycles, and 95% confidence intervals were estimated for key proportions to provide additional context for the observed changes.

3. Results

Baseline and re-audit patient characteristics were broadly comparable across key demographic and clinical variables, as shown in **(Table 1)**. There were no major differences in age distribution, sex, ward allocation, or prevalence of common VTE risk factors, suggesting that the observed improvement in adherence was unlikely to be explained by differences in case mix between the two audit periods.

3.1. Baseline Audit

A total of 237 adult medical inpatients were included in the baseline audit. Of these, 128 patients (54%; 95% CI: 48 – 60%) met NICE NG89 criteria for guideline-adherent VTE prophylaxis management. The remaining 109 patients (46%) were classified as non-adherent due to the absence of documented risk assessment, failure to prescribe indicated prophylaxis, or incomplete documentation of contraindications, as shown in **(Table 2)**

3.2. Post-Intervention Re-audit

Following the educational intervention, a re-audit was conducted, including 237 adult medical inpatients. Of these, 211 patients (89%; 95% CI: 85 – 93%) met the criteria for guideline-adherent VTE prophylaxis management. Non-adherence was observed in 26 patients (11%) as shown in **(Table 3)**.

Table 1: Baseline and Re-audit patient characteristics

Characteristic	Baseline Audit (n=237)	Re-audit (n=237)
Mean age (years)	56.8 ± 17.2	55.9 ± 16.8
Male sex, n (%)	134 (56.5%)	129 (54.4%)
Female sex, n (%)	103 (43.5%)	108 (45.6%)
General medical wards, n (%)	237 (100%)	237 (100%)
Reduced mobility, n (%)	148 (62.4%)	152 (64.1%)
Active infection/inflammation, n (%)	121 (51.1%)	118 (49.8%)
Heart or respiratory failure, n (%)	72 (30.4%)	69 (29.1%)
Malignancy, n (%)	38 (16.0%)	41 (17.3%)
Previous VTE, n (%)	19 (8.0%)	17 (7.2%)

VTE, venous thromboembolism.

Table 2: Baseline Audit Results

Measure	Number (%)
Guideline-adherent management	128 (54%)
Non-adherent management	109 (46%)

n, number.

Table 3: Re-audit Results

Measure	Number (%)
Guideline-adherent management	211 (89%)
Non-adherent management	26 (11%)

n, number.

Overall, adherence improved from 54% to 89%, representing an absolute increase of 35 percentage points as shown in **(Figure 1)**.

To better understand the drivers of improvement, the composite adherence outcome was disaggregated into its key components **(Table 4)**. Documentation of VTE risk assessment improved substantially from 59.9% at baseline to 92.0% on re-audit. Similarly, appropriate prescribing of prophylaxis in eligible patients increased from 55.3% to 86.5%. Documentation of contraindications and correct identification of low-risk patients also showed marked improvement. These findings suggest that the observed increase in overall adherence was driven by improvements across multiple steps in the clinical decision-making and documentation process rather than a single component.

4. Discussion

This quality improvement project demonstrated a substantial increase in adherence to NICE NG89 VTE prophylaxis recommendations following a targeted educational intervention. The observed improvement from 54% to 89% suggests that relatively simple educational

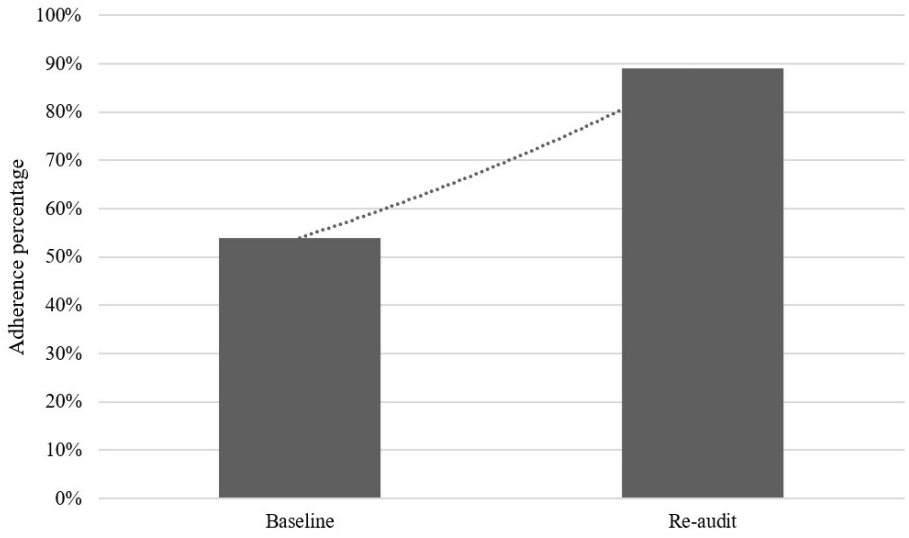

Figure 1: Comparison of baseline and post-intervention adherence to NICE NG89 venous thromboembolism prophylaxis recommendations among medical inpatients.

Table 4: Components of VTE Prophylaxis Guideline Adherence Before and After Intervention

Component	Baseline (n=237)	Re-audit (n=237)
VTE risk assessment documented	142 (59.9%)	218 (92.0%)
Appropriate prophylaxis prescribed (when indicated)	131 (55.3%)	205 (86.5%)
Contraindications appropriately documented	36/58 (62.1%)	49/54 (90.7%)
Low-risk patients were not given prophylaxis	21/37 (56.8%)	30/34 (88.2%)

VTE, venous thromboembolism; n, number.

strategies may influence clinician behavior and documentation practices within a short time frame.

Similar initiatives have reported improvements in VTE prophylaxis adherence following educational, audit-feedback, or informatics-based interventions [7–9]. However, many previously reported programs relied heavily on electronic decision-support systems and automated alerts embedded within electronic health records. Such infrastructure may not be available in many healthcare institutions in low- and middle-income countries. Our findings suggest that even in the absence of advanced informatics tools, education-focused interventions can lead to meaningful improvements in adherence to guideline-based practice.

The feasibility and scalability of this intervention should also be considered in the context of resource limitations typical of similar healthcare settings. In addition to reliance on paper-based documentation, the implementation of guideline-adherent VTE prophylaxis may be influenced by the availability and consistent supply of pharmacological agents, such as low-molecular-weight heparin, as well as access to mechanical prophylaxis devices, including graduated compression stockings or intermittent pneumatic compression devices. Workflow-related factors, such as high patient turnover, time constraints during admission clerking, and variability in clinical staffing, may further impact the consistent application of risk assessment and prescribing practices. While the educational intervention used in this study was low-cost and easily implementable within existing teaching structures, its scalability beyond a single department may require integration with institutional policies, periodic reinforcement, and alignment with pharmacy and nursing workflows to ensure sustained adherence.

Nevertheless, several alternative explanations for the observed improvement should be considered. The presence of an ongoing audit process may have introduced a Hawthorne effect, whereby clinicians modified their behavior due to awareness of being observed. Additionally, changes in staffing patterns or clinical rotations during the study period could have contributed to variation in prescribing behavior. Because the study design did not include a control group, these factors cannot be excluded.

This study is subject to potential ascertainment bias because blinding of data abstractors was not feasible, and although the audit team was separate from those delivering the educational sessions, awareness of the intervention period may still have influenced outcome classification. Another important consideration is that the study assessed process measures rather than patient outcomes. Although improved guideline adherence is generally associated with better patient safety, this project did not measure the incidence of hospital-acquired VTE, bleeding complications, or inappropriate prophylaxis in low-risk patients. This study did not include formal balancing measures, such as rates of bleeding complications, inappropriate prophylaxis in low-risk patients, or missed contraindications. As a result, while adherence to guideline-recommended prophylaxis improved, the potential for unintended consequences, such as overtreatment or harm, could not be evaluated. Future studies should incorporate balancing and patient outcome measures to ensure that improvements in process metrics do not adversely affect patient safety.

Despite these limitations, the study provides useful insights into practical strategies to improve guideline adherence in resource-limited settings. Educational interventions targeting junior clinicians

responsible for admission documentation may represent an accessible first step toward improving implementation of evidence-based VTE prevention strategies.

5. Conclusion

This single-center quality improvement project demonstrated that a targeted educational intervention was associated with improved adherence to NICE NG89 VTE prophylaxis recommendations during the re-audit period in a medical department. While these findings suggest that education-based strategies may improve guideline implementation in resource-limited settings, further quality improvement cycles and longer-term monitoring are required to evaluate sustainability and potential effects on patient outcomes.

Conflicts of Interest

The authors declare that they have no conflicts of interest relevant to this study.

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Ethical approval

This project was conducted as a quality improvement audit to evaluate and improve adherence to established clinical guidelines within the Department of Medicine at Khyber Teaching Hospital. This study was reviewed and approved at the departmental level in accordance with local institutional quality improvement governance procedures. As the project involved retrospective review of anonymized patient records and no direct patient contact or intervention, formal Institutional Review Board approval was not required. All data were handled in a de-identified format, and no patient-identifiable information was collected, stored, or used during data abstraction or analysis. Confidentiality was maintained throughout the study by restricting data access to members of the quality improvement team only.

Large Language Model

The authors used a large language model (ChatGPT, OpenAI) to assist with language editing and manuscript organization. All scientific content, data interpretation, and final manuscript revisions were reviewed and approved by the authors.

Authors' Contributions

Conceptualization MS, methodology MS and SK, data collection SS, FA, MS, MA K and SK, data analysis MS, writing original draft preparation MS and SK, writing review and editing all authors. All authors have read and approved the final manuscript.

Data Availability

The data supporting the findings of this quality improvement audit were derived from de-identified patient record abstractions collected at Khyber Teaching Hospital. Because these data originate from local institutional clinical records and were used under institutional quality improvement governance, they are not publicly available. De-identified summary data may be made available from the corresponding author on reasonable request, subject to institutional approval and applicable confidentiality requirements.

References

1. Alfehaid L, Alsuhebany N, Tawfik YMK, Alowais SA, Adnan S, Alfriah J, et al. A comprehensive review of venous thromboembolism risk assessment models for hospitalized medical patients: comparative evidence, implementation challenges, and future directions. Front Cardiovasc Med. 2025;12:1738139. [PMID: 41602342, PMCID: PMC12833051, https://doi.org/10.3389/fcvm.2025.1738139].
2. Nana M, Shute C, Williams R, Kokwaro F, Riddick K, Lane H. Multidisciplinary, patient-centred approach to improving compliance with venous thromboembolism (VTE) prophylaxis in a district general hospital. BMJ Open Qual. 2020;9(3). [PMID: 32718914, PMCID: PMC7371024, https://doi.org/10.1136/bmjoq-2019-000680].
3. Narayan SW, Gad F, Chong J, Chen VM, Patanwala AE. Preventability of venous thromboembolism in hospitalised patients. Intern Med J. 2023;53(4):577-83. [PMID: 34719859, https://doi.org/10.1111/imj.15600].
4. Yamamoto Y, Ogawa M, Okamoto T, Tsuboi M, Momosaki R. Acute-Phase Interventions and Clinical Implementation Challenges for Hospital-Associated Sarcopenia: A Narrative Review of a Multifaceted Approach to a Preventable Condition. Geriatr Gerontol Int. 2026;26(1):e70330. [PMID: 41566894, PMCID: PMC12824560, https://doi.org/10.1111/ggi.70330].
5. Smythe MA, Koerber JM, Roberts A, Hoffman JL, Batke J. Hospital Acquired Venous Thromboembolism: A Preventability Assessment. Hosp Pharm. 2024;59(2):183-7. [PMID: 38450351, PMCID: PMC10913888, https://doi.org/10.1177/00185787231198164].
6. National Institute for Health and Care Excellence. Venous thromboembolism in over 16s: Reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism | guidance | NICE; 2018. NICE: NICE; Available from: https://www.nice.org.uk/guidance/NG89.
7. Abdujawad AW, Al Raizah A, Al Saleh AS, Al Zahrani M, Hejazi A, Alotaibi S, et al. A quality improvement project to optimize VTE prophylaxis in surgical patients. Blood. 2025;146(Supplement 1):2617-7. [https://doi.org/10.1182/blood-2025-2617].
8. Abuzied Y, Deeb A, AlAnizy L, Al-Amer R, AlSheef M. Improving Venous Thromboembolism Prophylaxis Through Service Integration, Policy Enhancement, and Health Informatics. Glob J Qual Saf Healthc. 2024;7(1):22-7. [PMID: 38406656, PMCID: PMC10887485, https://doi.org/10.36401/JQSH-23-16].
9. Taha H, Govindraj E, Jaber F, Shehadeh G, Kelly B, Krishnan S, et al. Improving venous thromboembolism prophylaxis through critical thinking and health informatics. BMJ Open Qual. 2020;9(2). [PMID: 32487571, PMCID: PMC7269548, https://doi.org/10.1136/bmjoq-2019-000885].
10. Ghobadi M, Behzadi A, Sabermahani A. The Outcomes, Barriers, and Facilitators of Implementing Clinical Practice Guidelines in Iran: A Comprehensive Review. Iran J Public Health. 2024;53(2):323-34. [PMID: 38894831, PMCID: PMC11182465, https://doi.org/10.18502/ijph.v53i2.14917].
11. Odhus CO, Kapanga RR, Oele E. Barriers to and enablers of quality improvement in primary health care in low- and middle-income countries: A systematic review. PLOS Glob Public Health. 2024;4(1):e0002756. [PMID: 38236832, PMCID: PMC10796071, https://doi.org/10.1371/journal.pgph.0002756].
12. Stokes T, Shaw EJ, Camosso-Stefinovic J, Imamura M, Kanguru L, Hussein J. Barriers and enablers to guideline implementation strategies to improve obstetric care practice in low- and middle-income countries: a systematic review of qualitative evidence. Implement Sci. 2016;11(1):144. [PMID: 27770807, PMCID: PMC5075167, https://doi.org/10.1186/s13012-016-0508-1].

13. Ogrinc G, Davies L, Goodman D, Batalden P, Davidoff F, Stevens D. SQUIRE 2.0 (Standards for QUality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. BMJ Qual Saf. 2016;25(12):986-92. [PMID: 26369893, PMCID: PMC5256233, https://doi.org/10.1136/bmjqs-2015-004411].
14. Haroon MZ, Thaver IH. An assessment of existing surge capacity of tertiary healthcare system of Khyber Pakhtunkhwa Province of Pakistan using workload indicators for staffing need method. Hum Resour Health. 2022;19(Suppl 1):120. [PMID: 35090470, PMCID: PMC8796324, https://doi.org/10.1186/s12960-021-00663-3].

ASIDE Health Sciences

Review Article

Telehealth and In-Person Mental Health Care for Underserved Populations: A Narrative Scoping Synthesis

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ABSTRACT

Background: Mental health disparities disproportionately affect rural, low-income, and racially marginalized communities. Telehealth has emerged as a potentially important modality for expanding access to mental health care, yet comparative evidence on its clinical effectiveness, engagement outcomes, and equity implications relative to in-person care remains limited and heterogeneous.
Methods: A narrative scoping synthesis was conducted following PRISMA 2020 guidelines. PubMed and Scopus were searched through December 2024 using predefined keywords. The evidence base comprised primary comparative studies, systematic reviews, a rapid review, and a qualitative scoping review. Only English-language publications were eligible, introducing potential selection bias. Single-reviewer screening and extraction were performed, no protocol was pre-registered, and no formal risk-of-bias assessment was conducted—all acknowledged methodological limitations.
Results: Eight sources meeting inclusion criteria were identified, representing approximately 14,000 participants across diverse underserved settings; several included sources are review-level syntheses and should be interpreted accordingly. Evidence suggests broadly comparable clinical outcomes between telehealth and in-person care for depression, anxiety, and PTSD in some underserved settings, though findings are context-dependent and methodologically limited. Appointment adherence findings were mixed. Technology access, language barriers, and provider cultural competency gaps were consistently identified as equity-relevant concerns.
Conclusions: Available evidence suggests telehealth may offer broadly comparable outcomes to in-person mental health care in some underserved settings, though this conclusion derives from a heterogeneous, methodologically limited evidence base and should be interpreted with caution. Equity effects remain context-specific and conditional on structural supports. High-quality prospective trials with equity-centered outcome frameworks are needed.

1. Introduction

1.1. Background and Epidemiology

Mental health disorders represent a leading contributor to the global disease burden. According to the Global Burden of Disease Study 2019, mental disorders accounted for 5.1% of all disease burden worldwide. They constituted the leading cause of years lived with disability, responsible for approximately one in six disability-adjusted life years globally [1]. Between 1990 and 2019, the estimated number of people living with a mental disorder increased from approximately 655 million to 970 million, driven substantially by population growth [1]. Despite the scale of this burden, access to mental health services remains deeply inequitable across income levels, geographies, and racial and ethnic groups.

In the United States, national survey data consistently reveal large treatment gaps. According to the 2022 National Survey on Drug Use and Health, among the 59.3 million adults with any mental illness, nearly 50% did not receive mental health treatment in the prior year [2]. Racial and ethnic disparities in treatment receipt are well-documented: Asian, Black, and Hispanic adults with any mental illness were substantially less likely than White or multiracial adults to receive mental health services [2]. These disparities reflect not only differences in help-seeking behavior but also the structural inequities embedded in the distribution and financing of care.

1.2. The Mental Health Workforce Shortage and Geographic Disparities

Geographic maldistribution of mental health professionals compounds these access challenges considerably. Data from the Rural Health Information Hub indicate that approximately 70% of rural counties in the United States have no practicing psychiatrist [3]. As of late 2024, more than 4,200 Mental Health Professional Shortage Areas had been designated in rural areas alone, with an estimated 1,797 additional practitioners required to eliminate those designations [3]. Morales and colleagues characterized this as a compounding crisis, noting that as many as 65% of nonmetropolitan counties lack psychiatrists entirely and that over 60% of rural Americans live in designated mental health provider shortage areas [4]. The consequences are clinically significant: rural communities

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experience higher rates of suicide relative to urban areas, a gap that has widened over time [3].

Low-income urban populations face overlapping barriers of a different character. While specialty providers may be physically closer, cost, insurance status, transportation, inflexible work schedules, and stigma collectively suppress utilization [2]. Racially and ethnically marginalized communities face additional layers of structural inequity, including historical mistrust of medical institutions, limited availability of culturally competent or linguistically concordant providers, and systemic racism embedded within healthcare systems [4].

1.3. Telehealth as a Potential Structural Solution

Telehealth – broadly defined as the delivery of healthcare services using telecommunications technologies, including synchronous video and audio platforms – has rapidly expanded as a potential response to these structural barriers. Use of telehealth for mental health services grew substantially in the years preceding the COVID-19 pandemic and accelerated dramatically from 2020 onward, when regulatory waivers relaxed geographic restrictions and expanded reimbursement [5]. The pandemic created a natural experiment in which the rapid, large-scale adoption of telemental health made comparative effectiveness data available across diverse populations and settings.

Prior systematic reviews have generally found telehealth to be broadly comparable to in-person care for common mental health conditions, including depression and anxiety, in general adult populations [6, 7]. However, these reviews have not consistently focused on underserved, equity-relevant populations, where both the potential benefits and the risks of telehealth implementation differ substantially from those in broader samples. Whether telehealth expands access equitably – or reproduces and deepens existing disparities through a "digital divide" – depends substantially on how it is designed, delivered, and resourced [8].

1.4. Rationale and Aims

The intersection of mental health disparities, workforce shortages, and telehealth expansion presents a critical public health opportunity with significant equity implications. For this review, "underserved" was operationalized a priori to encompass populations characterized by at least one of the following: (1) rural or geographically isolated location with limited proximate mental health services; (2) low-income or Medicaid-enrolled status; (3) racial or ethnic minority identity in the context of documented health services disparities; or (4) limited English proficiency or linguistic minority status. Included sources were required to serve populations meeting at least one of these criteria.

This narrative scoping synthesis aims to review comparative evidence on telehealth versus in-person mental health care in underserved populations, focusing on clinical outcomes, appointment adherence, patient satisfaction, and equity-relevant access barriers. The evidence base includes primary comparative studies and review-level sources, reflecting the current state of the literature. By mapping available evidence on the conditions under which telehealth narrows or widens disparities, this synthesis aims to inform evidence-based clinical practice, policy development, and future research priorities.

2. Methods

2.1. Search Strategy

This review was conducted and reported following the PRISMA 2020 guidelines. The PICO framework was applied as follows: Population: adults from underserved, rural, low-income, or racially and ethnically marginalized populations (as defined in Section 1.4) seeking mental health care; Intervention: telehealth delivery of mental health services (synchronous video or telephone); Comparison: in-person delivery of equivalent mental health services; Outcomes: clinical symptom outcomes, appointment adherence and no-show rates, patient satisfaction, technology access barriers, and equity-relevant engagement metrics.

A comprehensive search of PubMed and Scopus was conducted through December 2024 (final search date: December 31, 2024). The full search strategy for PubMed was: ("telehealth" OR "telepsychiatry" OR "telemedicine" OR "videoconferencing" OR "video teleconference") AND ("mental health" OR "behavioral health" OR "depression" OR "anxiety" OR "PTSD") AND ("underserved" OR "rural" OR "low-income" OR "racial minority" OR "ethnic minority" OR "disparities" OR "health equity" OR "digital divide"). An equivalent strategy using subject headings and field tags was applied in Scopus. Boolean operators and MeSH terms were used where applicable. No supplementary search methods (gray literature, hand searching, expert consultation) were conducted, which is a limitation of this synthesis.

2.2. Eligibility Criteria

Given the mixed nature of the identified evidence base, this review adopted a scoping synthesis approach rather than a restricted primary-study systematic review. Sources were eligible for inclusion if they: (1) reported on or directly compared telehealth with in-person delivery of mental health or behavioral health services; (2) focused on or included populations characterized as underserved per the a priori definition above (rural, low-income, racially or ethnically diverse, or limited English proficiency); (3) reported at least one outcome relevant to clinical effectiveness, appointment adherence, patient satisfaction, or technology-related barriers; and (4) were published in English. Only English-language sources were included; this language restriction may have excluded relevant evidence from non-English-speaking contexts and is acknowledged as a potential source of bias.

This synthesis includes primary comparative studies (retrospective cohort analyses, prospective observational studies, cross-sectional analyses), systematic reviews and meta-analyses, a rapid review, and a qualitative systematic review. Sources were not excluded based solely on design, consistent with a scoping approach; however, review-level sources and primary studies are distinguished throughout the results and should not be interpreted as equivalent evidence. Studies evaluating only asynchronous telehealth without a synchronous comparator, editorials, case reports, or conference abstracts without sufficient original data were excluded.

2.3. Study Selection and Data Extraction

All records identified through database searches were exported for screening. Duplicate records were removed before screening. Titles and abstracts were screened by one reviewer, followed by a full-text review to confirm eligibility. Single-reviewer screening and extraction represent a significant methodological limitation of this synthesis; the absence of independent duplicate screening increases the risk of selection error and subjective inclusion bias. This limitation is acknowledged explicitly, and readers should interpret the evidence base and conclusions with appropriate caution. Data were extracted into a standardized form capturing study design, sample size, population characteristics (geographic setting, income level, racial/ethnic composition), intervention characteristics (modality, condition treated, duration, calendar period of data collection), and outcomes (clinical symptom scores, no-show rates, satisfaction

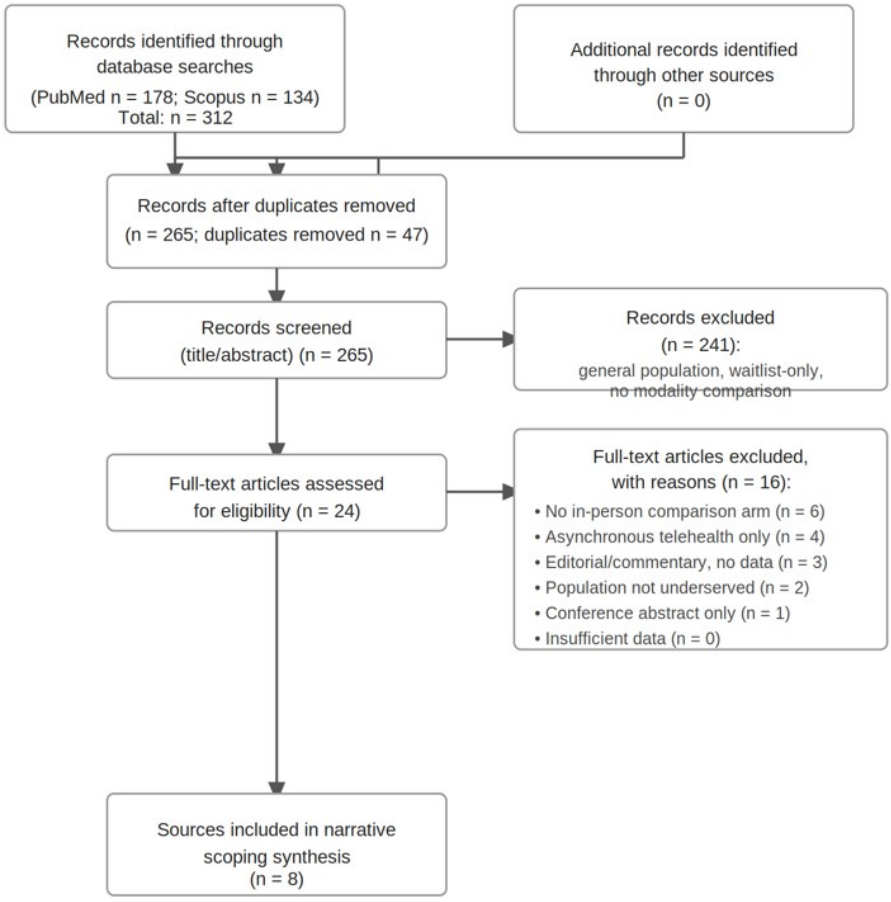

Figure 1: PRISMA 2020 flow diagram illustrating the study selection process for the narrative scoping synthesis on telehealth versus in-person mental health care for underserved populations.
Note: Records identified through database searches, PubMed (n = 178) and Scopus (n = 134), total n = 312; duplicates removed, n = 47; records screened (title/abstract), n = 265; records excluded at screening, n = 241 (general-population comparative trials without equity-relevant sampling; telehealth vs. waitlist only; no discrete modality comparison data); full-text articles assessed for eligibility, n = 24; full-text articles excluded, n = 16 (no direct in-person comparison arm, n = 6; exclusively asynchronous telehealth, n = 4; editorial/commentary without original data, n = 3; populations not meeting underserved definition, n = 2; conference abstract without sufficient data, n = 1); sources included in narrative scoping synthesis, n = 8.

ratings, reported barriers). No review protocol was registered before the conduct of this review; the lack of prospective registration is acknowledged as a limitation and raises the possibility of post hoc outcome framing.

2.4. Quality Appraisal

A formal standardized risk-of-bias assessment was not conducted for the included sources. This represents a significant limitation. Established tools are available for randomized trials (Cochrane RoB 2), observational studies (Newcastle-Ottawa Scale), and review-level evidence (AMSTAR-2); future reviews should apply the appropriate tools. In the absence of a formal appraisal, risks related to selection bias, confounding by indication, differential attrition, and pandemic-era temporal confounding were qualitatively assessed and incorporated into the narrative interpretation. Readers should interpret all comparative claims in this synthesis as low- to uncertain-certainty evidence given the absence of formal quality appraisal.

Given the substantial clinical, methodological, and temporal heterogeneity across included sources – spanning primary studies and review-level evidence, diverse settings, different telehealth modalities, and both pre-pandemic and pandemic-era periods – quantitative meta-analysis was not performed. Results are presented as a structured narrative synthesis, stratified by study design and outcome domain where possible.

2.5. Primary Outcomes

Primary outcomes assessed were: (1) clinical symptom outcomes for depression, anxiety, and PTSD; (2) appointment adherence and no-show rates; (3) patient satisfaction with care; and (4) equity-relevant access barriers, including technology access, digital literacy, and language concordance. These outcomes were selected to reflect both the clinical and structural dimensions most relevant to the question of whether telehealth effectively and equitably expands access to mental health care in underserved populations.

3. Results

3.1. Study Selection

Database searches of PubMed and Scopus through December 31, 2024, identified 312 records (PubMed: 178; Scopus: 134). After removal of 47 duplicates, 265 records underwent title and abstract screening; 241 were excluded as not meeting eligibility criteria (primarily general-population comparative trials without equity-relevant sampling, studies comparing telehealth only to waitlist controls, or studies not reporting discrete comparison data between modalities).

Twenty-four full texts were assessed for eligibility; sixteen were excluded (reasons: six lacked a direct in-person comparison arm, four focused exclusively on asynchronous telehealth, three were editorial or commentary without original data, two evaluated populations not meeting the underserved definition, and one was a conference abstract without sufficient data). Eight sources met all inclusion criteria and are included in this synthesis. A PRISMA flow diagram **(Figure 1)**.

The included evidence base is heterogeneous in design: two retrospective cohort analyses of electronic health records [9, 10], one prospective observational multi-site study [11], one systematic review and meta-analysis [7], one rapid review [6], one retrospective cross-sectional study [12], one retrospective observational study [13], and one qualitative systematic review [8]. Because the evidence base spans primary studies and review-level sources, participant counts cannot be aggregated into a single combined total without risk of double-counting; participants in primary studies alone number in excess of 1.9 million encounters (driven primarily by the large cross-sectional study [12]); the remaining primary studies encompass several thousand additional participants. Review-level sources synthesize additional populations not enumerated separately here. Studies were published between 2019 and 2024; the majority were conducted during or after the COVID-19 pandemic, a temporal factor relevant to the interpretation of the findings (see Sections 2.4 and 4.6).

3.2. Source Characteristics and Populations

Primary comparative studies included: a retrospective cohort analysis of behavioral health clinics in rural Louisiana, where 19% of patients lacked stable housing [9]; a retrospective study of an academic outpatient psychiatry practice examining no-show rates [10]; and a prospective multi-site observational study conducted across 17 partner organizations and 95 rural clinical sites in 13 states [11]. A large retrospective cross-sectional analysis of over 1.9 million outpatient encounters in Illinois during the sustained pandemic period was also included [12], as was a retrospective observational study of telehealth use patterns among low-income racial and ethnic minority populations during the pandemic [13].

Review-level sources included: a systematic review and meta-analysis of randomized controlled trials in mood, anxiety, and PTSD populations, including underserved veterans [7]; a rapid review of behavioral health randomized trials, including combat veterans and Latino primary care patients [6]; and a qualitative systematic review of barriers and facilitators among culturally and linguistically diverse populations from multiple international settings [8].

Populations spanned rural Louisiana with predominantly low-income Medicaid-enrolled patients [9], rural communities across multiple U.S. states [11], veterans with PTSD and depression [6, 7], low-income racial and ethnic minority patients in urban health centers [12, 13], and culturally and linguistically diverse patients across multiple international settings [8]. The geographic scope is predominantly, but not exclusively, United States-based; the qualitative systematic review [8] included international settings, which is noted as a limitation for U.S.-specific generalizability. Mental health conditions addressed included depression, anxiety disorders, PTSD, and mixed or co-occurring conditions. Telehealth modalities included synchronous video teleconferencing and telephone-delivered care. Calendar periods ranged from pre-pandemic settings to pandemic-era settings, to sustained post-pandemic practice, and modality effects should be interpreted in this temporal context. Study-level temporal context is noted in the narrative below where relevant.

3.3. Clinical Outcomes: Direct Comparative Evidence

Note: Clinical outcome findings below derive from the primary comparative studies and review-level syntheses, which are distinguished throughout. Review-level findings represent aggregated evidence from multiple studies and are not equivalent to primary comparative data.

3.3.1. Depression and Anxiety

Primary comparative evidence: The multi-site telebehavioral health study by McCord and colleagues [11], conducted across 95 rural clinical sites during the pandemic period, found no clinically significant difference (defined as a 5-point or greater difference on standardized scales) in depression or anxiety symptom reductions between telehealth and in-person groups, with both achieving an average reduction of approximately 3 points on standardized symptom measures. Bulkes and colleagues [5] similarly found equivalent outcomes for depressive symptoms and quality of life between matched cohorts receiving telehealth and in-person treatment within an intensive behavioral health system.

Review-level evidence: The meta-analysis by Shaker and colleagues [7], which synthesized 20 randomized trials (7,414 identified records), found treatment efficacy for telehealth and in-person care to be statistically comparable across depressive and anxiety disorders, with working alliance scores also not significantly different between modalities. The VA rapid review [6] similarly found that most included studies across PTSD, depression, and anxiety-related disorders identified no significant differences between telehealth and in-person delivery in symptom severity at follow-up. These review-level findings reflect aggregated evidence and are not primary comparative data from underserved populations specifically.

3.3.2. PTSD

Review-level evidence: The VA rapid review [6] summarized that PTSD symptom severity appeared similar after in-home video teleconference and clinic-based in-person delivery of individual psychotherapy, characterized as low-strength evidence due to study heterogeneity. One meta-analysis [14] – identified as a reference cited in included reviews but not itself one of the eight included sources – reported a small but statistically significant advantage for telehealth in PTSD symptom reduction (SMD = -0.21, 95% CI [-0.37, -0.05]) in a pooled analysis of six randomized trials; this finding is noted for contextual reference but is not attributable to an included source of this synthesis. No primary comparative study focused exclusively on PTSD in underserved populations was identified among the eight included sources.

3.4. Appointment Adherence and No-Show Rates

Adherence findings were more heterogeneous than clinical outcomes and demonstrated important context-dependence. The retrospective cohort study [9] in rural Louisiana behavioral health clinics – conducted during the pandemic period, with 19% of patients lacking stable housing, and many lacking private residential space, adequate internet connectivity, and stable income – found that telehealth appointments were associated with statistically significantly higher no-show odds compared to in-person appointments (OR 1.42; 95% CI, 1.09 – 1.84). The authors attributed this to the convergence of unmet social needs that created specific barriers to telehealth engagement, including a lack of private space, unreliable internet access, and unfamiliarity with technology platforms [9].

In contrast, the multi-site rural telebehavioral health study by McCord and colleagues [11] reported comparable adherence between telehealth and in-person cohorts across a broader and more geographically diverse sample. The large cross-sectional study of

over 1.9 million outpatient encounters in Illinois during the sustained pandemic phase [12] found that overall telehealth encounters were associated with significantly reduced no-show odds compared to in-person appointments (OR 0.28; 95% CI, 0.26 – 0.29); however, mental health specialty had the highest no-show odds ratio among all specialties studied (OR 2.99; 95% CI, 2.84 – 3.14), and Black and Hispanic patients on Medicaid had persistently higher no-show rates even when using telehealth. Studies of outpatient psychiatry clinics in academic settings [10] reported decreased overall no-show rates after transitioning to telehealth during the pandemic, particularly for telephone visits. However, population socioeconomic characteristics differed markedly from those in rural Louisiana. Findings on adherence, therefore, cannot be generalized across underserved populations without accounting for social needs burden and setting-specific factors.

3.5. Patient Satisfaction

Patient satisfaction was generally high in both telehealth and in-person conditions across the included sources. The meta-analysis by Shaker and colleagues [7] reported no statistically significant difference in patient satisfaction between telehealth and in-person psychiatric treatment. The rapid behavioral health review [6] similarly found that most included studies reported patient satisfaction comparable between modalities. In studies that specifically examined underserved populations, satisfaction varied more substantially by access-related factors: patients who encountered technology difficulties, experienced privacy concerns related to shared living spaces, or lacked language-concordant providers reported diminished satisfaction with telehealth specifically [8].

3.6. Equity-Relevant Access Barriers

3.6.1. The Digital Divide

Consistent across multiple included sources was the finding that technology access barriers disproportionately affect populations already marginalized by other social determinants of health. The qualitative systematic review by Nguyen and colleagues [8] – which included culturally and linguistically diverse populations from multiple international settings – found compounding barriers to digital health technology engagement, including limited access to devices and broadband internet, lower digital literacy, language incompatibility of platforms, and concerns about privacy and immigration authority contact for some immigrant populations. The retrospective observational study of telehealth use among low-income racial and ethnic minority patients [13] found that despite broad pandemic-era regulatory expansion of telehealth, utilization patterns remained substantially unequal, and that income and telehealth use were positively associated even within low-income samples.

Data from the 2022 National Survey on Drug Use and Health confirm that Asian, Black, and Hispanic adults with any mental illness are already less likely to receive mental health services than White and multiracial adults [2], meaning telehealth programs that fail to address structural access barriers risk deepening rather than narrowing these existing disparities. Older adults, patients with limited English proficiency, and individuals with low digital literacy were consistently identified as facing the greatest barriers to video telehealth specifically [8, 12, 13].

3.6.2. Language and Cultural Competency

Language barriers represented a distinct and clinically significant equity concern in telehealth mental health care delivery. A systematic scoping review of telepsychiatry for indigenous peoples and racial and ethnic minorities [15] found that insufficient interpreter services on telehealth platforms, the scarcity of language-concordant providers, and inadequate cultural adaptation of clinical content were among the primary identified barriers to equitable engagement. Disparities in telehealth use were most pronounced in telemental health services – where effective communication is fundamental – for patients with limited English proficiency [15]. Hispanic and Latino providers represent only approximately 6.6% of psychiatrists and 7.95% of psychologists despite constituting 19% of the U.S. population, creating a structural linguistic gap that telehealth alone cannot resolve [15].

Provider cultural competency emerged as a cross-cutting concern independent of care delivery modality. Studies in this synthesis noted that cultural mistrust, prior negative experiences with mental health services, and the absence of culturally adapted clinical materials were barriers in both in-person and telehealth settings, but were potentially amplified in telehealth due to the reduced interpersonal cues available in video-mediated communication [8, 15].

4. Discussion

4.1. Summary of Findings

This narrative scoping synthesis reviews evidence from eight sources encompassing primary comparative studies, systematic reviews, a rapid review, and a qualitative synthesis, representing diverse underserved and equity-relevant mental health populations. Available evidence suggests that telehealth may offer broadly comparable outcomes to in-person care for depression, anxiety, and PTSD in some underserved settings. This is broadly consistent with the existing literature on general adult populations [6, 7]. However, this conclusion must be interpreted with caution, given the methodological limitations of this synthesis, including single-reviewer screening, the absence of formal risk-of-bias assessment, mixed study designs, and the inclusion of both primary and review-level sources. Adherence findings were meaningfully heterogeneous and context-dependent: telehealth improved or maintained adherence in some settings but was associated with higher no-show rates in the most socioeconomically marginalized populations, where unmet social needs created specific barriers to telehealth engagement [9]. Patient satisfaction was generally comparable across modalities, but equity-relevant access barriers – particularly the digital divide, language barriers, and provider cultural competency deficits – were consistently identified as critical gaps. Direct comparative findings and contextual evidence of equity barriers are distinguished throughout this discussion.

4.2. Interpretation of Clinical Findings

The available evidence suggesting broadly comparable clinical outcomes across depression, anxiety, and PTSD is contextually and programmatically significant. Given the scale of the mental health workforce shortage – with 70% of rural counties lacking a psychiatrist and over 4,200 rural Mental Health Professional Shortage Areas designated as of 2025 [3] – a modality that may deliver comparable clinical outcomes while removing geographic barriers has substantial public health implications. However, clinicians and policymakers should interpret these findings as low- to uncertain-certainty evidence. The language of "non-inferiority" has not been used in this synthesis because no included primary study was formally designed as a non-inferiority trial, and no formal non-inferiority framework was applied in this review. The more accurate characterization is that outcomes were not clearly different between modalities in the available evidence, with the important caveat that this evidence base is methodologically limited.

Most included studies were conducted in settings where access to adequate devices and broadband was assumed or facilitated, and where providers had received some preparation for telehealth delivery. In settings where these conditions are not met – as exemplified by the rural Louisiana behavioral health clinic study [9], where nearly one in five patients lacked stable housing, and many lacked reliable internet access – telehealth not only failed to improve adherence but was associated with worse engagement. This underscores that any clinical benefits of telehealth are conditional on structural preconditions being met and cannot be assumed to generalize across all underserved populations.

4.3. The Digital Divide as a Health Equity Problem

A consistent theme across the included sources was that the digital divide – characterized by unequal access to devices, broadband internet, and digital literacy – disproportionately affects the populations most in need of expanded access to mental health services [8, 13]. This creates a structural paradox: the groups that stand to benefit most from telehealth's potential are also the groups least equipped, without targeted support, to do so. Older adults, individuals with low socioeconomic status, patients with limited English proficiency, and some racial and ethnic minority communities face compounding disadvantages in engaging with video telehealth specifically [8, 12, 13].

This finding has pragmatic policy implications. Universal broadband access, device provision for low-income patients, and digital literacy programs are not merely technical infrastructure investments but also health equity interventions. Several included sources noted that audio-only telephone-based telehealth, though often considered inferior to video, may serve as a critical access bridge for populations for whom video remains inaccessible, and that policies restricting reimbursement to video-only telehealth risk excluding the most marginalized patients [11, 13].

4.4. Cultural Competency as an Irreducible Equity Requirement

Beyond technological access, provider cultural competency was identified as a dimension of equitable telehealth that cannot be resolved by technological investment alone. The systematic scoping review of telepsychiatry cultural adaptations [15] found that successful telehealth programs for indigenous peoples and racial and ethnic minorities required community involvement in program design, adaptation of clinical materials, culturally concordant or informed providers, and language access services that went beyond basic translation. The structural underrepresentation of racial and ethnic minority mental health providers is not a telehealth problem. Still, telehealth's potential to connect patients with culturally concordant providers despite geographic barriers remains substantially unrealized, given the current workforce composition [15].

These findings align with the broader evidence on mental health disparities: racial and ethnic minority adults are less likely to receive mental health treatment even when controlling for access factors [2], suggesting that access alone does not resolve disparities rooted in cultural mistrust, stigma, and the absence of culturally affirming care.

4.5. Pandemic Timing and Temporal Confounding

A substantial limitation of the evidence base is that most included sources were conducted during or after the COVID-19 pandemic. Reimbursement rules, clinic workflows, patient behavior, and the availability of in-person alternatives all changed dramatically during this period, making it difficult to attribute observed modality differences – or the absence of such differences – to telehealth per se, rather than to the broader context of pandemic-era healthcare delivery. Adherence findings are particularly susceptible to this confounding: pandemic-era patterns of in-person avoidance, government-mandated workflows, and emergency regulatory changes may not reflect steady-state comparative effectiveness under normal conditions. Conclusions derived primarily from pandemic-era data should be interpreted with explicit acknowledgment of this temporal limitation.

4.6. Strengths and Limitations

This synthesis offers several strengths. It focuses explicitly on underserved populations – a group frequently underrepresented in prior telehealth reviews. The included sources span a range of designs, settings, and populations, providing breadth of evidence relevant to diverse clinical and policy contexts. The review addresses multiple dimensions of telehealth equity, including clinical outcomes, engagement, and structural access barriers.

However, significant limitations must be acknowledged explicitly. First, single-reviewer screening and extraction increase the risk of selection error and subjective inclusion bias; this is a major methodological limitation. Second, no formal risk-of-bias assessment was conducted, limiting confidence in the certainty of conclusions; all comparative claims should be interpreted as low- to uncertain-certainty evidence. Third, this synthesis includes both primary studies and review-level sources (systematic reviews, a rapid review, and a qualitative synthesis), and these are not equivalent forms of evidence; the evidence base is therefore heterogeneous in ways that preclude clean aggregation. Fourth, no review protocol was registered prior to conducting the review, raising the possibility of post hoc outcome framing. Fifth, only English-language sources were included, potentially excluding relevant evidence. Sixth, the evidence base is predominantly drawn from the pandemic or post-pandemic period, limiting generalizability to other temporal contexts. Seventh, the included studies span diverse geographic settings – predominantly U.S.-based, with some international sources – and conclusions may not generalize uniformly across health system contexts. Finally, the retrospective design of several key studies introduces potential confounding by indication.

4.7. Future Research Directions

This synthesis identifies several critical priorities for future research. Prospective randomized trials specifically designed to enroll underserved populations – with explicit stratification by socioeconomic status, racial and ethnic identity, and social needs burden – are needed to provide higher-quality comparative effectiveness evidence. Future reviews should apply dual independent screening, formal risk-of-bias assessment using established tools, and prospective protocol registration. Equity-centered outcome frameworks should be adopted in future studies, measuring not only symptom improvement but also engagement persistence, patient-reported experience, and disparities in outcomes across subgroups. Cost-effectiveness analyses that account for the infrastructure investments required to deliver equitable telehealth are urgently needed. Finally, rigorous evaluation of culturally adapted telehealth programs designed with community input, linguistic concordance, and culturally affirming clinical content is needed to determine whether such adaptations can close the equity gaps identified in this synthesis.

5. Conclusion

Available evidence suggests that telehealth may offer broadly comparable outcomes to in-person mental health care for underserved populations in some settings, with clinical findings for depression, anxiety, and PTSD not clearly different between modalities in the reviewed sources. This conclusion is based on a heterogeneous,

methodologically limited evidence base. It should be interpreted as low- to uncertain-certainty evidence rather than a definitive demonstration of equivalence or non-inferiority.

The evidence makes clear that telehealth is not inherently equitable: its potential benefits are conditional on structural preconditions, including device access, reliable broadband, digital literacy support, and culturally competent, linguistically accessible providers. In the most socioeconomically marginalized settings, these conditions frequently remain unmet, and telehealth may paradoxically increase engagement barriers relative to in-person care. The digital divide, persistent language barriers, and the underrepresentation of racial and ethnic minority providers in the mental health workforce are not problems that telehealth can solve independently; they require targeted, equity-driven investment at the levels of infrastructure, workforce, and policy.

As a pragmatic implication of the available evidence – rather than a firm evidence-based recommendation – telehealth may serve as a useful complement to in-person mental health care in underserved communities when structural preconditions are met. Particular attention should be given to audio-only access pathways for patients who remain inaccessible to video, community-engaged program design, and ongoing monitoring of disparities in engagement and outcomes across population subgroups. High-quality prospective trials with equity-centered frameworks are urgently needed before stronger conclusions can be drawn.

Conflicts of Interest

The author declares no financial or non-financial conflicts of interest related to this work. The author has no relevant employment, consultancy, honoraria, stock ownership, paid expert testimony, patents, personal relationships, or institutional affiliations that could have influenced the conduct, interpretation, or reporting of this narrative scoping synthesis.

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Institutional Review Board (IRB)

This article is a narrative scoping synthesis of previously published studies and does not involve new primary data collection; formal ethics approval was not required.

Large Language Model

None.

Author Contribution

SP contributed to the conception and design of the review, performed the literature search and data extraction, conducted data screening, drafted and critically revised the manuscript, and provided final approval of the submitted version. Risk-of-bias appraisal was not conducted as part of this review, as described in Section 2.4.

Data Availability

The data supporting this synthesis are the published studies cited in the reference list. Study-level characteristics described in the text represent the data extracted during this review; no additional datasets were generated.

References

1. GBD Mental Disorders Collaborators. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Psychiatry. 2022;9(2):137-50. [PMID: 35026139, PMCID: PMC8776563, https://doi.org/10.1016/S2215-0366(21)00395-3].
2. Substance Abuse and Mental Health Services Administration. Key Substance Use and Mental Health Indicators in the United States: Results from the 2022 National Survey on Drug Use and Health. SAMHSA; 2023.
3. Rural Health Information Hub. Challenges and Opportunities for Mental Health Services in Rural Areas; 2025.
4. Morales DA, Barksdale CL, Beckel-Mitchener AC. A call to action to address rural mental health disparities. J Clin Transl Sci. 2020;4(5):463-7. [PMID: 33244437, PMCID: PMC7681156, https://doi.org/10.1017/cts.2020.42].
5. Bulkes NZ, Davis K, Kay B, Riemann BC. Comparing efficacy of telehealth to in-person mental health care in intensive-treatment-seeking adults. J Psychiatr Res. 2022;145:347-52. [PMID: 34799124, PMCID: PMC8595951, https://doi.org/10.1016/j.jpsychires.2021.11.003].
6. Bellanti DM, Kelber MS, Workman DE, Beech EH, Belsher BE. Rapid Review on the Effectiveness of Telehealth Interventions for the Treatment of Behavioral Health Disorders. Mil Med. 2022;187(5-6):e577-88. [PMID: 34368853, https://doi.org/10.1093/milmed/usab318].
7. Shaker AA, Austin SF, Storebo OJ, Schaug JP, Ayad A, Sorensen JA, et al. Psychiatric Treatment Conducted via Telemedicine Versus In-Person Modality in Posttraumatic Stress Disorder, Mood Disorders, and Anxiety Disorders: Systematic Review and Meta-Analysis. JMIR Ment Health. 2023;10:e44790. [PMID: 37277113, PMCID: PMC10357375, https://doi.org/10.2196/44790].
8. Whitehead L, Talevski J, Fatehi F, Beauchamp A. Barriers to and Facilitators of Digital Health Among Culturally and Linguistically Diverse Populations: Qualitative Systematic Review. J Med Internet Res. 2023;25:e42719. [PMID: 36853742, PMCID: PMC10015358, https://doi.org/10.2196/42719].
9. Bhatta D, Sizer MA, Acharya B. Association Between Telehealth and Missed Appointments Among Patients Experiencing Behavioral Health Challenges. JAMA Netw Open. 2023;6(7):e2324252. [PMID: 37466943, PMCID: PMC10357338, https://doi.org/10.1001/jamanetworkopen.2023.24252].
10. Muppavarapu K, Saeed SA, Jones K, Hurd O, Haley V. Study of Impact of Telehealth Use on Clinic "No Show" Rates at an Academic Practice. Psychiatr Q. 2022;93(2):689-99. [PMID: 35412100, PMCID: PMC9004215, https://doi.org/10.1007/s11126-022-09983-6].
11. McCord C, Ullrich F, Merchant KAS, Bhagianadh D, Carter KD, Nelson E, et al. Comparison of in-person vs. telebehavioral health outcomes from rural populations across America. BMC Psychiatry. 2022;22(1):778. [PMID: 36496352, PMCID: PMC9736702, https://doi.org/10.1186/s12888-022-04421-0].
12. Amagai S, Vonesh E, Adams J, Luo Y. Closing the gap: addressing telehealth disparities across specialties in the sustained pandemic era. NPJ Digit Med. 2024;7(1):217. [PMID: 39164391, PMCID: PMC11335954, https://doi.org/10.1038/s41746-024-01201-w].
13. Williams C, Shang D. Telehealth Usage Among Low-Income Racial and Ethnic Minority Populations During the COVID-19 Pandemic: Retrospective Observational Study. J Med Internet Res. 2023;25:e43604. [PMID: 37171848, PMCID: PMC10185335, https://doi.org/10.2196/43604].
14. Kelber MS, Smolenski DJ, Boyd C, Shank LM, Bellanti DM, Milligan T, et al. Evidence-based telehealth interventions for post-traumatic

stress disorder, depression, and anxiety: A systematic review and meta-analysis. J Telemed Telecare. 2025;31(6):757-67. [PMID: 38254285, https://doi.org/10.1177/1357633X231224491].

15. Ruiz-Cosignani D, Chen Y, Cheung G, Lawrence M, Lyndon MP, Ma'u E, et al. Adaptation models, barriers, and facilitators for cultural safety in telepsychiatry: A systematic scoping review. J Telemed Telecare. 2024;30(3):466-74. [PMID: 34989643, PMCID: PMC10928963, https://doi.org/10.1177/1357633X211069664].

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Original Article

A Single-Center Before-and-After Quality Improvement Audit of AKI Recognition and Bundle-Based Care in Adult Medical Inpatients With KDIGO-Defined AKI in a Resource-Limited Tertiary Hospital in Pakistan

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ABSTRACT

Background: Among hospitalized adults in medical settings, delayed recognition and incomplete bundle-based care may contribute to progression, longer hospitalization, and poorer renal recovery. Adherence to AKI care bundles remains inconsistent, in resource-limited hospitals with staffing, workflow, and documentation constraints.
Methods: We conducted a single-center before-and-after improvement audit over two cycles, preceded by a pilot phase that refined case identification and data collection. The source population comprised consecutive adult medical inpatients meeting KDIGO AKI criteria during admission. In cycle one, 120 patients were assessed. The intervention included a paper-based AKI checklist, staff education, nephrotoxin-prescribing prompts, and escalation triggers. A re-audit of 118 patients was performed, followed by a 3-month sustainability review. Process indicators and outcomes were analyzed using methods and compared across cycles. Patients already under active inpatient nephrology care when AKI was identified were included in the overall cohort but excluded from the nephrology-referral denominator.
Results: Baseline compliance was suboptimal across key care domains. The intervention was associated with improved AKI recognition from 65.0% to 87.3%, medication review from 51.7% to 78.0%, and fluid assessment from 48.3% to 76.3% (all $p<0.001$). It was also associated with a reduction in progression to severe AKI from 33.3% to 23.7%, and a decrease in mean length of stay from 7.9±3.4 to 6.6±3.0 days. Improvements were sustained at 3 months.
Conclusion: A paper-based AKI bundle was associated with improved recognition and care processes, with changes in outcomes, supporting feasibility in resource-limited settings, although causal inference is limited by design. Further multicenter studies are warranted.

1. Introduction

Acute kidney injury (AKI) is a common and clinically consequential syndrome encountered across medical and nephrology services. It affects approximately 8% to 22% of hospitalized patients and is defined by an abrupt reduction in renal function of varying severity [1]. AKI is strongly associated with adverse outcomes, including increased mortality, with reported risk rising by approximately 1.4 to 15.4 times [2]. It also predisposes patients to the development of chronic kidney disease or progression of pre-existing renal dysfunction [3]. In addition, AKI is associated with increased morbidity, prolonged hospital stay, higher healthcare costs, and a greater risk of recurrent AKI after discharge [4, 5].

In acute medical settings, AKI is often multifactorial, commonly arising from sepsis, hypovolemia, nephrotoxic exposure, obstructive uropathy, or hemodynamic instability. Importantly, outcomes are frequently influenced not only by the initial insult but also by delays in recognition, incomplete evaluation, and inconsistent application of supportive care measures [6].

The Kidney Disease: Improving Global Outcomes (KDIGO) guideline provides a standardized framework for AKI diagnosis based on serum creatinine changes and urine output criteria, and emphasizes early recognition, volume assessment, medication review, and timely specialist input where appropriate [7]. Similarly, National Institute for Health and Care Excellence (NICE) guidance highlights the importance of identifying at-risk patients, monitoring renal function systematically, and avoiding preventable harm from nephrotoxins or delayed escalation [8]. Despite these recommendations, AKI care in routine practice remains variable. In resource-limited settings in particular, delays in reviewing creatinine trends, incomplete urine output monitoring, and continued exposure to nephrotoxic medications are commonly observed [5, 9].

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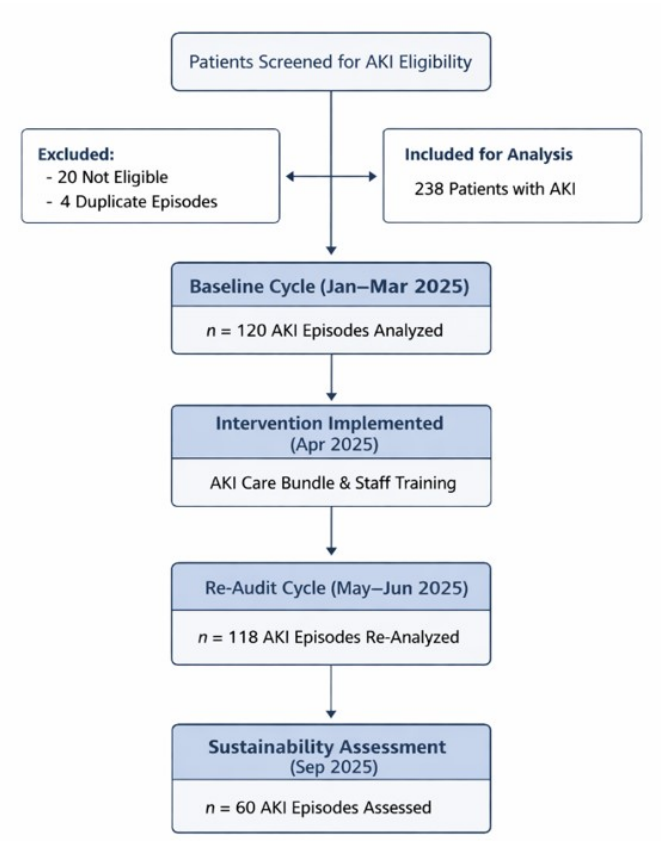

Figure 1: Study flow diagram.

This quality improvement audit was undertaken in response to these gaps in routine care. The objective was to assess baseline AKI recognition and management and to evaluate changes in practice following implementation of a structured, low-cost intervention within a tertiary care hospital in a resource-limited setting. A closed-loop audit design was used, incorporating a pilot phase to refine data collection and a subsequent sustainability check to explore whether observed changes were maintained over time.

2. Methods

This was a prospective, single-center, before-and-after quality improvement audit conducted in the adult medical inpatients admitted to the Departments of Medicine and Nephrology at MTI-Khyber Teaching Hospital, a tertiary care teaching hospital in a resource-limited region. The source population comprised consecutive adult patients aged 18 years or older who met KDIGO criteria for AKI during hospitalization, whether the AKI was identified on the medical ward, during acute admission, or after nephrology consultation. Patients already receiving active inpatient nephrology consultation at the time AKI was first identified were retained in the overall AKI cohort for process and outcome analyses, but were excluded from the nephrology-referral analysis because referral had already occurred and was therefore not clinically applicable.

The audit was carried out in four phases: (Phase 1) a pilot phase to test the data collection tool and confirm feasibility of case identification, (Phase 2) a baseline audit cycle, (Phase 3) implementation of a structured intervention package followed by a re-audit cycle, and (Phase 4) a 3-month sustainability assessment to explore maintenance of observed changes in routine clinical practice. The audit was conducted over a defined nine-month period from 1 January 2025 to 30 September 2025. The baseline audit cycle was carried out from 1 January 2025 to 31 March 2025. This was followed by an implementation phase from 1 April 2025 to 30 April 2025 during which the intervention bundle was introduced and staff training was completed, with a defined 2-month gap between re-audit completion and sustainability assessment to assess durability rather than continuous measurement. The re-audit cycle was conducted from 1 May 2025 to 30 June 2025. A sustainability assessment was subsequently performed from 1 September 2025 to 30 September 2025 to evaluate maintenance of observed changes in routine clinical practice. Each cycle was sufficiently long to mitigate the potential influence of short-term seasonal variation in admissions and case mix (**Figure 1**).

2.1. Case Identification and Eligibility

The inclusion criteria were deliberately broad to reflect real-world inpatients. Adults aged 18 years or older were included if they met KDIGO criteria for AKI during admission, whether the AKI was identified on the medical ward, during acute admission, or after nephrology consultation.

AKI was defined and staged according to KDIGO criteria using serum creatinine and/or urine output. Baseline creatinine was determined using the most recent value within the preceding 3 months where available. If prior creatinine was unavailable, the admission creatinine was used as a reference and AKI was defined based on subsequent changes during hospitalization, consistent with

pragmatic approaches in resource-limited settings. Urine output criteria were applied where reliable charting was available.

Patients already on chronic dialysis and renal transplant recipients were excluded because their renal trajectory and management pathway differ substantially from standard AKI care. To reduce duplicate counting, each admission was assigned a unique hospital and admission identifier, and only the first AKI episode per admission was included. Where a patient was readmitted during the audit period, the episode was counted again only if it represented a clearly separate admission. A 90-day look-back was also used to identify and exclude duplicate episodes. Identifiers were collected temporarily only for linkage and deduplication purposes. A separate password-protected linkage file contained the hospital and admission identifiers needed to identify repeat episodes and verify eligibility. This linkage file was accessible only to the principal investigator and was not merged into the analytic dataset. After finalizing the dataset and checking for duplicates, all direct identifiers were removed from the working dataset. AKI was classified as community-acquired if present at admission or within 48 hours of admission, and hospital-acquired if developing thereafter. Patients already under active nephrology inpatient care at the time of AKI identification were excluded from the analysis of nephrology referral to avoid incorporation bias.

2.2. Patient Flow and Study Population

During the baseline cycle, 132 patients with suspected acute kidney injury were screened. Twelve patients were excluded due to pre-existing end-stage kidney disease, renal transplant status, or incomplete diagnostic criteria, leaving 120 eligible AKI episodes for analysis. In the re-audit cycle, 126 patients were screened; eight were excluded for similar reasons, resulting in 118 included episodes. During the sustainability phase, 64 patients were screened and four were excluded, leaving 60 patients for analysis.

2.3. Case Identification, Numerators, and Denominators

Acute kidney injury was defined according to KDIGO criteria using serum creatinine and urine output. Baseline creatinine was determined from values available within the preceding three months. When prior creatinine was unavailable, admission creatinine was used as the reference, and subsequent changes during hospitalization were used to define AKI. Urine output criteria were applied when reliable documentation was available.

For all process measures, the denominator consisted of all eligible AKI episodes unless otherwise specified. AKI recognition within 24 hours was assessed in all included patients. Repeat serum creatinine within 24 hours was assessed in all patients in whom ongoing admission blood sampling was clinically indicated. Medication review, fluid status assessment, urine output monitoring, and urinalysis were assessed in all eligible patients. Nephrology referral was assessed only in patients meeting predefined escalation criteria as per the study protocol. Nephrotoxin withholding was assessed in patients who were receiving at least one potentially nephrotoxic medication at the time of AKI recognition.

2.4. Process Measure Definitions

AKI recognition was defined as documentation of AKI diagnosis in the medical record within 24 hours of meeting KDIGO criteria. Medication review was defined as a documented clinical review of all medications within 12 hours of AKI recognition, including adjustment or discontinuation of nephrotoxic or renally cleared agents where appropriate. Fluid status assessment was defined as documented evaluation of volume status in clinical notes within 24 hours of AKI recognition. Urine output monitoring was considered adequate when at least shift-wise documentation was recorded during the first 24 hours after AKI identification. Nephrotoxin withholding was defined as temporary discontinuation or dose adjustment of drugs such as non-steroidal anti-inflammatory drugs, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and aminoglycosides where clinically appropriate. Nephrology referral was defined according to local practice criteria, including KDIGO stage 2 or 3 AKI, persistent oliguria, refractory electrolyte imbalance, suspected intrinsic renal disease, or lack of improvement within 48 hours.

2.5. Process Measures and Outcomes

The audit standards were based on KDIGO and NICE principles, operationalized for feasibility in the local setting. Each process indicator was defined using explicit numerator, denominator, and timeframe criteria. Key documentation-based process measures included:

- AKI recognition/documentation within 24 hours of meeting criteria
- Repeat creatinine within 24 hours
- Medication review within 12 hours
- Fluid status documentation within 24 hours
- Adequate documented urine output charting
- Performance of urinalysis
- Nephrology referral when indicated

"Adequate documented urine output charting" was defined as at least shift-wise or hourly documentation during the first 24 hours following AKI recognition. "Medication review" referred to documented review by a physician, including adjustment or discontinuation of nephrotoxic or renally cleared medications where appropriate.

Clinical outcomes included progression to severe AKI (KDIGO stage 3), need for renal replacement therapy (reported separately), length of hospital stay, renal recovery at discharge, in-hospital mortality, and 30-day readmission. Renal recovery was defined as return of serum creatinine to within 25% of baseline at discharge. Readmission was defined as unplanned readmission to the same hospital within 30 days.

All process indicators reflect documentation of care in medical records and may not fully capture bedside execution. Process measures were additionally plotted as weekly run charts to evaluate temporal trends across cycles **(Figure 2)** and **(Figure 3)**.

2.6. Sample Size Considerations

A pragmatic sample size approach was used. The pilot phase showed baseline compliance of approximately 55% across key process indicators. A target improvement of 20 percentage points was considered clinically meaningful, corresponding to approximately 88 patients per cycle. The baseline audit included 120 patients, allowing reasonably precise estimates of performance.

2.7. Intervention Fidelity

Intervention fidelity was assessed through structured review of randomly selected case records from each cycle. Thirty records per cycle were evaluated for presence and completeness of the AKI checklist, documentation of AKI staging, completion of medication review, and documentation of fluid assessment. The presence of a checklist in the medical record improved from 82% in the baseline period to 93% in the re-audit cycle. Completion of at least 80% of checklist items improved from 61% to 84%. Documentation of AKI stage improved from 68% to 89%, and recorded medication review improved from 64% to 86%.

Table 1: AKI Care Checklist Used in the Intervention

Domain	Checklist item
Recognition and diagnosis	Confirm AKI using KDIGO criteria based on serum creatinine and/or urine output.
Recognition and diagnosis	Document AKI stage clearly in the notes (stage 1, 2, or 3).
Recognition and diagnosis	Record baseline creatinine if available.
Monitoring	Repeat serum creatinine within 24 hours.
Monitoring	Initiate strict urine output charting
Monitoring	Monitor vital signs, including blood pressure and perfusion status.
Medication review	Review all medications within 12 hours.
Medication review	Stop, hold, or modify nephrotoxic drugs where clinically appropriate.
Medication review	Adjust doses of renally cleared medications.
Fluid assessment	Perform and document volume status assessment.
Fluid assessment	Initiate appropriate fluid resuscitation if hypovolemic.
Fluid assessment	Avoid fluid overload in euvolemic or hypervolemic patients.
Investigations	Perform urinalysis, with microscopy when indicated.
Investigations	Consider renal ultrasound if obstruction is suspected.
Escalation	Assess the need for nephrology referral.
Escalation	Identify red flags such as oliguria, rising creatinine, or electrolyte imbalance.
Documentation	Ensure AKI diagnosis and management plan are clearly documented.

AKI, acute kidney injury; KDIGO, Kidney Disease: Improving Global Outcomes.

2.8. Sustainability Sample

The sustainability assessment included 60 consecutive patients admitted during September 2025. These patients were selected consecutively from medical ward admissions meeting KDIGO criteria for AKI. The sample was intended as an exploratory assessment of maintenance of intervention effects rather than a formally powered comparative analysis.

2.9. Intervention

The intervention was intentionally low-cost and adapted to a resource-limited environment. It included a one-page AKI checklist **(Table 1)**, focused staff education, nephrotoxin prompts in patient charts, and a simple escalation framework. Weekly non-punitive feedback was provided at ward level.

Implementation was supported through repeated teaching sessions, the availability of checklists, and regular feedback discussions.

2.10. Implementation and Training

The audit was conducted by a multidisciplinary team comprising residents, interns, and a supervising consultant physician. All team members underwent structured training before the baseline cycle. Inter-rater reliability during the pilot phase exceeded 90% for key variables.

Table 2: Audit Proforma Used for Data Collection

Section	Data captured
Patient identification	Hospital number, admission number, ward, and date of admission.
Demographics	Age and sex.
Comorbidities	Diabetes, hypertension, chronic kidney disease, cardiovascular disease, liver disease, and known obstructive uropathy.
AKI definition	Baseline creatinine, peak creatinine, urine output criteria, and KDIGO stage.
Aetiology	Prerenal, intrinsic, postrenal, sepsis-associated, and nephrotoxin-associated AKI.
Process measures	Time to recognition, repeat creatinine, urine output charting, fluid assessment, urinalysis, medication review, and nephrology referral.
Treatment actions	Fluids given, nephrotoxins withheld, dose adjustment, imaging, and dialysis.
Outcomes	Peak KDIGO stage, recovery at discharge, length of stay, in-hospital death, and 30-day readmission.

AKI, acute kidney injury; KDIGO, Kidney Disease: Improving Global Outcomes.

Data collectors were not involved in the direct care of most patients during the baseline phase. During the re-audit phase, clinicians were aware of the intervention but were not provided with patient-level audit scoring.

2.11. Escalation and Definitions

A structured escalation framework was introduced. Nephrology referral was defined according to local practice criteria, including KDIGO stage 2 or 3 AKI, persistent oliguria, refractory electrolyte imbalance, suspected intrinsic renal disease, or lack of improvement within 48 hours. This measure was assessed only among patients who met referral criteria and were not already under active nephrology care at the time AKI was identified.

Nephrotoxin withholding refers to the temporary discontinuation or adjustment of medications such as NSAIDs, ACE inhibitors/ARBs, and aminoglycosides, where clinically feasible.

2.12. Sustainability Assessment

A sustainability assessment was conducted using a consecutive sample of 60 eligible patients admitted during the post-intervention period. This was intended as an exploratory assessment of maintenance rather than a formal longitudinal analysis. This was a one-month assessment conducted three months after the intervention period.

2.13. Data Collection and Flow

The audit proforma captured demographics, comorbidities, AKI characteristics, process measures, and outcomes **(Table 2)**.

2.14. Statistical Analysis

Descriptive statistics were used to summarize baseline characteristics and clinical variables. Categorical variables were compared using chi-square tests, and continuous variables were compared using independent sample t-tests. Effect sizes were reported as absolute risk differences with corresponding 95% confidence intervals for all major processes and clinical outcomes. Ninety-five percent

Table 3: Patient characteristics by audit cycle

Characteristic	Baseline cycle (n=120)	Re-audit cycle (n=118)	p-value
Age, mean ± SD, years	58.4 ± 16.5	57.7 ± 17.0	0.75
Male sex, n (%)	74 (61.7)	71 (60.2)	0.81
Diabetes mellitus, n (%)	52 (43.3)	49 (41.5)	0.78
Hypertension, n (%)	68 (56.7)	66 (55.9)	0.91
Chronic kidney disease, n (%)	38 (31.7)	36 (30.5)	0.85
Sepsis or active infection, n (%)	32 (26.7)	31 (26.3)	0.94
Hypovolemia or dehydration, n (%)	41 (34.2)	39 (33.1)	0.86
NSAID exposure before admission, n (%)	27 (22.5)	25 (21.2)	0.81
Contrast exposure during admission, n (%)	11 (9.2)	10 (8.5)	0.85
ICU-level monitoring required, n (%)	18 (15.0)	17 (14.4)	0.90

NSAID, non-steroidal anti-inflammatory drug; ICU, intensive care unit.

confidence intervals for absolute risk differences were estimated using the Wald method for independent proportions.

The prespecified primary outcome of the study was AKI recognition within 24 hours of meeting KDIGO criteria. Secondary outcomes included all other process measures as well as clinical outcomes such as progression to severe AKI, need for renal replacement therapy, length of hospital stay, renal recovery at discharge, in-hospital mortality, and 30-day readmission.

To account for potential confounding, a multivariable logistic regression model was used to analyze the primary outcome. This model adjusted for age, sex, diabetes mellitus, chronic kidney disease, sepsis, and baseline AKI stage. Sensitivity analyses were conducted excluding patients with missing baseline creatinine values and those with hospital-acquired AKI, and results remained consistent across these analyses. Given the before-and-after design, all analyses were treated as exploratory, with associations rather than causal effects.

The study is reported in accordance with SQUIRE 2.0 guidelines [10].

2.15. Ethics and Governance

This project was conducted as a quality improvement audit and was approved by the departmental audit/governance body at MTI-Khyber Teaching Hospital. Formal institutional review board approval was waived as no patient-identifiable data were collected and no deviation from standard care occurred.

3. Results

A total of 120 consecutive AKI episodes were included in the baseline cycle and 118 in the re-audit cycle. Baseline characteristics were broadly comparable across cycles; however, differences in the distribution of AKI severity may reflect stage migration due to earlier recognition rather than true baseline equivalence **(Table 3)**.

Table 4: AKI phenotype and severity

Variable	Baseline cycle (n=120)	Re-audit cycle (n=118)	p-value
Prerenal AKI, n (%)	57 (47.5)	54 (45.8)	0.92
Intrinsic AKI, n (%)	41 (34.2)	40 (33.9)	0.98
Postrenal AKI, n (%)	22 (18.3)	24 (20.3)	0.68
KDIGO stage 1, n (%)	46 (38.3)	49 (41.5)	0.24
KDIGO stage 2, n (%)	34 (28.3)	41 (34.7)	0.24
KDIGO stage 3, n (%)	40 (33.3)	28 (23.7)	0.09
Dialysis required during admission, n (%)	14 (11.7)	8 (6.8)	0.19

AKI, acute kidney injury; KDIGO, Kidney Disease: Improving Global Outcomes.

The distribution of AKI etiology was broadly similar across both cycles. The re-audit cycle included a lower proportion of patients with KDIGO stage 3 AKI than the baseline cycle, although this difference did not reach statistical significance **(Table 4)**.

Baseline performance across the process indicators showed important deficiencies. AKI was documented within 24 hours in 65.0% of cases; repeat creatinine was arranged within 24 hours in 57.5%; medication review was documented in 51.7%; fluid status was documented in 48.3%; and urine output monitoring was adequately charted in 45.0%. Nephrology referral occurred when indicated in 40.0% of eligible patients.

Following the introduction of the intervention bundle, improvement was observed across all major documentation-based process measures. Documented AKI recognition increased to 87.3%, repeat creatinine review to 81.4%, medication review to 78.0%, fluid assessment to 76.3%, urine output charting to 72.0%, and urinalysis to 75.4%. Appropriate nephrology referral, assessed only among patients eligible for referral, increased from 40.0% to 67.8%. Documented withholding or adjustment of nephrotoxins was more frequent when relevant. All of these changes were statistically significant **(Table 5)**. Nephrology referral was calculated only among patients meeting predefined escalation criteria and not already under active nephrology care at the time AKI was identified.

Clinical outcomes were also more favorable in the re-audit cycle. Progression to KDIGO stage 3 AKI was lower in the re-audit than in the baseline cycle, and the need for renal replacement therapy was also reduced. However, the latter did not reach statistical significance. Mean length of stay was shorter in the re-audit cycle, and creatinine recovery by discharge was more frequent in the re-audit cycle. This should be interpreted as an exploratory in-hospital biochemical outcome rather than a definitive measure of renal recovery. Mortality and 30-day readmission showed favorable trends but did not reach statistical significance **(Table 6)**.

The 3-month sustainability review showed some reduction from the immediate post-intervention cycle, but the process indicators remained above baseline levels.

(Table 7) shows whether the gain was held after the immediate implementation period. A mild decline was observed, which is common with workflow interventions, but the process remained better than before the audit began.

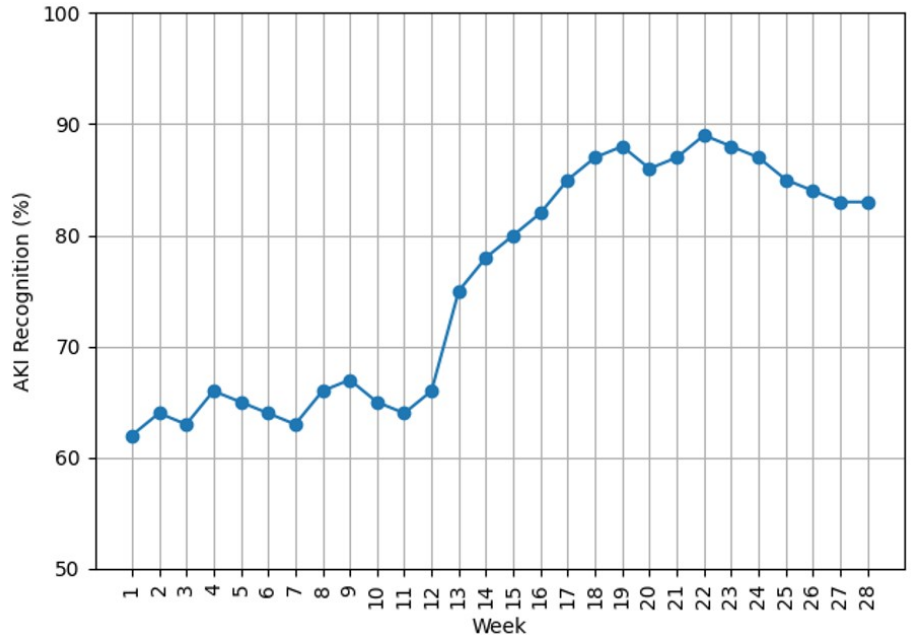

Figure 2: Weekly run chart for AKI recognition within 24 hours.

Table 5: Documentation-based AKI process indicators before and after intervention

Process measure	Baseline cycle (n=120)	Re-audit cycle (n=118)	Absolute change	p-value
AKI recognized/documented within 24h	78 (65.0%)	103 (87.3%)	+22.3%	<0.001
Repeat creatinine within 24h	69 (57.5%)	96 (81.4%)	+23.9%	<0.001
Medication review within 12h	62 (51.7%)	92 (78.0%)	+26.3%	<0.001
Fluid status documented within 24h	58 (48.3%)	90 (76.3%)	+28.0%	<0.001
Urine output charted adequately	54 (45.0%)	85 (72.0%)	+27.0%	<0.001
Urinalysis performed	66 (55.0%)	89 (75.4%)	+20.4%	<0.001
Nephrology referral when indicated	48 (40.0%)	80 (67.8%)	+27.8%	<0.001
Nephrotoxins withheld when relevant	44/70 (62.9%)	62/68 (91.2%)	+28.3%	<0.001

AKI, acute kidney injury.

Table 6: Clinical outcomes

Outcome	Baseline cycle (n=120)	Re-audit cycle (n=118)	p-value
Progression to KDIGO stage 3 AKI, n (%)	40 (33.3%)	28 (23.7%)	0.09
Need for renal replacement therapy, n (%)	14 (11.7%)	8 (6.8%)	0.19
Mean length of stay, days ± SD	7.9 ± 3.4	6.6 ± 3.0	0.002
Creatinine recovery by discharge, n (%)	73 (60.8%)	90 (76.3%)	0.010
In-hospital mortality, n (%)	10 (8.3%)	6 (5.1%)	0.34
30-day readmission with AKI, n (%)	18 (15.0%)	11 (9.3%)	0.17

AKI, acute kidney injury; KDIGO, Kidney Disease: Improving Global Outcomes; SD, standard deviation.

Effect estimates for key documentation-based process measures showed consistent improvement following implementation of the intervention bundle. AKI recognition within 24 hours increased by 22.3% with a 95% confidence interval of 12.6% to 32.0%. Repeat creatinine monitoring improved by 23.9% (95% CI 13.8% to 33.9%). Medication review improved by 26.3% (95% CI 15.9% to 36.7%), while fluid status documentation improved by 28.0% (95% CI 17.5% to 38.5%). Urine output monitoring improved by 27.0% (95% CI 16.3% to 37.7%), urinalysis by 20.4% (95% CI 9.9% to 30.9%), nephrology referral by 27.8% (95% CI 16.6% to 39.0%), and nephrotoxin withholding by 28.3% (95% CI 16.8% to 39.8%).

In multivariable logistic regression adjusting for age, sex, diabetes mellitus, chronic kidney disease, sepsis, and baseline AKI stage, AKI recognition within 24 hours remained significantly higher in the post-intervention cycle with an adjusted odds ratio of 3.12 (95% confidence interval 1.78 to 5.49). Sensitivity analyses excluding patients with missing baseline creatinine and those with hospital-acquired AKI demonstrated consistent findings across all major process measures.

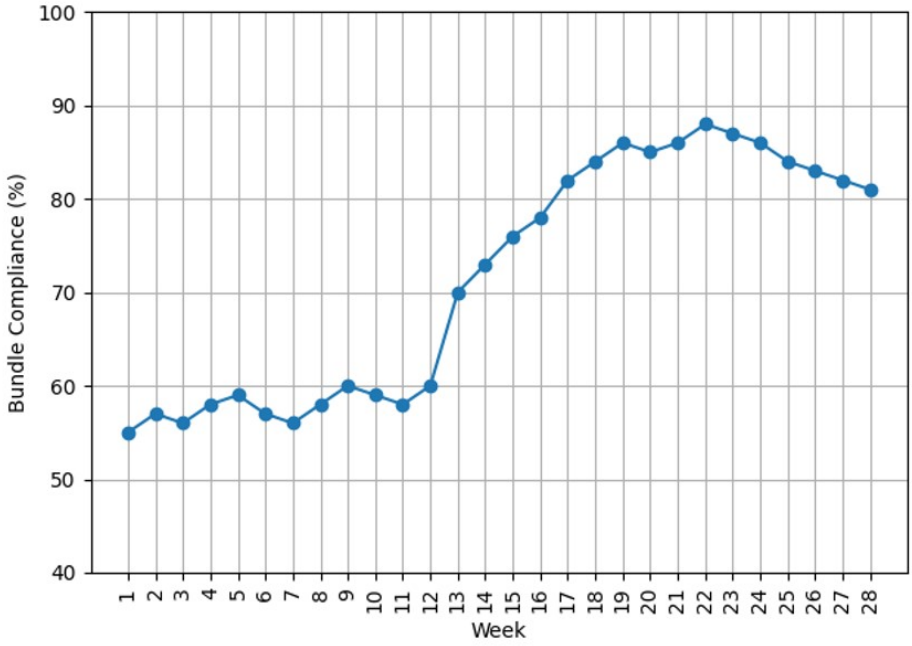

Figure 3: Weekly run chart for AKI bundle compliance over time.

Table 7: Sustainability of improvement at 3 months

Measure	Post-intervention re-audit	3-month spot-check (n=60)
AKI recognition within 24h	87.3%	83.3%
Medication review within 12h	78.0%	75.0%
Fluid assessment within 24h	76.3%	70.0%
Nephrology referral when indicated	67.8%	63.3%

AKI, acute kidney injury.

4. Discussion

This quality improvement audit describes changes in AKI recognition and bundle-based care processes following implementation of a structured, low-cost intervention in a resource-limited tertiary care hospital. Across two audit cycles, we observed substantial improvements in documentation of key AKI care processes, including early recognition, medication review, fluid assessment, urine output monitoring, and nephrology referral when indicated.

These changes were most pronounced in workflow-dependent documentation measures, suggesting that structured prompts, education, and feedback may improve recording and consistency of guideline-recommended AKI care processes. Given that AKI care often relies on timely identification and coordinated action across multiple steps, even modest improvements in system reliability may be clinically meaningful in resource-constrained environments.

Improvements in process measures were accompanied by more favorable trends in selected clinical outcomes, including reduced progression to severe AKI, shorter length of stay, and higher rates of creatinine recovery at discharge. An apparent improvement in creatinine recovery at discharge was observed; however, this finding should be interpreted cautiously as an exploratory biochemical outcome measured at discharge and not as a standardized long-term renal recovery endpoint. The before-and-after design does not allow attribution of outcome differences to the intervention, and observed changes may also reflect differences in case mix, AKI severity distribution, temporal practice changes, or unmeasured confounders between study periods.

Notably, mortality and 30-day readmission did not demonstrate statistically significant changes. This is not unexpected, as these outcomes are influenced by a broader range of patient and system-level factors beyond the immediate management of AKI, and the study was not powered to detect differences in these endpoints.

The sustainability assessment suggested partial maintenance of improved process performance at three months, although some decline from the immediate post-intervention period was observed. This pattern is consistent with prior quality improvement literature [11–13], where initial gains often attenuate without ongoing reinforcement. The findings therefore suggest that continued feedback mechanisms and periodic reinforcement may be necessary to maintain improvements over time, rather than a one-time intervention effect.

The observed lower proportion of KDIGO stage 3 AKI in the re-audit cycle may also have influenced downstream outcomes, including need for renal replacement therapy and length of stay. Importantly, this difference likely reflects a combination of true case variation and potential stage migration due to earlier recognition, rather than a stable baseline equivalence between cycles. Accordingly, stage distribution should be interpreted as a dynamic marker influenced by detection practices rather than a fixed cohort characteristic. The apparent downstream differences in clinical outcomes may therefore reflect earlier recognition, stage migration, or differences in AKI severity at presentation rather than a direct effect of the intervention. Accordingly, these outcome findings should be considered exploratory and hypothesis-generating rather than confirmatory.

From a broader systems perspective, these findings support the potential value of simple, low-cost interventions such as checklists, structured escalation pathways, and routine feedback in improving the reliability of AKI care processes. Similar interventions have shown variable effectiveness across settings, but their success often depends on local implementation fidelity, staff engagement, and integration into existing workflows rather than on the intervention's complexity [14].

5. Limitations

This study has several important limitations. First, its single-center, nonrandomized before-and-after design limits internal validity and precludes causal inference. Second, improvements in documentation-based process measures may not fully reflect bedside clinical actions, and some observed changes may represent improved recording rather than actual changes in care delivery. Third, differences in AKI severity distribution between cycles may have influenced clinical outcomes. Fourth, the sustainability analysis was short-term and exploratory, limiting conclusions regarding long-term durability of effect. Finally, discharge-based renal recovery may be influenced by variations in length of stay and should be interpreted as in-hospital biochemical recovery rather than standardized longitudinal renal function recovery.

6. Conclusion

In this quality improvement audit, implementation of a structured AKI care bundle was associated with improved documentation and adherence to recommended AKI care processes in a resource-limited hospital setting. Improvements in selected clinical outcomes were observed but cannot be attributed causally to the intervention, given the study design. The findings highlight the potential role of simple system-level interventions in strengthening AKI care delivery, while underscoring the need for more robust prospective and multi-center evaluations to confirm effectiveness and assess long-term sustainability.

Conflicts of Interest

The authors declare that they have no known financial or non-financial conflicts of interest related to this work. No author has any competing interests, affiliations, or relationships that could have influenced the study design, data collection, analysis, interpretation, manuscript preparation, or decision to submit the article for publication.

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Institutional Review Board (IRB)

This study was conducted as a clinical audit and quality improvement project (Audit Approval Number: KTH-MTI/QI/2025/017). Patient-identifying information was collected only temporarily for linkage and deduplication, stored separately in a password-protected file accessible only to the principal investigator. It was not retained in the analytic dataset. Formal ethics committee approval was not required, and no identifiable patient data were disclosed.

Large Language Model

Artificial intelligence tools were used in a limited capacity to assist with language refinement and manuscript editing. The study design, data collection, analysis, interpretation, and final content were developed and verified by the authors.

Author Contributions

MAI contributed to conceptualization, study design, data collection, manuscript drafting, and supervision. MS contributed to literature review, data interpretation, manuscript writing, critical revision of the manuscript, and corresponding author responsibilities. SIYK contributed to data analysis, interpretation of results, and manuscript editing. SK contributed to data collection, patient management, literature review, and manuscript writing. MSM contributed to statistical analysis, methodology support, and manuscript review. FN contributed to data acquisition, formatting, and proofreading of the manuscript. AS contributed to final manuscript review, validation of data, and approval of the submitted version. All authors contributed substantially to the work, critically reviewed the manuscript, approved the final version, and agree to be accountable for all aspects of the work.

Data Availability

The data supporting the findings of this study are available from the corresponding author on reasonable request.

References

1. Sawhney S, Marks A, Fluck N, Levin A, Prescott G, Black C. Intermediate and Long-term Outcomes of Survivors of Acute Kidney Injury Episodes: A Large Population-Based Cohort Study. Am J Kidney Dis. 2017;69(1):18-28. [PMID: 27555107, PMCID: PMC5176133, https://doi.org/10.1053/j.ajkd.2016.05.018].
2. Gameiro J, Fonseca JA, Outerelo C, Lopes JA. Acute Kidney Injury: From Diagnosis to Prevention and Treatment Strategies. J Clin Med. 2020;9(6). [PMID: 32498340, PMCID: PMC7357116, https://doi.org/10.3390/jcm9061704].
3. Khadzhynov D, Schmidt D, Hardt J, Rauch G, Gocke P, Eckardt KU, et al. The Incidence of Acute Kidney Injury and Associated Hospital Mortality. Dtsch Arztebl Int. 2019;116(22):397-404. [PMID: 31366430, PMCID: PMC6676729, https://doi.org/10.3238/arztebl.2019.0397].
4. Brar S, Ye F, James MT, Harrison TG, Pannu N, Interdisciplinary Chronic Disease Collaboration. Processes of Care After Hospital Discharge for Survivors of Acute Kidney Injury: A Population-Based Cohort Study. Am J Kidney Dis. 2024;83(2):216-28. [PMID: 37734688, https://doi.org/10.1053/j.ajkd.2023.07.015].
5. Georges TD, Marie-Patrice H, Ingrid TS, Mbua RG, Hermine FM, Gloria A. Causes and outcome of acute kidney injury amongst adults patients in two hospitals of different category in Cameroon; a 5 year retrospective comparative study. BMC Nephrol. 2022;23(1):364. [PMID: 36376867, PMCID: PMC9661768, https://doi.org/10.1186/s12882-022-02992-4].
6. Wang H, Lambourg E, Guthrie B, Morales DR, Donnan PT, Bell S. Patient outcomes following AKI and AKD: a population-based cohort study. BMC Med. 2022;20(1):229. [PMID: 35854309, PMCID: PMC9297625, https://doi.org/10.1186/s12916-022-02428-8].
7. BMJ Best Practice. Acute kidney injury criteria [Internet];. BMJ Best Practice. Available from: https://bestpractice.bmj.com/topics/en-gb/83/criteria.

8. Acute kidney injury: prevention, detection and management [Internet]; 2019. Available from: https://www.nice.org.uk/guidance/ng148.
9. Igiraneza G, Dusabejambo V, Finklestein FO, Rastegar A. Challenges in the Recognition and Management of Acute Kidney Injury by Hospitals in Resource-Limited Settings. Kidney Int Rep. 2020;5(7):991-9. [PMID: 32647756, PMCID: PMC7336002, https://doi.org/10.1016/j.ekir.2020.04.003].
10. Ogrinc G, Davies L, Goodman D, Batalden P, Davidoff F, Stevens D. SQUIRE 2.0 (Standards for QUality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. BMJ Qual Saf. 2016;25(12):986-92. [PMID: 26369893, PMCID: PMC5256233, https://doi.org/10.1136/bmjqs-2015-004411].
11. Ahmed FR, Al-Yateem N, Nejadghaderi SA, Gamil R, AbuRuz ME. Effect of acute kidney injury care bundle on kidney outcomes in cardiac patients receiving critical care: a systematic review and meta-analysis. BMC Nephrol. 2025;26(1):17. [PMID: 39794703, PMCID: PMC11721091, https://doi.org/10.1186/s12882-025-03955-1].
12. Munoz-Sanchez A, Martin-Rodriguez L, Lopez-Sanchez P, Valdenebro M, Serrano-Salazar ML, Marques M, et al. Intermediate and long-term AKI outcomes in a public health system. J Nephrol. 2025;38(7):1985-94. [PMID: 40751025, PMCID: PMC12484351, https://doi.org/10.1007/s40620-025-02367-6].
13. Sykes L, Nipah R, Kalra P, Green D. A narrative review of the impact of interventions in acute kidney injury. J Nephrol. 2018;31(4):523-35. [PMID: 29188454, PMCID: PMC6061256, https://doi.org/10.1007/s40620-017-0454-2].
14. Kotwal S, Herath S, Erlich J, Boardman S, Qian J, Lawton P, et al. Electronic alerts and a care bundle for acute kidney injury-an Australian cohort study. Nephrol Dial Transplant. 2023;38(3):610-7. [PMID: 35438795, https://doi.org/10.1093/ndt/gfac155].

ASIDE Health Sciences

Original Article

Perceived Roles of People Resource Groups in Cultural Awareness and Community Building: A Qualitative Interview Study in the U.S. Health System

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ABSTRACT

Background: Persistent inequities and the underrepresentation of marginalized groups in healthcare have been described as undermining workforce inclusion and patient experiences. People Resource Groups (PRGs) aim to support peer connection and institutional engagement; however, their roles in healthcare remain insufficiently characterized. This study examined how PRG members perceived their participation as contributing to cultural competence, equity, belonging, and professional identity within a healthcare organization.
Methods: Semi–structured interviews were conducted between April and November 2024 with seven members of two PRGs: FIRST Peoples (Indigenous) and Honor in Pride (LGBTQIA+). Interviews explored members' experiences and perceived impacts of PRG participation. Data were analyzed using primarily deductive thematic analysis guided by the Campinha–Bacote model of cultural competence (awareness, knowledge, skill, encounters, and desire), while allowing for inductive insights. Findings reflect participant perspectives rather than measured clinical or organizational outcomes.
Results: Four themes emerged. Participants described experiences of cultural invisibility in the workplace. They perceived that PRG participation supported cultural humility and inclusive communication, which they associated with strengthened physician–patient relationships. Participants described PRGs as fostering belonging and cross–cultural solidarity and attributed increased confidence to engage in organizational initiatives to this participation. They emphasized the need for leadership support, protected time, and structural flexibility, noting limitations related to underfunding and inconsistent institutional integration.
Conclusions: PRG members perceived that participation supported cultural competence, belonging, and engagement within their organization. These findings represent member perspectives and warrant further study across settings.

1. Introduction

Indigenous and LGBTQIA+ communities in the U.S. experience persistent health disparities rooted in historical trauma, structural inequities, and systemic prejudice, underscoring the need for healthcare environments that address structural barriers alongside clinical care [1–4]. Prior scholarship and participant narratives describe how health equity is shaped not only by clinical interventions but also by the cultural, structural, and relational contexts in which care is delivered, with implications for trust, continuity, and perceived quality [5–7]. Healthcare systems have increasingly pursued more inclusive environments through community – building initiatives intended to support both patient experience and workforce wellbeing [8–10].

One organizational strategy increasingly adopted across sectors is the use of People Resource Groups (PRGs), also referred to as employee or affinity resource groups. We intentionally use the term People Resource Group (PRG) rather than the more common Employee Resource Group (ERG) or affinity group to reflect this organization's emphasis on seeing beyond the employee role to center the whole person, recognizing individuals as human beings with lived experiences and identities that extend beyond formal employment, while also highlighting reciprocal resource-sharing, educational contribution, and institutional engagement rather than solely employee affiliation or social identity. In corporate settings, PRGs have been described as supporting employee engagement, mentorship, leadership development, and retention, as well as informing organizational culture and policy [11, 12]. In healthcare, however, the published literature is more limited and primarily consists of descriptive reports on group formation, recruitment initiatives, or mentorship structures rather than empirical examinations of members' experiences or perceived institutional impact. While healthcare PRGs are not absent from the literature, their experiential influence within clinical institutions, particularly regarding workforce belonging, professional identity development, and educational engagement, remains insufficiently characterized [3, 13, 14].

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This study explored how members of two interprofessional PRGs within a not – for – profit health system in Arizona perceived PRG participation as influencing their professional development, sense of belonging, and engagement in inclusive educational initiatives. In 2022, our institution received an American Board of Internal Medicine grant, "Building Trust through Diversity, Health Care Equity, and Inclusion in Internal Medicine Training," to strengthen care for Indigenous and LGBTQIA+ communities. As part of this effort, two PRGs were launched: FIRST (Fostering Indigenous Representation through Service and Tradition) Peoples and Honor in Pride (HIP), groups for Indigenous and LGBTQIA+ employees and allies, respectively. PRG activities included collaborating with the Internal Medicine residency program to co – develop curricula on Indigenous and LGBTQIA+ health, as well as advocacy and inclusion – focused initiatives within the workplace.

Given the limited empirical literature examining healthcare PRGs from the perspective of participants, we conducted semi – structured interviews with PRG members to explore: (1) how participants perceived PRG participation as shaping their professional development and sense of belonging within the organization; and (2) how participants described PRGs as contributing to inclusive education and culturally responsive approaches to care within their institution.

By centering members' lived experiences, this study addresses a gap in healthcare literature regarding the experiential and educational role of PRGs within clinical systems. The analysis focuses on participants' perspectives related to workforce belonging and educational engagement and does not evaluate clinical outcomes, physician – patient relationships, or organizational performance metrics.

1.1. Culturally Responsive Terminology

In alignment with the preferences of the FIRST Peoples PRG, we use the term "Indigenous" to honor the diverse cultures, histories, and languages of peoples across the Western Hemisphere [15]. This editorial choice reflects our commitment to cultural humility and respectful engagement, including our decision to lowercase "white" to de – center whiteness in discourse. Similarly, we use the LGBTQIA+ acronym to affirm a broad and evolving range of identities, including lesbian, gay, bisexual, transgender, queer, intersex, asexual, and aromantic individuals. The "+" signals the spectrum of experiences beyond binary definitions and underscores our intentional use of inclusive, culturally responsive language [15, 16].

2. Methods

2.1. Study Design and Framework

We employed a qualitative design using a primarily deductive thematic analysis guided by the Campinha – Bacote Model of Cultural Competence [17]. This process – oriented framework provided a structured lens for interpreting PRG member experiences, conceptualizing cultural competence as a lifelong journey across five interrelated constructs: cultural awareness (self – examination of bias), cultural knowledge (understanding cultural practices and beliefs), cultural skill (delivering respectful, appropriate care), cultural encounters (direct interactions with diverse populations), and cultural desire (intrinsic motivation to become culturally competent) [17]. While the analytic framework was deductively derived, the approach allowed for the addition of inductive codes when data did not fit existing constructs, consistent with a flexible, theory – informed qualitative design.

2.2. Participants and Sampling Strategy

We recruited participants via email to participate in this study voluntarily. Eligibility was purposefully restricted to PRG members who were actively involved in curricular co – production with the organization's Internal Medicine Residency Program, in addition to other PRG activities. Educational contributions included participation in panel discussions and communication-skills – based sessions.

This criterion reflects an intentional, high – engagement sampling strategy designed to elicit rich, information – dense accounts from participants with direct experience of bridging PRG participation and educational initiatives. We acknowledge that this approach likely privileges perspectives of highly engaged members and may bias findings toward more favorable appraisals of PRG impact; however, this design choice aligns with the study's aim to examine perceived experiential and educational influence rather than to capture the full range of PRG member perspectives.

Participants received branded organizational merchandise (approximate value <$25 USD) for their involvement in educational activities; this incentive was not contingent on participation in research interviews, and no additional compensation was provided for study participation.

Of the seven eligible members of the FIRST Peoples PRG, four participated in semi – structured interviews. Of the six eligible members of the Honor in Pride (HIP) PRG, three participated.

2.3. Participant Roles and Backgrounds

To protect confidentiality, only general professional roles and affiliations are reported. Participants represented a multidisciplinary workforce, including nursing, pharmacy, laboratory services, genetic counseling, and diversity leadership. All participant names are pseudonyms.

2.4. Data Collection

We developed a semi – structured interview guide informed by a targeted literature review and aligned with the study aims. The semi – structured format allowed participants to narrate their experiences while maintaining consistency across key domains.

Minor real – time refinements were made to the interview guide during early interviews (e.g., rewording prompts for clarity and adding probes to elicit concrete examples of educational engagement or professional development). These adaptations did not alter the core interview questions or analytic domains, which remained consistent across all interviews. A versioned interview guide was maintained to document changes and preserve methodological transparency.

Semi – structured interviews were conducted via Zoom from April to November 2024, with sessions averaging sixty minutes. Interviews explored participant experiences within PRGs, perceived influence on cultural awareness and inclusivity, involvement in resident education, and experiences navigating healthcare systems.

Informed consent was obtained from all participants involved in this study. Participants received detailed information about the study's purpose, procedures, the voluntary nature of participation, and confidentiality protections. Participants were offered the option to keep cameras on or off to prioritize comfort and privacy. All participants agreed to participate prior to the commencement of data collection. Interviews were audio – recorded, auto – transcribed using Zoom, and manually reviewed for accuracy before being uploaded to Dedoose for qualitative data management and coding.

2.5. Data Analysis

We conducted a primarily deductive thematic analysis using predefined codes aligned with the five constructs of the Campinha – Bacote Model.

The analytic approach was theory – informed and deductive in structure; however, we explicitly allowed for inductive code generation when participant narratives extended beyond the predefined constructs. Thus, the analysis followed a deductive framework with systematic openness to emergent, data – driven codes. A codebook was developed based on the Campinha-Bacote domains and iteratively refined throughout the analytic process through peer debriefing, member checking, targeted independent review by a second qualitative reviewer, and analytic consensus discussion, to incorporate inductive additions and clarify code boundaries.

2.6. Interview Guide: Iterations and Maintenance of Core Questions

During data collection, minor real – time refinements were made to the interview guide to improve clarity and depth. These refinements occurred after the first three interviews. They involved (1) rewording two questions for clarity, (2) adding one optional probe related to leadership support, and (3) reorganizing question order to improve conversational flow. No core questions were removed, and all participants were asked the same foundational questions aligned with the study's aims and theoretical framework.

To preserve comparability across interviews, a stable set of core questions was maintained throughout. Adaptations were limited to probes or clarifications and did not alter the substantive focus of inquiry.

2.7. Coding Process and Dependability Strategy

All interview transcripts were initially coded by a primary qualitative analyst using a predominantly deductive coding framework aligned with the Campinha-Bacote Model of Cultural Competence, with openness to inductive code development when participant narratives extended beyond predefined domains.

To strengthen analytic dependability, we implemented a multi-method validation strategy that integrated a second – reader review, peer debriefing, analytical consensus, and member checking. Among these approaches, peer debriefing served as the primary strategy for ensuring dependability, supplemented by a targeted second-reader review and member checking.

2.8. Second-Reader Review of Transcripts and Codebook

After the primary qualitative analyst completed initial coding, a second reader, a member of the research team, conducted an independent review of a subset of interview transcripts and the evolving codebook. This review examined code application consistency, thematic alignment, and areas of conceptual overlap among codes (e.g., cultural humility, openness, advocacy, and identity affirmation).

The second reader review functioned as a targeted dependability check rather than a full parallel dual-coding of the entire dataset. Feedback from this review informed the refinement of code definitions, the consolidation of overlapping codes, and the clarification of how codes were organized within the final thematic structure through analytic consensus discussion.

2.9. Peer Debriefing and Analytic Consensus

Peer debriefing served as a primary strategy for dependability and was conducted through regularly scheduled analytic meetings with the research team. During these sessions, the primary coder presented evolving codes, thematic structures, and illustrative excerpts for critical discussion. Team members examined code boundaries, challenged interpretive assumptions, questioned potential overextension of findings, and explored alternative explanations to ensure themes remained grounded in participant narratives.

2.10. Member Checking (Participant Transcript Review)

Member validation was also incorporated, with participants invited to review and reflect on summary interpretations of their narratives to confirm their resonance with their lived experiences. This process was intended to enhance credibility and ethical representation rather than to achieve consensus on thematic interpretations. Participants who engaged in transcript review did not request substantive changes to content, and no interviews were withdrawn. This form of participant validation focused on accuracy and representation rather than on co-analysis of themes.

2.11. Reflexivity and Positionality

To further enhance credibility, the primary analyst engaged in reflexive journaling throughout data collection and analysis. Reflexive documentation included analytic decisions, evolving interpretations, assumptions, and consideration of how insider positionality within the healthcare system might influence interpretation. Independent secondary review by a second coder further strengthened reflexivity by introducing an external analytic perspective and reducing reliance on a single interpretive lens.

2.12. Management of Insider Participation

One study participant was also a member of the research team. To mitigate potential bias, this individual was excluded from coding decisions and did not participate in analytic discussions involving their own interview transcript or quotations. Their involvement was limited to broader conceptual discussions unrelated to their personal data.

2.13. Analytic Adequacy and Information Power

Given the focused study aim, theory – informed framework, and high – engagement participant sample, the study prioritized depth of information over sample size. Analytic adequacy was assessed by the presence of redundancy within predefined theoretical domains and the absence of substantively new inductive codes. Findings are framed as context – specific and hypothesis – generating.

2.14. Methodological Limitations Related to Coding

Although peer debriefing, supported by targeted second – reader review and member checking, strengthens analytic rigor, we acknowledge that systematic parallel dual-coding across the entire dataset and formal inter-rater reliability testing were not conducted. Future qualitative studies would benefit from incorporating full dual-coding from project inception when feasible.

2.15. Ethical Review

This study was reviewed by the HonorHealth Institutional Review Board and determined to be exempt from human subjects research oversight due to its focus on professional experiences and minimal risk to participants.

3. Results

The findings of this study reveal interconnected dynamics among personal identity, workplace culture, and institutional structures that shape PRG members' experiences and contributions in the healthcare

setting. Four overarching themes emerged. First, through a lack of recognition, misrepresentation, and microaggressions, participants described how cultural invisibility eroded their sense of belonging and undermined equitable care. Second, PRG participation was perceived as a catalyst for strengthening physician – patient relationships by fostering cultural humility, inclusive communication, and trust, particularly through sharing lived experiences with physician trainees. Third, engagement in PRGs nurtured belonging, community – building, and cross – cultural solidarity, empowering members to advocate for institutional inclusion and policy change. Finally, participants highlighted that the sustainability and impact of PRGs depend on visible leadership commitment, structural flexibility, and tangible organizational support to overcome barriers such as scheduling conflicts, lack of recognition, and the emotional labor of equity work. These themes reflect participants' perceptions of how PRGs may function not only as affinity spaces but as potential contributors to cultural change within their organizational context.

Given the small size of PRG rosters and the potential for deductive identification, certain narrative details (e.g., specific clinical roles, departments, or event titles) have been generalized or omitted. Pseudonyms were used, and minor contextual modifications were made where necessary to preserve meaning while protecting participant confidentiality.

3.1. Theme I: PRG members describe their experiences of cultural invisibility in the workplace

Most participants described experiences of cultural invisibility in the healthcare workplace, which they reported eroding their sense of belonging and, in their view, could affect the quality of interpersonal and clinical interactions. Cultural invisibility refers to the experience of having one's cultural identity overlooked, minimized, or dismissed within dominant institutional settings [18]. Participants described this invisibility as manifesting through lack of representation, misrecognition, or dismissive comments, contributing to feelings of exclusion and alienation. Several participants further noted that such dynamics limited opportunities for cultural humility and, in their perception, could affect patient communication.

Several participants shared examples of colleagues overlooking or misunderstanding their identities. Aki (Indigenous PRG) described feeling culturally invisible in professional spaces prior to PRG involvement, a sentiment echoed by Taylor (LGBTQIA+ PRG). Taylor recalled overhearing colleagues' dismissive comments about pronoun use early in their employment. They described feeling "shocked" and "devastated," noting that the experience heightened their awareness of how identity is perceived in clinical environments. Taylor explained: "I include Pride in my email signature and share my pronouns in meetings. But in the back of my head, I sometimes wonder whether everyone respects that. I'd say the vast majority of physicians are fantastic… but we still have a long way to go." Similarly, Beni (Indigenous PRG) described instances in which colleagues demonstrated limited understanding of Indigenous cultures, including the use of culturally inappropriate language when referring to patients. Beni reflected, "People just don't know. They just need to be educated." Across interviews, several participants emphasized that healthcare professionals generally enter their fields with the intent to help patients. However, they expressed concern that without adequate cultural awareness and training, well – intentioned clinicians may inadvertently contribute to misunderstanding or marginalization. These reflections represent participants' perceptions of how invisibility may shape workplace climate and communication.

In addition to overt experiences, several participants reflected on the complexity of navigating intersecting identities. Riley (LGBTQIA+ PRG) noted that discrimination often stemmed from the reduction of identity to a single dimension, stating, "I'm more than just this one aspect of my identity." Indigenous PRG members described balancing dual cultural frameworks within professional practice. Shay (Indigenous PRG) discussed reconciling participation in traditional cultural practices with Western medical norms, describing this as both challenging and enriching.

While most participants reported experiences of invisibility or marginalization, one participant described predominantly supportive interactions with colleagues and emphasized variability across teams and departments. This counterpoint suggests that experiences of cultural invisibility were not uniform, even within the same institutional context.

Collectively, these narratives illustrate how participants experienced cultural invisibility as both an individual and structural phenomenon affecting professional identity, workplace climate, and, in their view, clinical communication. Participants emphasized the importance of institutional commitment to inclusive practices and culturally grounded education to address these gaps.

3.2. Theme II: PRG participation was perceived to strengthen physician – patient relationships by promoting cultural humility and inclusive communication

Most members described PRG participation as reinforcing the importance of cultural humility in physician – patient interactions. They emphasized that sharing their lived experiences within healthcare settings can inspire humility, trust, and empathy, which they believed could strengthen communication with patients from diverse backgrounds. These reflections represent participants' perceptions of how PRG engagement may influence clinical relationships rather than direct measurement of patient outcomes.

Several participants emphasized that humility is foundational to effective care. Riley (LGBTQIA+ PRG) described a need for openness in physician – patient relationships, particularly for individuals from marginalized communities who may carry prior negative healthcare experiences. Riley explained that even a single dismissive interaction can shape a patient's long – term willingness to seek care. Similarly, Dakota (Indigenous PRG) reflected that "initial visits are where people get their lasting impressions," underlining the perceived importance of culturally attentive first encounters.

Across both PRGs, participants consistently described humility as involving acknowledgment of one's knowledge gaps and willingness to learn. Beni (Indigenous PRG) noted that healthcare professionals who are vulnerable and who openly recognize limits in their cultural understanding create more meaningful interactions with patients. Participants characterized such acknowledgment not as weakness but as a core component of culturally responsive care.

Several LGBTQIA+ PRG participants similarly emphasized that cultural competency requires adaptability rather than perfection. Casey (LGBTQIA+ PRG) stated: "Physicians need to accept that they'll make mistakes and be open to learning from them… It's not about being perfect but about approaching situations with openness and willingness to adapt." Participants described this mindset as essential for building trust with patients whose identities may not align with dominant cultural norms, aligning with broader discussions of humility as foundational to continuous professional growth in healthcare.

Most participants also reflected on their involvement in co – produced educational sessions for resident physicians. They reported that residents appeared receptive and engaged when hearing directly

from PRG members. These observations are based on participant perception, as residents were not interviewed in this study. Several participants described perceiving increased curiosity and thoughtful questioning from residents during sessions. Beni (Indigenous PRG) described perceiving a "hunger" among some learners to better understand Indigenous patient experiences.

Dakota (Indigenous PRG) described how communication norms within Indigenous communities, such as avoiding direct expressions of pain, may be misunderstood by providers unfamiliar with these practices. They described a clinical encounter involving an elderly Navajo – speaking patient in which limited interpreter access and cultural understanding led to a difficult visit. Despite their shared heritage and efforts to assist, the communication barriers were not fully resolved. Dakota (Indigenous PRG) interpreted this experience as illustrating the limits of individual cultural awareness in the absence of adequate structural language support. Several participants emphasized that while individual humility is necessary, it is insufficient in the absence of structural support. Limited interpreter access, time constraints, and unclear clinical role expectations during educational simulations were described as barriers that could undermine even well – intentioned efforts at culturally responsive care. For example, participants involved in standardized patient sessions noted that residents sometimes appeared uncertain about the clinical context (e.g., inpatient versus outpatient setting), and in one instance, inaccurate information about HIV pre – exposure prophylaxis (PrEP) was shared. These experiences reinforced participants' view that cultural humility must be paired with accurate clinical knowledge and institutional preparation to meaningfully improve care.

Aki (Indigenous PRG) reflected that participation in PRG activities and resident sessions could encourage clinicians to consider alternative communication approaches: "I think just having PRG groups and having that representation and encouragement will help us do better for our patients, whether it's just learning how to communicate better or learning how to communicate differently to patients." Shay (Indigenous PRG) similarly emphasized that physicians who listen attentively and demonstrate genuine interest in patients' cultural backgrounds are more likely, in their view, to build trust. Riley (LGBTQIA+ PRG) stated, "When patients feel safe, they're more likely to open up." While participants described these anticipated downstream effects, the present study did not assess patient – level outcomes.

Participants also described using PRG forums to highlight how seemingly small clinical interactions may carry lasting significance for marginalized patients. Taylor (LGBTQIA+ PRG) noted, "It was a great opportunity to show residents how even small interactions, like dismissive comments, can have a lasting impact." Riley (LGBTQIA+ PRG) reflected on conversations with residents: "Yes, we may have a label associated with one of the PRG groups, but all of us are unique and multifaceted individuals. I feel like that really goes a long way." From Beni's (Indigenous PRG) perspective, some residents appeared open and willing to learn more about Indigenous patient experiences, though participants acknowledged variability in engagement. Dakota (Indigenous PRG) noted that sustained exposure and practice might be necessary for learning to "sink in," suggesting that single sessions alone may be insufficient for lasting change.

When asked how PRG participation influenced their own perceptions, Aki (Indigenous PRG) described feeling that they were "contributing something valuable" and becoming more integrated within the organizational community. Importantly, Aki (Indigenous PRG) also offered a nuanced counterpoint regarding the limits of PRG impact on their immediate work environment. While Aki (Indigenous PRG) described PRG participation as meaningful for validating identity and contributing to resident learning, they noted that their day-to-day clinical work setting remained largely unchanged. As Aki (Indigenous PRG) explained, participation in PRG activities did not directly alter routine workflows or workplace dynamics, underscoring that perceived educational and relational benefits did not necessarily translate into observable changes in the immediate work environment. This perspective highlights that PRG influence may be experienced more strongly in educational, relational, or personal domains than in structural workplace conditions. Observing resident interest during sessions was described as "rewarding." Participants suggested that recognizing the potential educational influence of their contributions enhanced their motivation to remain engaged in PRG activities.

Although most participants were optimistic about the influence of PRG – informed education, one participant offered a contrasting perspective, questioning whether brief educational exposures alone were sufficient to meaningfully alter entrenched communication patterns, suggesting that sustained reinforcement would likely be necessary. Participants also acknowledged that the broader impact of PRG – informed education may be shaped by variable engagement and participation within the PRGs themselves. Some described limited attendance at events or inconsistent involvement among members, suggesting that the reach of educational efforts may depend on sustained organizational support and protected time for participation.

Together, participants perceived PRG involvement as creating opportunities to model humility, share culturally grounded perspectives, and encourage more inclusive communication practices. At the same time, they recognized that the translation of these efforts into sustained clinical change likely requires structural reinforcement, accurate clinical preparation, and consistent organizational support. Although direct clinical or educational outcomes were not measured, participants described PRG engagement as contributing to a culture that aspires to openness, reflective practice, and patient – centered care, while acknowledging the limits of brief or inconsistently supported interventions.

3.3. Theme III: PRG participation was perceived to build belonging and cross – cultural solidarity, fostering member engagement in institutional inclusion efforts

Most participants described PRG participation as creating networks of emotional and professional support that deepened their sense of belonging within the organization. Many participants, particularly those from historically underrepresented backgrounds, characterized PRGs as spaces where aspects of their identity felt recognized and affirmed.

Aki (Indigenous PRG) reflected on initial hesitancy to join the Hispanic PRG due to uncertainty about "fully qualifying or belonging." With encouragement from a manager, Aki (Indigenous PRG) chose to participate and described eventually finding meaningful connection: "I understood the culture and the hardships people face. It's not about being a perfect fit; it's about bringing that awareness to healthcare and making a difference." Aki (Indigenous PRG) later described feeling "super excited" when the Indigenous PRG was formed, observing that it felt distinct yet aligned with broader efforts to increase representation in healthcare settings. Rather than describing this shift as transformative at an institutional level, Aki (Indigenous PRG) framed it as personally affirming and motivating. They further emphasized that the sense of belonging they developed through PRG involvement was not automatic, but required personal effort, vulnerability, and active participation. They

described belonging as something that had to be "pushed for," noting that meaningful connection emerged only when individuals showed up consistently, advocated for themselves, and were willing to engage despite uncertainty or discomfort. This account highlights that while PRGs may create supportive structures, the experience of belonging is co-constructed through both institutional opportunity and individual agency.

Similarly, Shay (Indigenous PRG) described being encouraged by a colleague to become involved in PRG activities. Initially uncertain about the purpose of PRGs, Shay described conducting independent research and becoming inspired by observing community outreach efforts. When learning that a Native – focused PRG was forming, Shay described feeling "compelled to get involved," linking participation to a desire to support their community. These narratives reflect participants' perceptions of PRGs as entry points into both identity affirmation and broader institutional engagement.

Several participants emphasized the role of informal social gatherings in cultivating belonging. Taylor (LGBTQIA+ PRG) described hosting recurring social events intended to foster connection: "The number one way to get people more involved is to build connections… We started hosting monthly gatherings where we simply hang out. This year, after building more connections, we had over 50 participants!" Taylor interpreted this to be a sign that members were finding value in these interactions. Participants noted that rotating meeting times and offering varied formats (e.g., coffee meetups, family – friendly events) were perceived as responsive to member needs, suggesting that low – barrier, relationship – centered activities contributed to participants' sense of inclusion and engagement.

For many participants, representation and recognition were central motivators for continued involvement. Shay (Indigenous PRG) remarked, "They want to hear our voices… They really wanted my input." Dakota (Indigenous PRG) described involvement in PRG – related education as feeling part of "something bigger than myself." Taylor (LGBTQIA+ PRG) similarly stated that contributing to resident education "made me feel like my voice mattered." Aki (Indigenous PRG) reflected, "I felt like I was being heard, or at least seen… I felt really proud of myself for putting myself out there." Participants consistently linked these experiences to enhanced personal engagement within the organization. Importantly, these reflections describe perceived shifts in individual sense of belonging rather than measured changes in institutional climate. Consistent with this distinction, Aki (Indigenous PRG) also noted that participation in PRG activities did not markedly change their immediate day-to-day work environment. While involvement reinforced their belief in the importance of PRG advocacy and strengthened their motivation to participate, Aki (Indigenous PRG) described routine workplace expectations and workflows as largely unchanged. This counterpoint underscores that PRG benefits were often experienced at the level of personal meaning, validation, and engagement, rather than through observable structural or environmental change.

For some participants, this strengthened sense of belonging was associated with increased willingness to engage in advocacy efforts. Taylor (LGBTQIA+ PRG) described feeling purposeful in working toward more inclusive care environments. Members of the LGBTQIA+ PRG discussed advocating for inclusive restroom signage and respectful pronoun usage on intake forms. These examples were described as participant – initiated efforts aimed at promoting inclusivity. The present study did not evaluate the implementation or outcomes of these advocacy efforts but captures how participants understood PRGs as supportive spaces for raising such concerns.

Participants also described cross – cultural solidarity across PRGs. Although Indigenous and LGBTQIA+ PRGs differed in focus, members emphasized perceived shared goals related to visibility, psychological safety, and equity. Riley (LGBTQIA+ PRG) stated: "I'm more than happy to show up in solidarity with the Black, American Indian, Veterans, or any other PRGs because we do have a lot of the same struggles." Beni (Indigenous PRG) noted, "It's reciprocal... I advocate for what's right because I feel a sense of belonging." Participants framed solidarity not as uniformity across identities, but as mutual recognition of overlapping experiences of marginalization.

Several participants described cultural humility and self – reflection as foundational to sustaining cross – group engagement. Riley and Taylor (LGBTQIA+ PRG) reflected on learning from other PRGs and recognizing both differences and shared challenges. Participants described this process as ongoing rather than complete, emphasizing learning and relationship – building over definitive institutional change. This aligns with the idea that solidarity is not just about advocacy but also about self – examination and understanding one's position within broader systems of power [19].

Not all participants described uniformly strong cross – group engagement, representing a deviant perspective within the sample. One participant noted that while solidarity across PRGs was encouraged, collaboration between groups remained sporadic and often dependent on individual relationships rather than formal structures. Another reflected that some employees may remain hesitant to join PRGs due to concerns about visibility or perceived stigma. These perspectives suggest that while belonging was widely described, participation may still be shaped by personal and contextual factors.

Collectively, participants perceived PRGs as spaces that foster belonging, relational connection, and cross – cultural engagement. While institutional outcomes were not directly assessed, participants consistently described PRG involvement as strengthening their sense of voice, visibility, and motivation to participate in inclusion – related efforts within the organization, while also recognizing, through counterpoints such as Aki's (Indigenous PRG), that these benefits were neither uniform nor automatic and did not necessarily translate into immediate changes in workplace structure or climate.

3.4. Theme IV: PRGs participation was perceived to require sustained leadership support, protected time, and structural flexibility to address participation barriers

Participants described multiple barriers that they perceived as limiting sustained engagement in PRG activities. These included scheduling constraints, variability in leadership support, and the emotional labor associated with advocacy and organizational change efforts. Rather than presenting these challenges as universal, participants described them as contextual and variable across roles and departments. For example, Riley (LGBTQIA+ PRG) emphasized the challenge of scheduling, especially for those working night shifts and those without flexibility in their workday: "The biggest challenge I experience in participating in LGBTQIA+ is really timing and scheduling because I work the night shift." Several participants described perceiving that PRG participation was sometimes expected to occur outside regular work hours or during lunch breaks. These expectations were described as discouraging for some employees. Participants framed protected time during work hours as an important facilitator of equitable participation, particularly for hourly staff or those in patient – facing roles.

Shay (Indigenous PRG) described a different type of participation barrier related to navigating personal cultural boundaries. Raised off

reservation and within both Christian and Indigenous traditions, Shay (Indigenous PRG) expressed initial uncertainty about participating in certain traditional ceremonies. Shay (Indigenous PRG) described addressing this by communicating boundaries openly with group leadership, which allowed continued engagement without compromising personal beliefs. Participants described such flexibility as important for sustaining inclusive spaces within PRGs themselves.

Leadership support was also described as influential in shaping participation experiences. Several participants emphasized the perceived importance of visible executive endorsement and structural backing. Beni (Indigenous PRG) stated, "It has to come from the top," reflecting a belief that leadership engagement signals institutional legitimacy. Beni further noted a desire for greater executive visibility to encourage broader participation. Some participants expressed concern that without sustained institutional commitment, PRGs could risk becoming under – resourced or symbolic rather than structurally supported.

At the same time, leadership experiences were not uniformly described as limited. A small number of participants reported having supervisors who actively encouraged PRG engagement during work hours and expressed support for their involvement. These accounts suggest that participation conditions may vary considerably across departments and reporting structures.

Other participants described encountering barriers, including canceled meetings or limited administrative follow – through. Taylor (LGBTQIA+ PRG) reflected: "At first, it went nowhere, meetings were canceled, emails ignored… Sometimes, you just need to do it and ask for permission later." Rather than framing this solely as resistance, participants described it as part of navigating complex organizational systems. Dakota (Indigenous PRG) perceived that increased institutional backing over time contributed to expanded group activity, though participants did not describe formal evaluation of these efforts. Sustaining engagement was also described as challenging. Riley (LGBTQIA+ PRG) and Beni (Indigenous PRG) both discussed difficulties maintaining consistent participation despite initial enthusiasm, citing demanding clinical workloads and differences in scheduling flexibility between salaried and hourly employees. These constraints were described as structural rather than individual shortcomings.

Participants additionally highlighted the emotional labor involved in advocating for inclusion – related changes. Taylor (LGBTQIA+ PRG) noted: "Some members have been told they shouldn't send emails or attend meetings during work hours. That's frustrating because the PRG work directly benefits [the organization]." While participants perceived PRG efforts as beneficial, they also described feeling that the labor required to sustain momentum was sometimes underrecognized. These accounts reflect participants' experiences of navigating both visible and less visible dimensions of organizational change work.

Together, participants perceived that sustained PRG engagement required more than informal acknowledgment. They emphasized the importance of protected time, leadership visibility, and structural flexibility to facilitate equitable participation. Although the present study did not evaluate institutional policy or leadership perspectives, participants consistently described structural support as central to the long – term viability of PRG initiatives.

4. Discussion

The findings of this study highlight PRG members' perceptions of how participation contributed to experiences of affirmation, belonging, and professional engagement within their healthcare organization. Participants described PRGs not merely as peer – support spaces, but as forums through which they could share lived experiences, reflect on identity, and engage with institutional processes. These descriptions should be understood as participant – reported perceptions rather than evidence of demonstrated organizational change, and they reflect participant narratives rather than independently verified institutional effects.

Importantly, our findings are limited to participants' reported experiences and perceptions. While participants described PRGs as influencing workplace culture and professional engagement, we did not directly measure clinician behavior change, curriculum effectiveness, patient outcomes, or institutional performance metrics. Therefore, any discussion of potential organizational or patient – level impact should be interpreted as hypothesis – generating rather than as established outcomes.

Our findings suggest that participants described PRGs as potentially contributing to institutional conversations about equity and inclusion, framing these contributions as aspirational rather than as established organizational functions.

4.1. Strengthening PRG Infrastructure Through Healthcare Leadership

Participants emphasized the importance of equity – focused leadership in supporting PRG sustainability and engagement, aligning with existing literature on leadership's role in fostering cultural awareness and inclusion [20–24]. Importantly, participants suggested that leadership support would ideally include adequate funding, dedicated staffing, and protected time for PRG members to fulfill their roles effectively. They emphasized that without this infrastructure, PRG efforts were perceived as being at risk of becoming symbolic, episodic, and vulnerable to turnover or shifting organizational priorities.

To provide effective and culturally inclusive leadership in healthcare, prior literature suggests it is important that there are structured opportunities for self – reflection and skill – building in culturally inclusive communication to enable leaders to recognize their own identity, biases, and assumptions, address systemic inequities, and learn more about the diverse backgrounds and lived experiences of their team [21, 25, 26]. For healthcare leaders, introspection that is centered around cultural awareness and understanding was perceived as potentially influencing how they approach their leadership position [25]. However, because this is not an innate trait for most, intentional self – reflection should not be assumed as a natural part of leadership development, and efficiency and clinical outcomes often take precedence in the realm of healthcare [25].

For this reason, prior literature suggests that leadership development programs benefit from explicitly teaching skills in critical self – examination, including how to question assumptions, recognize implicit bias, and understand how positional power shapes others' experiences [20–23, 25]. One way healthcare organizations can nurture this development is by expanding Cultural Knowledge through engagement with PRGs, as described by participants and supported by prior literature, as Cultural Knowledge is essential for fostering equity – focused leadership in a diverse organization [17, 20–23]. Leaders who are well versed in the challenges faced by marginalized communities can better support PRGs and ensure that institutional policies align with their needs [25].

Participants described sustained, visible leadership support as important for the perceived success and legitimacy of PRGs within their organization [27]. As highlighted by participants in both

the LGBTQIA+ and Indigenous PRGs, managerial and executive support was described as contributing to participants' sense of belonging and willingness to engage [27–29]. Further, equipping leaders to facilitate cross – PRG collaboration was described by participants as a way to support perceptions of intergroup solidarity and reduce silos, rather than as a demonstrated driver of broader organizational impact [30, 31]. Moreover, when PRGs are meaningfully resourced with staffing support, protected time, and access to decision – making spaces, their contributions to DEI goals were perceived by participants as more consistent rather than intervallic [32].

Leadership development programs and performance evaluations could consider assessing Cultural Skill competencies, equipping leaders to anticipate and dismantle structural barriers [20–23]. We frame this as a recommendation informed by participant narratives and existing literature, rather than as a tested intervention within this study.

Participants also described aspirational views of PRGs serving as more formally recognized contributors to institutional equity efforts within healthcare settings. These views reflected participant hopes and priorities rather than empirically observed organizational outcomes. Positioning PRGs in this way reinforces the importance of integrating their insights into organizational strategy. However, in this study, such positioning was described aspirationally by participants; we did not evaluate whether or how these integrations translated into measurable institutional change. Participants suggested that sustainability may involve more deliberate, phased approaches to growth, including clearer alignment with organizational mission statements, performance metrics, and operational plans [32, 33]. Such integration was perceived by participants as one way institutions might signal commitment and provide greater visibility for PRG efforts [32, 33].

In prior scholarship, PRGs have been conceptualized as potential contributors to institutional change when meaningfully supported and integrated into organizational structures [20–23, 32, 33]. PRGs have been described in the literature as theoretically positioned to influence organizational culture when sufficiently resourced and integrated [34, 35]. We reference this literature to contextualize participant narratives rather than to suggest that such outcomes were observed in the present study. PRGs can serve as consultative bodies that bring forward critical perspectives on hiring practices, retention strategies, and community engagement, while also addressing systemic inequities that impact marginalized groups [34]. Their contributions can extend beyond representation, with the potential of offering actionable solutions that enhance institutional resilience and accountability which may contribute to improved perceptions of engagement, team dynamics, and accountability [34–36].

When PRGs are conceptualized as strategic assets and guided by culturally responsive leadership, participants perceived that PRGs could inform equity – oriented conversations and priorities within their organizational context [34]. We did not measure improved patient outcomes, clinician performance, or system – level metrics, and thus such impacts remain areas for future empirical study.

This study was informed by Campinha – Bacote's model of cultural competence, which conceptualizes competence as an ongoing process involving cultural awareness, knowledge, skill, encounters, and desire [17]. Throughout our analysis, participants frequently described processes aligned with cultural humility, particularly critical self – reflection, recognition of power imbalances, and lifelong learning [25]. We conceptualize cultural humility not as a replacement for competence, but as a relational and reflective orientation that operationalizes key elements of Campinha – Bacote's framework within PRG contexts [37]. In this study, PRGs appeared to facilitate cultural encounters and awareness (competence domains) through narrative exchange and reflective dialogue (humility practices) [17, 21, 22, 38]. We therefore view competence and humility as complementary constructs, with humility functioning as a mechanism through which competence is continually developed [17, 21, 22, 38].

4.2. Centering PRG Narratives in Clinical Education to Advance Cultural Competence and Humility

Importantly, while PRG members served as educators and facilitators of resident physician learning, their involvement in these roles was also described by participants as contributing to their own development in cultural competence [21, 22]. The act of teaching, mentoring, and engaging in outreach was perceived as supporting resident education and as reinforcing PRG members' self-awareness, cultural knowledge, and commitment to inclusive care [38, 39]. This reciprocal process highlights the perceived educational value of culturally grounded leadership and peer-based learning [38–41].

Early exposure to PRGs during medical training has been described in prior literature as immersing resident learners in authentic, culturally grounded narratives that may challenge biases and support the development of more inclusive care practices [38, 42]. Narrative-based training rooted in lived experience has similarly been associated in prior studies with empathy development, person-centered care, and increased comfort navigating cultural complexity in clinical settings [38]. PRG-led educational sessions are therefore conceptualized in the literature as providing cultural encounters that reinforce the importance of cultural humility and self-awareness in healthcare delivery [17, 21, 22, 38]. For example, a co – produced Indigenous Health curriculum delivered in partnership with Indigenous PRG members significantly improved resident physicians' self – reported knowledge about Indigenous communities and enhanced perceived communication skills [43]. We cite these findings to contextualize participant narratives rather than as evidence of educational impact within the present study, as they reflect perceived educational outcomes rather than objectively measured clinical effects [43].

To support the potential continuity of such educational efforts, healthcare institutions may consider sustained support for PRGs by involving them in medical curriculum design, faculty development, and broader equity strategies [34, 44]. These recommendations are offered as practice considerations informed by participant narratives and existing scholarship, rather than as interventions evaluated or tested within this study.

4.3. Facilitating Intersectional Solidarity and Cross – PRG Collaboration

PRG members in our study often navigated dual or intersecting identities that shaped both their lived experiences and professional roles. Intersectionality, the overlapping of race, ethnicity, gender, sexuality, and cultural heritage, creates layered dynamics of marginalization and privilege that influence how individuals are perceived, how they engage with systems of power, and how they advocate for themselves and their communities [19, 30, 31]. For healthcare professionals, cultivating intersectional awareness is essential for fostering stronger relationships, improving team dynamics, and delivering equitable care [19, 31]. Structured reflection practices, such as identity mapping and narrative sharing, can deepen this awareness by validating complex lived realities and encouraging critical examination of how one's own identity and social position affect the interpretation of others' experiences [25]. Within PRG

and peer support settings, listening through an intersectional lens, acknowledging power imbalances, validating lived experience, and fostering mutual understanding can transform surface level engagement into meaningful connection and collective growth [19, 29, 31].

The significance of solidarity across PRGs in our study was apparent in participant narratives. Many described how engagement across identity groups seemed to broaden their understanding and empathy [30, 31]. However, it is important to note that while cross – PRG collaboration was widely viewed positively, dissenting perspectives were limited in our sample. This may reflect self – selection bias, as participants who chose to be interviewed may have been more engaged or more satisfied with PRG involvement. Future research should intentionally sample individuals with neutral or critical perspectives to more fully capture variation in experiences.

Healthcare organizations may consider developing structured strategies to facilitate intergroup alliances, such as cross – community events and collaborative education programs [30, 31]. These suggestions are grounded in participant experiences and supported by prior literature and are offered as practice implications rather than as evidence-based interventions evaluated within this study.

4.4. Addressing Social Desirability and Insider Dynamics

An important limitation of this study relates to the potential influence of social desirability bias and insider dynamics. Participants were interviewed within their employing healthcare system, and some were engaged in DEI – adjacent work. These contextual factors may have influenced how participants described their experiences, potentially emphasizing positive aspects of PRGs or aligning responses with perceived institutional values.

To mitigate response pressure, participants were informed that interviews were confidential, participation was voluntary, and findings would be reported in aggregate without attribution to identifiable roles. The interviewer was not in a direct supervisory relationship with participants, and raw transcripts were not shared with institutional leadership. Nevertheless, we acknowledge that power dynamics and organizational loyalty may have shaped responses. Future research conducted by external evaluators or across multiple institutions may help further reduce insider influence.

5. Limitations

This study has several limitations. The focus on only two PRGs may not capture the experiences of other marginalized populations. Participants were self – selected, which may have overrepresented positive experiences. Conducted within a single healthcare system, findings may not generalize in other contexts.

Additionally, we did not measure objective outcomes such as clinician behavior change, patient satisfaction, retention rates, or institutional performance metrics. Our findings therefore reflect perceived experiences rather than demonstrable system – level effects.

As noted above, social desirability bias and insider dynamics may have influenced participant responses despite mitigation efforts.

Future research should incorporate broader samples across multiple institutions, intentionally include dissenting or disengaged perspectives, and integrate measurable organizational and patient – level outcomes to evaluate PRG effectiveness more rigorously.

6. Conclusion

PRGs were perceived by participants to play an important role within healthcare organizations by addressing cultural invisibility, promoting a sense of belonging, and creating supportive spaces for marginalized healthcare workers.

Because participants perceived their educational involvement as meaningful, PRG members described reinforced cultural awareness, validation of their lived experiences, and a strengthened sense of belonging and commitment to inclusive practice. These reflections describe participants' internal and relational experiences and should not be interpreted as evidence of changes in resident clinical practice or patient care. Participation in PRG-informed educational activities was experienced by participants as mutually reinforcing, in that contributing to resident learning was perceived to deepen PRG members' engagement, empowerment, and sense of belonging within the organization.

The study found that PRGs were described by participants as most sustainable and meaningful when recognized and supported within organizational processes. PRG members reported that visible leadership involvement, such as attending PRG events or publicly endorsing initiatives, was perceived as validating their work and as contributing positively to their sense of belonging. Participants also highlighted that structural support, including flexibility to participate during work hours and formal recognition of contributions, was perceived as reducing emotional labor associated with engagement and encouraging sustained involvement.

Importantly, our findings reflect the lived experiences and perceptions of PRG members within a single healthcare system. We did not measure organizational accountability, institutional performance outcomes, or patient – experience indicators. Therefore, while participants described PRGs as influencing workplace culture and educational practices, the extent to which these perceptions translate into measurable systemic change remains an empirical question for future study.

This research contributes to the growing body of knowledge on healthcare equity, workforce inclusion, professional development, cultural competence, cross – cultural solidarity, and organizational leadership by centering the narratives of PRG members. Our findings suggest that PRGs are perceived by participants as supporting belonging and educational contribution within the contexts studied.

A concrete next step for this line of inquiry would be a mixed – methods evaluation that pairs qualitative inquiry with quantitative measures, such as validated belonging and retention metrics among healthcare workers and patient – experience indicators to empirically assess whether and how PRG engagement is associated with measurable organizational and clinical outcomes.

Conflicts of Interest

The authors declare no competing interests that could have influenced the objectivity or outcome of this research.

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Institutional Review Board (IRB)

This study was reviewed by the HonorHealth Institutional Review Board and determined to be exempt from human subject research oversight, based on its focus on professional experiences and minimal risk to participants.

Large Language Model

A large language model (OpenAI ChatGPT, GPT-5.3-mini) was used for language editing and stylistic refinement of the manuscript. The use of this tool was restricted to improving clarity and grammar and did not involve generation of scientific content or modification of study results. The authors take full responsibility for the integrity of the final manuscript.

Author Contributions

JB contributed to conceptualization, methodology, investigation, formal analysis, writing original draft preparation, writing review and editing, and project administration. SJ contributed to conceptualization, methodology, and writing review and editing. DS contributed to conceptualization, writing review and editing, and supervision. PR contributed to conceptualization, writing review and editing, and supervision.

Data Availability

The data supporting the findings of this study are not publicly available due to the sensitive and confidential nature of the participant narratives. Access to the data is restricted to protect the privacy of the participants. However, de–identified excerpts from the data may be made available upon reasonable request to the corresponding author, subject to ethical approval and institutional guidelines.

References

1. Lewis ME, Blackmore I, Kamaka ML, Wildcat S, Anderson-Buettner A, Modde E, et al. "Understand the Way We Walk Our Life": Indigenous Patients' Experiences and Recommendations for Healthcare in the United States. Int J Environ Res Public Health. 2025;22(3). [PMID: 40238544, PMCID: PMC11941805, https://doi.org/10.3390/ijerph22030445].
2. Lewis ME, Wildcat S, Anderson A. Visioning an Effective Health Encounter: Indigenous Healthcare Experiences and Recommendations for Health Professionals. Int J Environ Res Public Health. 2023;20(20). [PMID: 37887655, PMCID: PMC10606678, https://doi.org/10.3390/ijerph20206917].
3. Mitchell LA, Jacobs C, McEwen A. (In)visibility of LGBTQIA+ people and relationships in healthcare: A scoping review. Patient Educ Couns. 2023;114:107828. [PMID: 37301011, https://doi.org/10.1016/j.pec.2023.107828].
4. Nguyen NH, Subhan FB, Williams K, Chan CB. Barriers and Mitigating Strategies to Healthcare Access in Indigenous Communities of Canada: A Narrative Review. Healthcare (Basel). 2020;8(2). [PMID: 32357396, PMCID: PMC7349010, https://doi.org/10.3390/healthcare8020112].
5. Chantarat T, Rogers TB, Mitchell CR, Ko MJ. Perceptions of workplace climate and diversity, equity, and inclusion within health services and policy research. Health Serv Res. 2023;58(2):314-24. [PMID: 35808931, PMCID: PMC10012221, https://doi.org/10.1111/1475-6773.14032].
6. Gresh A, Ahmed N, Boynton-Jarrett R, Sharifi M, Rosenthal MS, Fenick AM. Clinicians' Perspectives on Equitable Health Care Delivery in Group Well-Child Care. Acad Pediatr. 2023;23(7):1385-93. [PMID: 37302699, https://doi.org/10.1016/j.acap.2023.06.010].
7. Stanford FC. The Importance of Diversity and Inclusion in the Healthcare Workforce. J Natl Med Assoc. 2020;112(3):247-9. [PMID: 32336480, PMCID: PMC7387183, https://doi.org/10.1016/j.jnma.2020.03.014].
8. Boland EM, Martin I, Jordan B, Decker-Tonnesen P, Bhagra A. Enhancing Belonging in Healthcare: A Commentary on Strategies for Organizational Leadership. J Healthc Leadersh. 2025;17:117-21. [PMID: 40242833, PMCID: PMC12001412, https://doi.org/10.2147/JHL.S473636].
9. Kizilkaya S. The mediating role of physician trust in the relationship between medical mistrust and health-care system distrust. Cir Cir. 2024;92(1):46-51. [PMID: 38537240, https://doi.org/10.24875/CIRU.23000102].
10. O'Neill B, Ferrer R, O'Brien P, Watt G, Gottlieb L, Pinto A, et al. Improving Equity Through Primary Care: Proceedings of the 2019 Toronto International Conference on Quality in Primary Care. Ann Fam Med. 2020;18(4):364-9. [PMID: 32661039, PMCID: PMC7358019, https://doi.org/10.1370/afm.2560].
11. Dhandayuthapani DSP, Shalini MK. A Conceptual Study On Employee Engagement And Its Impact On Employee Retention In Healthcare. International Journal of Research Publication and Reviews. 2024;5(5):7203-6. [https://doi.org/10.55248/gengpi.5.0524.1303].
12. Lafferty M, Strange W, Kaboli P, Tuepker A, Teo AR. Patient Sense of Belonging in the Veterans Health Administration: A Qualitative Study of Appointment Attendance and Patient Engagement. Med Care. 2022;60(9):726-32. [PMID: 35880766, PMCID: PMC9378705, https://doi.org/10.1097/MLR.0000000000001749].
13. Jahan T, Yadav DA. The Impact of Employee Silence on Healthcare and Wellbeing in Sustainable Communities. International Journal of Research Publication and Reviews. 2024;5(9):3199-202. [https://doi.org/10.55248/gengpi.5.0924.2673].
14. Schlachter S, Rolf S, Welbourne TM. Dynamics of Employee Resource Groups: Leader Experiences Driving Mutual Benefits for Employees and Employers. Compensation & Benefits Review. 2023;56(3):119-37. [https://doi.org/10.1177/08863687231192179].
15. Fox MJ, Wu H. Terminology and Language Used in Indigenous-Specific Gender and Sexuality Diversity Studies: A Systematic Review. Social Sciences. 2023;12(3). [https://doi.org/10.3390/socsci12030145].
16. McEwing E, Black T, Zolobczuk J, Dursun U. Moving Beyond the LGBTQIA+ Acronym: Toward Patient-Centered Care. Rehabil Nurs. 2022;47(5):162-7. [PMID: 35687562, https://doi.org/10.1097/RNJ.0000000000000378].
17. Campinha-Bacote J. The Process of Cultural Competence in the Delivery of Healthcare Services: a model of care. J Transcult Nurs. 2002;13(3):181-4; discussion 200-1. [PMID: 12113146, https://doi.org/10.1177/10459602013003003].
18. BenGhida D, Schellini M. Shadows Amidst: Cultural Identity in the Spectrum of Visibility and Invisibility. Photography and Culture. 2024;18(1):77-86. [https://doi.org/10.1080/17514517.2024.2414685].
19. Mosley TJ, Zajdel RA, Alderete E, Clayton JA, Heidari S, Perez-Stable EJ, et al. Intersectionality and diversity, equity, and inclusion in the healthcare and scientific workforces. Lancet Reg Health Am. 2025;41:100973. [PMID: 40321651, PMCID: PMC12049688, https://doi.org/10.1016/j.lana.2024.100973].
20. Buki LP, Quintero Johnson JM, Knight K, Walton A. "Cultural and conceptual knowledge": Reformulation and conceptual analysis of a key component of the health literacy model. Soc Sci Med. 2024;356:117150. [PMID: 39088929, https://doi.org/10.1016/j.socscimed.2024.117150].
21. Constantinou CS, Andreou P, Nikitara M, Papageorgiou A. Cultural Competence in Healthcare and Healthcare Education. Societies. 2022;12(6). [https://doi.org/10.3390/soc12060178].

22. Gulati S, Weir C. Cultural Competence in Healthcare Leadership Education and Development. Societies. 2022;12(2). [https://doi.org/10.3390/soc12020039].
23. Pasztor J. Cultural Intelligence (CQ) and Cultural Exposure Through Mobility Programs. GiLE Journal of Skills Development. 2021;1(1):50-66. [https://doi.org/10.52398/gjsd.2021.v1.i1.pp50-66].
24. Restivo V, Minutolo G, Battaglini A, Carli A, Capraro M, Gaeta M, et al. Leadership Effectiveness in Healthcare Settings: A Systematic Review and Meta-Analysis of Cross-Sectional and Before-After Studies. Int J Environ Res Public Health. 2022;19(17). [PMID: 36078706, PMCID: PMC9518077, https://doi.org/10.3390/ijerph191710995].
25. Argyriadis A, Patelarou E, Paoullis P, Patelarou A, Dimitrakopoulos I, Zisi V, et al. Self-Assessment of Health Professionals' Cultural Competence: Knowledge, Skills, and Mental Health Concepts for Optimal Health Care. Int J Environ Res Public Health. 2022;19(18). [PMID: 36141554, PMCID: PMC9517303, https://doi.org/10.3390/ijerph191811282].
26. Sze GW, Yuin YS, Durganaudu H, Pillai N, Yap CG, Jahan NK. Narrative Review of Leadership Development Programs among Medical Professionals. OALib. 2021;08(06):1-12. [https://doi.org/10.4236/oalib.1107555].
27. Konieczna A. The experience of social (in)visibility in narratives about ostracism. Communications. 2025;50(4):838-58. [https://doi.org/10.1515/commun-2023-0153].
28. Ford LG, Lewis C, Volberding JL. The Perceptions and Experiences Among Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Agender Patients of Quality of Care With Health Care Services. International Journal of Athletic Therapy and Training. 2024;29(3):130-5. [https://doi.org/10.1123/ijatt.2022-0140].
29. Grailey KE, Murray E, Reader T, Brett SJ. The presence and potential impact of psychological safety in the healthcare setting: an evidence synthesis. BMC Health Serv Res. 2021;21(1):773. [PMID: 34353319, PMCID: PMC8344175, https://doi.org/10.1186/s12913-021-06740-6].
30. Policardo GR, Prati F, Burak C, Van Assche J, Rubini M. Fostering Solidarity Among Ethnic Minority Groups: Addressing the Role of Inter-Minority Contact in Cross-Cultural Contexts. Int Rev Soc Psychol. 2025;38:14. [PMID: 41127327, PMCID: PMC12539338, https://doi.org/10.5334/irsp.1096].
31. Young R, Ayiasi RM, Shung-King M, Morgan R. Health systems of oppression: applying intersectionality in health systems to expose hidden inequities. Health Policy Plan. 2020;35(9):1228-30. [PMID: 33179072, https://doi.org/10.1093/heapol/czaa111].
32. Schmidt M, Steigenberger N, Berndtzon M, Uman T. Cultural diversity in health care teams: A systematic integrative review and research agenda. Health Care Manage Rev. 2023;48(4):311-22. [PMID: 37615941, https://doi.org/10.1097/HMR.0000000000000379].
33. Dib K, Belrhiti Z. Unpacking the black box of interprofessional collaboration within healthcare networks: a scoping review. BMJ Open. 2025;15(6):e101702. [PMID: 40514237, PMCID: PMC12164625, https://doi.org/10.1136/bmjopen-2025-101702].
34. Haile SC. Communities of practice in action: how employee resource groups broker knowledge for underrepresented employees. Equality, Diversity and Inclusion: An International Journal. 2025:1-20. [https://doi.org/10.1108/edi-02-2025-0110].
35. Whalen DH, Lewis ME, Gillson S, McBeath B, Alexander B, Nyhan K. Health effects of Indigenous language use and revitalization: a realist review. Int J Equity Health. 2022;21(1):169. [PMID: 36437457, PMCID: PMC9703682, https://doi.org/10.1186/s12939-022-01782-6].
36. Holcomb D, Gonyer M. Inclusive Language and Culturally Responsive Formal Mentorship. Critical Social Work. 2024;25(2). [https://doi.org/10.22329/csw.v25i2.7903].
37. Tsuchida RE, Doan J, Losman ED, Haggins AN, Huang RD, Hekman DJ, et al. Cultural Humility Curriculum to Address Healthcare Disparities for Emergency Medicine Residents. West J Emerg Med. 2023;24(2):119-26. [PMID: 36976587, PMCID: PMC10047734, https://doi.org/10.5811/westjem.2023.1.58366].
38. Mazzoli Smith L, Villar F, Wendel S. Narrative-based learning for person-centred healthcare: the Caring Stories learning framework. Med Humanit. 2023;49(4):583-92. [PMID: 37208190, PMCID: PMC10803961, https://doi.org/10.1136/medhum-2022-012530].
39. Beasley C, Jones-Locklear J, Jacobs MA. Cultural Competence with American Indian Clients: Workforce and Personal Development. N C Med J. 2021;82(6):423-6. [PMID: 34750223, https://doi.org/10.18043/ncm.82.6.423].
40. Becker ES. Exploring the Peer Leadership Network of Rehabilitation Healthcare Professionals Following Leader Development Training. J Healthc Leadersh. 2024;16:39-52. [PMID: 38288295, PMCID: PMC10823868, https://doi.org/10.2147/JHL.S443203].
41. Cipta DA, Andoko D, Theja A, Utama AVE, Hendrik H, William DG, et al. Culturally sensitive patient-centered healthcare: a focus on health behavior modification in low and middle-income nations-insights from Indonesia. Front Med (Lausanne). 2024;11:1353037. [PMID: 38681051, PMCID: PMC11047771, https://doi.org/10.3389/fmed.2024.1353037].
42. Távora I, Saqib SI, Kauser S. Advancing Equality, Diversity and Inclusion Through Voice for All: The Role of Employee Resource Groups. British Journal of Management. 2025;37(1). [https://doi.org/10.1111/1467-8551.70025].
43. Jain S, Brocchini J, Radhakrishan P, Sall D. Preparing IM Residents to Care for Indigenous Peoples: A Co-Produced Indigenous Health Curriculum. J Gen Intern Med. 2025;40(14):3340-4. [PMID: 40634651, PMCID: PMC12586802, https://doi.org/10.1007/s11606-025-09729-7].
44. Chen YS, Liao KC, Yau SY. From hesitation to participation: a narrative review of facilitators and barriers for healthcare professionals' engagement in medical education research. BMC Med Educ. 2025;25(1):302. [PMID: 40001074, PMCID: PMC11852885, https://doi.org/10.1186/s12909-025-06792-w].

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Review Article

Tuberculosis in People Experiencing Homelessness During the COVID-19 Era: A Narrative Review of Primary Observational Evidence

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ABSTRACT

Background: Tuberculosis (TB) remains a significant global public health problem, disproportionately affecting people experiencing homelessness (PEH). During the COVID-19 pandemic, healthcare resources were redirected, potentially disrupting TB monitoring and care for this already vulnerable population.
Methods: This review of primary observational studies was conducted using PubMed, LILACS, SciELO, Cochrane Library, CAPES Periódicos, and ScienceDirect. Searches used the terms [(Tuberculosis) AND (homeless people) AND (COVID)] and [(Tuberculosis) AND (unhoused) AND (COVID)], covering publications from 2020 to November 2025. Secondary reviews identified during the search were excluded from the primary evidence set and used solely for background contextualization.
Results: The studies documented high rates of unfavorable TB outcomes among PEH — including treatment discontinuation, prolonged hospitalization, and elevated mortality — across multiple settings and healthcare contexts. Each study employed a distinct operational definition of homelessness, limiting direct cross-study comparisons. Where PEH-specific denominators were available, outcomes were substantially worse than general population comparators. Evidence on TB–COVID coinfection specifically within PEH remains scarce; most relevant estimates come from broader vulnerable or mixed populations and are considered indirect evidence.
Conclusion: Structural vulnerabilities — including inadequate housing, barriers to healthcare access, and high comorbidity burden — are the primary drivers of poor TB outcomes in PEH. Pandemic-era care disruptions were associated with worsened TB indicators in the general population; among PEH, outcomes remained persistently high across periods, suggesting a pre-existing ceiling of vulnerability. The descriptive nature of the available primary evidence constrains causal attribution.

1. Introduction

Tuberculosis is a neglected tropical disease caused primarily by Mycobacterium tuberculosis, the most epidemiologically significant species within the genus Mycobacterium, and it affects individuals of all ages but disproportionately impacts adults in low- and middle-income countries due to socioeconomic vulnerabilities that heighten exposure and hinder access to care [1, 2]. Transmission occurs mainly through the inhalation of bacilli released into the air when individuals with active pulmonary tuberculosis cough, speak, or sneeze, while ingestion of milk contaminated with M. bovis represents a less common gastrointestinal transmission route [1, 3]. Infectivity persists as long as bacilli are present in sputum, typically declining after approximately 15 days of appropriate treatment. However, ongoing risks persist in communities burdened by overcrowding, limited ventilation, and poor living conditions, all of which amplify the potential for transmission. Furthermore, the disease's lengthy and complex treatment regimen often results in low adherence, which compromises therapeutic success, prolongs infectiousness, and perpetuates transmission cycles, particularly among populations experiencing social inequality and restricted access to healthcare services.

Tuberculosis remains a significant public health problem. In Brazil, more than 85,000 new cases were reported in 2024, representing a significant increase over previous years, even relative to the pre-pandemic period, when annual totals did not exceed 80,000 cases (including new and retreatment cases). Among new cases of confirmed pulmonary tuberculosis, 36.2% were closed due to abandonment – a proportion 2.6 times the WHO-established 5% threshold – during the 2020 – 2022 period. This increase appears to be related to disruptions in health services and systems caused by the COVID-19 pandemic [4–7].

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), responsible for COVID-19, has infected more than 35.5 million Brazilians since 2020, causing an infectious respiratory disease transmitted through small liquid particles and often characterized by a severe inflammatory response that disrupts immune function [8, 9]. Both pulmonary tuberculosis and COVID-19 affect the respiratory system, potentially causing permanent alterations that compromise lung parenchyma and pulmonary function [10–12].

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During the COVID-19 pandemic, priority public health care was concentrated on SARS-CoV-2 containment, which significantly affected the monitoring and treatment of other diseases, including TB – reflected in reductions in case notifications and likely increases in undiagnosed patients [10, 13–16].

People experiencing homelessness (PEH) form a heterogeneous and vulnerable population surviving in conditions of extreme material deprivation – including lack of stable shelter, basic sanitary conditions, and economic resources – which renders them susceptible to infectious diseases, treatment barriers, and adverse health outcomes. During the SARS-CoV-2 pandemic, the homeless population grew in several settings at a rate disproportionate to general population growth [17, 18].

Despite growing literature on TB and COVID-19, evidence specifically addressing PEH remains fragmented, heterogeneous, and methodologically limited. Most available studies employ divergent operational definitions of homelessness, and PEH-specific denominators are often not reported separately from broader vulnerable-population data. Understanding the TB burden and care disruptions experienced by PEH during the COVID-19 era – and distinguishing direct from indirect evidence – is essential for informing targeted public health responses.

The objective of this narrative review was to describe TB-related outcomes and care disruptions among people experiencing homelessness (PEH) during the COVID-19 era (2020 – 2025) using primary observational evidence.

2. Methods

This narrative review was designed to synthesize primary observational evidence on TB-related outcomes among PEH during the COVID-19 era. A narrative approach was selected given the substantial heterogeneity of the available evidence across study designs, population definitions, and outcome measures, which precluded a formal meta-analytic synthesis. No formal protocol was pre-registered; this methodological limitation is acknowledged.

Primary studies were prioritized to anchor the main findings. Secondary reviews (Laycock et al., 2021; Zhu et al., 2023) identified during the search were excluded from the primary evidence set and are used solely to contextualize background information, mechanisms, or service-delivery dynamics [19, 20]. These secondary sources are clearly distinguished from primary study findings throughout the manuscript.

2.1. Search Strategy

Searches were conducted in six databases: PubMed (MEDLINE), LILACS (Virtual Health Library), SciELO (Scientific Electronic Library Online), Cochrane Library, CAPES Periódicos, and Elsevier/ScienceDirect. Searches were performed between October and November 2025, covering publications from 1 January 2020 to 30 November 2025. Language limits: English, Portuguese, and Spanish.

The core search combined the following term sets: [(Tuberculosis) AND (homeless people) AND (COVID)] and [(Tuberculosis) AND (unhoused) AND (COVID)]. In PubMed, MeSH terms were used: ("Tuberculosis"[MeSH Terms] OR "Tuberculosis"[Title/Abstract]) AND ("Ill-Housed Persons"[MeSH Terms] OR "homeless people"[Title/Abstract] OR "unhoused"[Title/Abstract] OR "people experiencing homelessness"[Title/Abstract]) AND ("COVID-19"[MeSH Terms] OR "SARS-CoV-2"[Title/Abstract] OR "COVID"[Title/Abstract]). Equivalent DeCS-based terms were applied in LILACS and SciELO; adapted free-text strategies were used in the remaining databases as described in Supplementary Table S1.

2.2. Eligibility Criteria

The review question was structured using a PECO framework: Population (P) – people experiencing homelessness; Exposure (E) – the COVID-19 pandemic era (2020 onward); Comparator (C) – pre-pandemic period and/or general population, where applicable; Outcomes (O) – TB-related indicators including incidence, treatment interruption, hospitalization, mortality, and TB – COVID coinfection.

Inclusion criteria required that studies: (1) were published between 2020 and 2025; (2) reported outcomes for a population that explicitly included PEH or a clearly separable PEH subgroup; and (3) addressed at least one TB-related outcome. Qualitative and quantitative studies published in Portuguese, English, or Spanish were eligible.

Studies were excluded if they were duplicate records; focused exclusively on sheltered populations, preventing comparison with unsheltered individuals; did not address the specified TB-related outcomes; were case reports; or were secondary reviews (which were retained only for contextual use). Given the Brazilian context – where a substantial proportion of the homeless population is unsheltered and exposed to conditions of extreme street vulnerability – studies focusing exclusively on sheltered populations were not prioritized.

Secondary reviews identified through the search were not counted among the included primary studies and were not formally appraised for quality. Their use is restricted to contextualizing background and mechanistic information.

2.3. Study Selection and Data Extraction

A total of 306 records were identified across all databases. After removal of 20 duplicates, 286 records remained for title and abstract screening. Of these, 259 were excluded at the screening stage for the following reasons: population not addressing PEH (n=98); no TB-related outcome reported (n=87); study did not address the COVID-19 period or context (n=52); publication outside the eligible period (n=22). Twenty-seven full-text articles were assessed for eligibility. Eighteen were excluded at full-text review: secondary reviews repositioned as contextual references (n=2); case reports (n=3); PEH subgroup not separable from broader population (n=6); outcomes not meeting inclusion criteria (n=4); duplicate data source (n=2); language not covered by the review (n=1). Seven primary studies were included in the final qualitative synthesis, plus two contextual secondary reviews supported the writing of this review **(Figure 1)**.

Study selection was conducted in two sequential stages by two independent reviewers, with discrepancies resolved by consensus or consultation with a third reviewer. Data were extracted independently by both reviewers using a standardized extraction form.

2.4. Data Synthesis

Given the heterogeneity of included studies, a narrative synthesis approach was adopted. Studies were organized into three thematic domains: (1) TB-related clinical outcomes among PEH; (2) TB diagnosis and treatment continuity during the COVID-19 era; and (3) TB – COVID coinfection. An explicit evidence hierarchy was applied: PEH-specific quantitative studies (retrospective and prospective cohorts, case-control studies) anchor the main findings; descriptive and surveillance analyses provide supporting context; qualitative evidence illuminates mechanisms, barriers, and service-delivery dynamics. Findings across domains are reported with

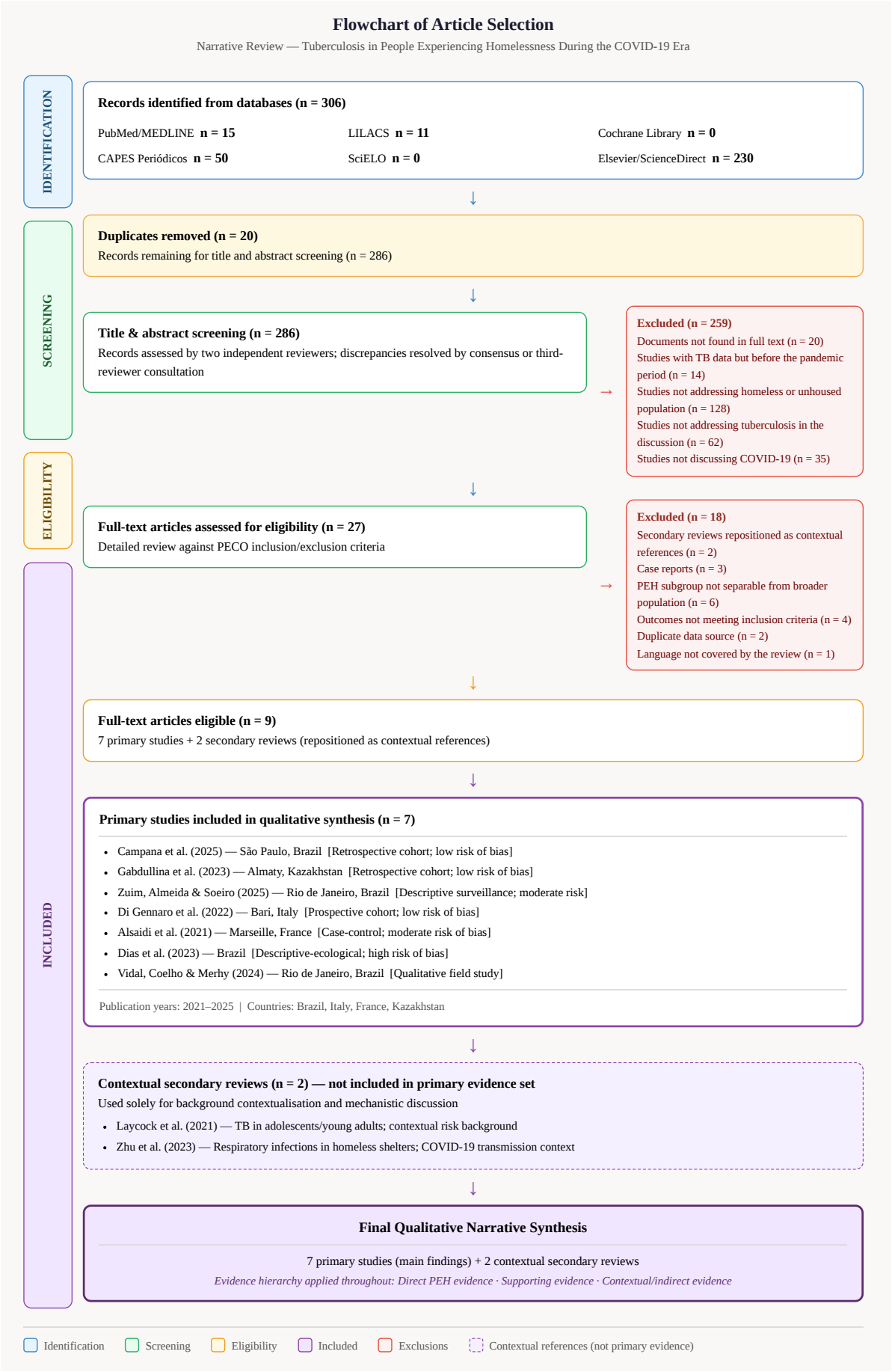

Figure 1: Flowchart of Article Selection.

explicit identification of study designs and PEH-specificity of the data.

2.5. Risk of Bias Assessment

Design-specific appraisal tools were applied as follows: the Newcastle – Ottawa Scale (NOS) was used for observational cohort and case-control studies (Di Gennaro et al., Gabdullina et al., Campana et al., Alsaidi et al.)[21–24]; the CASP Qualitative Checklist was used for the qualitative field study (Vidal et al.)[25]; and the Joanna Briggs Institute (JBI) Prevalence Checklist was applied to descriptive and surveillance-based studies (Dias et al., Zuim et al.)[26, 27]. Secondary reviews (Laycock et al., Zhu et al.) were not formally appraised, as they were excluded from the primary evidence set [19, 20]. Individual quality ratings are reported in Supplementary Table S2 and inform interpretation but do not function as formal inclusion thresholds.

3. Results

The seven included primary studies were conducted across multiple countries and settings, including Brazil, Italy, France, and Kazakhstan. Study designs included retrospective cohorts (Gabdullina et al., Campana et al., Di Gennaro et al.)[22–24], a case-control study (Alsaidi et al.)[21], prospective observational analyses (Di Gennaro et al.)[23], and descriptive surveillance analyses (Dias et al., Zuim et al., Vidal et al.)[25–27]. Publication years ranged from 2021 to 2025. **(Table 1)** summarises key characteristics, including the operational definition of homelessness used in each study and the degree to which PEH-specific data are separable from broader populations.

The risk-of-bias assessment revealed substantial variability in methodological quality. Three studies with robust designs and appropriate adjustment for confounding (Di Gennaro et al., Gabdullina et al., Campana et al.)[22–24] were classified as low risk, and the study by Alsaidi et al. was classified as moderate risk due to limited comparability or partial representativeness of PEH [21]. The remaining studies were at high risk of bias due to indirect populations, descriptive designs, or a lack of control for confounding. Full ratings are provided in Supplementary Table S2.

In interpreting these findings, readers should note that the included studies employ heterogeneous operational definitions of homelessness – ranging from formally street-dwelling adults to shelter residents, shared dormitory occupants, and administrative or socially vulnerable classifications. These differences limit direct cross-study comparability, and findings from studies with indirect or partial PEH definitions are explicitly labeled as such throughout this section.

Evidence hierarchy note: *The following results are presented according to an explicit evidence hierarchy. PEH-specific quantitative studies drive the primary findings (labeled 'Direct PEH evidence'). Descriptive and surveillance analyses provide supporting context (labeled 'Supporting evidence'). Qualitative and contextual literature are used to explain mechanisms and barriers (labeled 'Contextual/indirect evidence').*

Direct PEH evidence – Campana et al. (2025; São Paulo, Brazil; retrospective cohort; low risk of bias): In São Paulo, between 2017 and 2022, more than 39,000 TB cases were reported. Among PEH specifically, the proportion of unfavorable outcomes remained persistently high and statistically stable across the pre-pandemic and pandemic periods (57.8% pre-pandemic vs. 59.5% pandemic; no significant period-associated risk). Dropout rates were approximately 50%, and TB mortality exceeded 8% throughout. In contrast, unfavorable outcomes in the general population increased significantly during the pandemic period (from 21.8% pre-pandemic to 28.9% during the pandemic; HR 1.45; 95% CI: 1.37 – 1.55). These PEH-specific figures represent the most methodologically robust estimates of pandemic-era changes in TB outcomes in this population available in the reviewed literature [22].

Direct PEH evidence – Gabdullina et al. (2023; Almaty, Kazakhstan; retrospective cohort; low risk of bias): A retrospective study of TB treatment outcomes among socially vulnerable populations from 2018 to 2021 found that unfavorable outcomes increased markedly during the pandemic period compared with the pre-pandemic period (20% vs. 11%). Mortality rose (9% vs. 6%). After adjustment for age, sex, HIV status, and alcohol use, homelessness was independently associated with unfavorable outcomes (aRR approximately 2.7 – 2.9). These PEH-specific adjusted estimates are among the strongest quantitative evidence available for homelessness as a risk factor for poor TB outcomes [24].

Direct PEH evidence – Zuim, Almeida & Soeiro (2025; Rio de Janeiro, Brazil; descriptive surveillance; moderate risk of bias): A descriptive analysis of Rio de Janeiro surveillance data from 2016 to 2021 documented 2,965 TB cases among the homeless population – 1,708 (57.6%) new cases and 1,257 (42.4%) retreatment cases. Treatment interruption rates were high: 50.3% in new cases and 61.1% in retreatment cases. Proportions of deaths were 10.1% and 6.5%, respectively. The authors noted that COVID-19 worsened pre-existing inequalities and TB indicators in this population [27].

Direct PEH evidence – Di Gennaro et al. (2022; Bari, Italy; prospective cohort; low risk of bias): Among 206 TB-diagnosed patients admitted from 2013 to 2021, 17 (8.3%) were identified as experiencing homelessness. Overall treatment success was 57%; TB-attributable mortality was 1% (n=4). Social vulnerability – including homelessness and prolonged street residence – was associated with longer hospitalization duration, particularly among patients under 65 years of age (43 vs. 24 days). This study provides direct PEH-specific clinical outcome data within a broader cohort, though the PEH subgroup is small [23].

Supporting evidence – Dias et al. (2023; Brazil; descriptive-ecological; high risk of bias): A national descriptive analysis of pulmonary TB in Brazil from 2019 to 2021 estimated that PEH accounted for 4.2% of all pulmonary TB diagnoses nationally, with the Southern Region showing the highest proportional representation. Structural barriers – including underreporting, insufficient primary care coverage, and limited community health agent outreach – were identified as persistent drivers of diagnostic delay and treatment dropout. These findings provide national surveillance context but do not enable PEH-specific outcome calculations independent of broader population data [26].

Contextual/indirect evidence – Alsaidi et al. (2021; Marseille, France; case-control; moderate risk of bias): In a case-control study of 64 participants from a mixed vulnerable population – including immigrants and individuals experiencing homelessness, supported by a social assistance organization – conducted during March – May 2020, 23.4% were hospitalized. Risk factors for COVID-19 infection included shared dormitory residence, poor social distancing adherence, and prior TB history or multiple comorbidities. This study provides contextual evidence regarding COVID-19 risk in mixed vulnerable populations that included PEH, but PEH-specific outcomes are not separable from the broader study population [21].

Contextual/indirect evidence – Vidal, Coelho & Merhy (2024; Rio de Janeiro, Brazil; qualitative field study; CASP appraisal): A qualitative study conducted between May and December 2021,

Table 1: Literature compilation relating to cases of tuberculosis in people experiencing homelessness (PEH) during the COVID-19 pandemic.

Reference	Country	Design	Study duration	Homelessness Definition	TB / COVID Variables	Outcomes	Main Results
Laycock et al.	Not specified (multi-context)	Narrative review	2016–2021	Vulnerable youth including those in homelessness (implicit, not formally defined)	TB progression risk; age-related immunological susceptibility; vulnerability factors	TB infection and progression risk	TB progression increases with age (due to puberty-related immunological changes). Homeless and marginalized youth have higher TB risk due to healthcare access barriers and congregate living.
Alsaidi et al.	France (Marseille)	Observational study	March 2020 to May 2020	Individuals in vulnerable housing, including homelessness and shared dormitories (AAJT-supported population)	COVID-19 infection; TB history; comorbidities; living conditions	COVID-19 infection; hospitalization	23.4% hospitalized. COVID-19 risk associated with shared dormitories, poor social distancing, prior TB, and comorbidities.
Di Gennaro et al.	Bari (Italy)	Prospective cohort	From January 13, 2013, to December 15, 2021	Individuals identified as homeless within TB patient cohort (no formal definition provided)	TB diagnosis delay; hospitalization; treatment outcomes	Treatment success; mortality; hospitalization duration	8% homeless. Younger patients (< 65) had longer diagnostic delay and hospitalization. Overall treatment success 57%; mortality 1%. Social vulnerability influenced longer hospitalization.
Dias et al.	Brazil	Observational analysis	2019–2021	People living on the streets (structural/social definition)	Pulmonary TB incidence; social determinants; healthcare access	TB diagnosis, treatment adherence, transmission	Homeless represented 4.2% of TB cases. Structural barriers (underreporting, weak primary care) contribute to delayed diagnosis, treatment dropout, and ongoing transmission.
Zuim, Almeida & Soeiro	Rio de Janeiro (Brazil)	Observational (surveillance-based)	2016–2021	Homeless population (administrative classification)	TB incidence; treatment adherence; COVID-19 context	Treatment interruption; mortality	2,965 TB cases among the homeless. High dropout (50–61%) and mortality (6.5–10.1%). COVID-19 worsened inequalities and TB indicators.
Vidal, Coelho & Merhy	Rio de Janeiro (Brazil)	Observational (surveillance-based)	Between May and December 2021	Homeless population (a conceptual approach within the SUS)	Social determinants; access to healthcare (not necessarily specific to TB or COVID)	Access, care, vulnerability of professionals from the "street clinic" linked to a basic health unit	They highlight structural barriers to care for the homeless population, including fragmented care, difficulties in accessing services, and the need for strategies such as mobile clinics.
Gabdullina et al.	Almaty (Kazakhstan)	Retrospective cohort	2018–2021	Socially vulnerable populations including homelessness (not formally defined)	TB treatment outcomes; COVID-19 period comparison	Unfavorable outcomes; mortality	Unfavorable outcomes increased during COVID-19 (20% vs. 11%); mortality rose (9% vs. 6%). Homelessness independently associated with poor outcomes (aRR ~2.7–2.9).
da Silva Campana et al.	São Paulo (Brazil)	Retrospective cohort	2017–2022	Homeless subgroup within TB registry (not formally defined)	TB outcomes; COVID-19 period; diagnostic use	Unfavorable outcomes; dropout; mortality	Unfavorable outcomes increased in general population (21.8%→28.9%). Among homeless: persistently high unfavorable outcomes (~58–60%), dropout ~50%, mortality > 8%. No significant pandemic effect in this subgroup.
Zhu et al.	Multi-country	Systematic review	2020–2021	Shelter users vs. non-sheltered homeless	COVID-19 prevalence; TB infection risk	Infection prevalence; asymptomatic cases	Up to 86% asymptomatic COVID-19 in shelters. Higher SARS-CoV-2 prevalence in shelters vs. unsheltered. Frequent shelter use linked to higher TB infection risk due to prolonged exposure.

TB, tuberculosis; COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; AAJT, Association d'Aide aux Jeunes Travailleurs; SUS, Sistema Único de Saúde; aRR, adjusted relative risk.

from the perspective of healthcare professionals linked to street clinics, documented structural barriers to TB care for PEH: fragmented service delivery, difficulties in maintaining continuity of care, and reliance on mobile outreach units as a compensatory strategy. These findings are used to explain mechanisms and service-delivery context rather than to quantify outcomes [25].

Supporting evidence – Laycock et al. (2021; narrative review; repositioned as contextual reference): As a secondary review, this work is not included in the primary evidence set. It is noted here for contextual purposes: focusing on TB in adolescents and young adults aged 10 – 24 years from 2016 to 2021, the review documented that TB progression risk increases with puberty-related immunological changes, and that homeless and marginalized youth face elevated TB risk due to congregate living and healthcare access barriers. This provides background to understand age-specific TB vulnerability [19].

Contextual reference – Zhu et al. (2023; systematic review; repositioned as contextual reference): As a secondary review, this work is not included in the primary evidence set. For context: this systematic review of 21 articles documented that mass testing in shelter settings identified high proportions of asymptomatic COVID-19 cases (up to 86% in one study) and that shelter users had higher SARS-CoV-2 prevalence than unsheltered PEH. Prolonged shared environments were the main transmission factor identified for TB in this setting [20, 28].

4. Discussion

This narrative review synthesized primary observational evidence from seven studies to describe TB-related outcomes and care disruptions among PEH during the COVID-19 era. The evidence hierarchy applied throughout this synthesis distinguishes between PEH-specific quantitative studies – which anchor the primary conclusions – and descriptive, qualitative, or contextual sources, which are used to explain mechanisms and service-delivery dynamics. Collectively, findings indicate a severe and disproportionate TB burden in this population, characterized by persistently high rates of treatment interruption, prolonged hospitalizations, and elevated mortality [29]. These patterns predate the COVID-19 era; available evidence suggests that the pandemic in PEH did not uniformly worsen them, though disruptions in the broader population are well documented.

4.1. Structural Drivers of Poor TB Outcomes in PEH

Across the primary studies reviewed, PEH consistently showed substantially worse TB outcomes than general-population comparators when such data were available [29, 30]. The most methodologically robust evidence – from Campana et al. (2025) and Gabdullina et al. (2023) – confirms that unfavorable TB outcomes (treatment discontinuation, mortality, loss to follow-up) are far more prevalent among PEH than in the general population, and that homelessness is independently associated with poor outcomes even after adjustment for major confounders (aRR 2.7 – 2.9) [22, 24, 30].

The structural drivers of these outcomes are consistent across settings, despite differences in healthcare systems and geographic contexts compound these vulnerabilities [28, 29, 31]: (i) at the individual level, impaired self-care capacity, mental health conditions, and substance use disorders interfere with treatment adherence; (ii) at the social level, stigma, overcrowding, poor ventilation, and food insecurity facilitate TB transmission and disease progression; (iii) and programmatic factors, limited access to primary healthcare, fragmented service delivery, and treatment interruptions [29]. The qualitative evidence from Vidal et al. (2024) contextualizes these mechanisms from the perspective of healthcare providers working in street outreach settings, illustrating the operational challenges of maintaining continuity of care for this population [25].

Brazilian national surveillance data consistently document high dropout rates (50 – 61%) and substantial mortality (6.5 – 10.1%) among PEH with TB [26, 27]. While these studies have methodological limitations, including reliance on administrative definitions of homelessness and the absence of adjustment for confounding, their consistency across different Brazilian settings reinforces the pattern documented in more robust study designs.

4.2. TB Outcomes During the COVID-19 Era Among PEH

The relationship between the COVID-19 era and TB outcomes among PEH is best characterized as amplifying pre-existing structural vulnerabilities rather than as a uniformly causal effect of the pandemic. The available evidence does not consistently demonstrate a statistically significant pandemic-associated deterioration in PEH-specific TB outcomes, but it documents persistently severe baseline conditions.

The São Paulo registry analysis, the most methodologically robust study available for this question, used time-stratified comparisons and proportional hazard models to demonstrate a clear pandemic-associated increase in unfavorable outcomes among the general population (HR 1.45; 95% CI: 1.37 – 1.55) [22]. Among PEH, however, unfavorable outcomes remained statistically stable and persistently high across periods (57.8% pre-pandemic vs. 59.5% pandemic). This pattern could reflect a ceiling effect – outcomes were already so severe among PEH that pandemic-related disruptions produced no measurable marginal increase – or a protective effect of specialized, PEH-targeted services that maintained some continuity of care. The Kazakhstan cohort, from a different healthcare system, documented a different pattern: unfavorable outcomes increased during the pandemic period (from 11% to 20%), with elevated mortality, and identified homelessness as an independent predictor of these outcomes [24].

Declines in TB notification rates and service disruptions during the pandemic are well documented in broader population analyses [32]. Still, these estimates are not PEH-specific and are treated as contextual evidence rather than direct support for PEH-specific conclusions. Pandemic-related disruptions are biologically and epidemiologically plausible in PEH, given limited access to hygiene, healthcare, and stable housing; however, the extent to which these dynamics specifically affected PEH TB outcomes – beyond the already severe baseline – remains insufficiently quantified in the current primary evidence base.

4.3. TB – COVID Coinfection: Evidence and Limitations

Evidence on TB – COVID coinfection specifically within PEH is scarce. Most available estimates of coinfection outcomes are derived from broader population meta-analyses, which document higher fatality rates among coinfected individuals than among COVID-19-only cases [33–35]. These estimates are biologically plausible in PEH given the high prevalence of active TB and immunosuppressive comorbidities in this group. Still, they cannot be attributed to PEH specifically and are presented as contextual background [36].

The only included primary study addressing TB history and COVID-19 outcomes in a partially PEH population identified prior TB as a risk factor for COVID-19 infection in a mixed vulnerable population [21]. However, PEH-specific outcomes stratified by TB status were not reported, and this study is characterized as indirect evidence. The Zhu et al. systematic review (repositioned as a contextual reference)

documented higher SARS-CoV-2 prevalence among shelter users and asymptomatic transmission dynamics relevant to understanding infection risk [20]. Still, it did not specifically address TB – COVID coinfection outcomes.

Accordingly, any conclusions regarding TB – COVID coinfection in PEH must be treated as speculative, supported only by biological plausibility and indirect epidemiological evidence. This represents a critical gap in the literature requiring prospective, PEH-specific studies.

4.4. Health System Disruptions and Programmatic Fragility

Programmatic challenges were consistently identified as key contributors to poor TB outcomes among PEH, particularly in the context of the COVID-19 era. Primary studies consistently documented disruptions to TB diagnosis, follow-up, and treatment continuity in PEH-relevant settings, including reductions in service availability, reallocation of resources to the COVID-19 response, and decreased access to primary care [37].

The qualitative evidence from Vidal et al. (2024) contextualizes these systemic challenges from a street-clinic operational perspective: fragmented care pathways, professional burnout, and logistical constraints of mobile outreach highlight the operational fragility of PEH-targeted services even before and during the pandemic [25]. Surveillance data from Rio de Janeiro and the São Paulo cohort both document diagnostic and follow-up disruptions affecting TB management in PEH contexts [22, 27].

5. Limitations

Several limitations should be considered when interpreting these findings. First, the heterogeneity of operational definitions of homelessness across included studies prevents direct cross-study comparisons. Studies range from those explicitly focusing on street-dwelling adults to those using administrative, sheltered, or mixed vulnerable-population classifications; the latter are clearly characterized as indirect evidence throughout this review, but their inclusion introduces imprecision into the overall synthesis of evidence.

Second, a significant proportion of included studies were at moderate to high risk of bias, particularly due to the use of administrative population definitions, limited control for confounding, and small PEH subgroup sizes. Findings from high-risk studies, while consistent with the overall pattern, should be interpreted with caution.

Third, formal quality appraisal tools were applied only to primary studies; the two secondary reviews were repositioned as contextual references and were not formally appraised. This is methodologically appropriate but limits the ability to assess the quality of the contextual literature drawn upon in the Discussion.

Fourth, the restriction to six databases and three languages may have introduced selection bias, potentially missing relevant evidence published in other languages or in grey literature. No protocol was pre-registered, which is acknowledged as a methodological limitation consistent with the narrative design.

Finally, the predominantly descriptive nature of the available primary evidence precludes rigorous causal inference about the pandemic's effects on PEH TB outcomes. What can be concluded is that unfavorable TB outcomes remain unacceptably high among PEH across the reviewed period, and that pandemic-era disruptions likely affected an already critical situation – the magnitude and direction of any marginal pandemic effect in PEH specifically cannot be robustly estimated from this evidence base.

6. Conclusion

This narrative review described TB-related outcomes and care disruptions among PEH during the COVID-19 era (2020 – 2025). The most methodologically robust evidence confirms that PEH are disproportionately affected by unfavorable TB outcomes – including high rates of treatment interruption, prolonged hospitalization, and elevated mortality – driven by structural vulnerabilities operating across individual, social, and programmatic dimensions.

Pandemic-era disruptions were associated with increased unfavorable TB outcomes in the general population in multiple settings. Among PEH, outcomes remained persistently high across pre-pandemic and pandemic periods in the most robust study available, suggesting a pre-existing ceiling of vulnerability; in another high-quality study from a different setting, pandemic-era worsening was documented. This inter-study heterogeneity underscores the importance of context-specific, PEH-targeted surveillance and service delivery.

Evidence on TB – COVID coinfection in PEH specifically remains sparse, heterogeneous, and indirect. Future research should prioritize well-designed prospective studies with explicit PEH definitions, separable PEH-specific outcome denominators, and appropriate comparator designs to better characterize the epidemiological dynamics of TB and TB – COVID coinfection in this population.

Conflicts of Interest

The authors declare no conflicts of interest.

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This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

Large Language Model

The authors declare that generative artificial intelligence (AI) tools were used to assist in language refinement and grammar checking during the preparation of this manuscript. The authors reviewed and verified all content, and they take full responsibility for the integrity and accuracy of the manuscript.

Author Contributions

SKS contributed to conceptualization, methodology, investigation, literature search, study selection, data extraction, data analysis, writing the original draft, preparation of figures and tables, and writing review and editing. JKR contributed to investigation, literature search, study selection, data extraction, data analysis, writing the original draft, and writing review and editing. LNC contributed to conceptualization, supervision, methodology, critical review of

the manuscript, and writing review and editing. SMS contributed to conceptualization, supervision, methodology, critical review of the manuscript, and writing review and editing. All authors read and approved the final manuscript.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

1. Ministério da Saúde. Manual de recomendações para o controle da tuberculose no Brasil. Brasília; 2019. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil_2_ed.pdf.
2. Savacool JW. Philadelphia and the White Plague. Trans Stud Coll Physicians Phila. 1986;8(3):147-81. [PMID: 3532445].
3. Centers for Disease Control and Prevention. Tuberculosis (TB): Basic TB Facts. Atlanta; 2019. Available from: https://www.cdc.gov/tb/topic/basics/default.htm.
4. Maia CMF, Martelli DRB, Silveira D, Oliveira EA, Martelli Junior H. Tuberculosis in Brazil: the impact of the COVID-19 pandemic. J Bras Pneumol. 2022;48(2):e20220082. [PMID: 35475872, PMCID: PMC9064638, https://doi.org/10.36416/1806-3756/e20220082].
5. Nascimento CPA, Bezerra e Silva SY, Ferreira AGL, da Silva SB, Lira ALBdC, Pinto ESG. Vulnerabilidade De Pessoas Em SituaÇÃo De Rua Que Vivem Com Tuberculose: AnÁlise De Conceito. Revista Enfermagem Atual In Derme. 2023;97(3). [https://doi.org/10.31011/reaid-2023-v.97-n.3-art.1908].
6. Ministério da Saúde. Boletim Epidemiológico de Tuberculose - número especial. Brasília; 2024. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/especiais/2024/boletim-epidemiologico-de-tuberculose-numero-especial-mar-2024.pdf.
7. Silva DR, Mello FCQ, D'Ambrosio L, Centis R, Dalcolmo MP, Migliori GB. Tuberculosis and COVID-19, the new cursed duet: what differs between Brazil and Europe? J Bras Pneumol. 2021;47(2):e20210044. [PMID: 33950095, PMCID: PMC8332832, https://doi.org/10.36416/1806-3756/e20210044].
8. Pan American Health Organization. Histórico da pandemia de COVID-19. Washington;. Available from: https://www.paho.org/pt/covid19/historico-da-pandemia-covid-19.
9. World Health Organization. Origin of SARS-CoV-2. Geneva; 2020. Available from: https://apps.who.int/iris/bitstream/handle/10665/332197/WHO-2019-nCoV-FAQ-Virus_origin-2020.1-eng.pdf.
10. Aggarwal AN, Agarwal R, Dhooria S, Prasad KT, Sehgal IS, Muthu V. Active pulmonary tuberculosis and coronavirus disease 2019: A systematic review and meta-analysis. PLoS One. 2021;16(10):e0259006. [PMID: 34673822, PMCID: PMC8530351, https://doi.org/10.1371/journal.pone.0259006].
11. Baratella E, Crivelli P, Marrocchio C, Bozzato AM, Vito A, Madeddu G, et al. Severity of lung involvement on chest X-rays in SARS-coronavirus-2 infected patients as a possible tool to predict clinical progression: an observational retrospective analysis of the relationship between radiological, clinical, and laboratory data. J Bras Pneumol. 2020;46(5):e20200226. [PMID: 32965310, PMCID: PMC7572267, https://doi.org/10.36416/1806-3756/e20200226].
12. Fan H, Wu F, Liu J, Zeng W, Zheng S, Tian H, et al. Pulmonary tuberculosis as a risk factor for chronic obstructive pulmonary disease: a systematic review and meta-analysis. Ann Transl Med. 2021;9(5):390. [PMID: 33842611, PMCID: PMC8033376, https://doi.org/10.21037/atm-20-4576].
13. Fei H, Yinyin X, Hui C, Ni W, Xin D, Wei C, et al. The impact of the COVID-19 epidemic on tuberculosis control in China. Lancet Reg Health West Pac. 2020;3:100032. [PMID: 34173601, PMCID: PMC7511841, https://doi.org/10.1016/j.lanwpc.2020.100032].
14. Fukunaga R, Glaziou P, Harris JB, Date A, Floyd K, Kasaeva T. Epidemiology of Tuberculosis and Progress Toward Meeting Global Targets - Worldwide, 2019. MMWR Morb Mortal Wkly Rep. 2021;70(12):427-30. [PMID: 33764960, PMCID: PMC7993552, https://doi.org/10.15585/mmwr.mm7012a4].
15. McQuaid CF, Vassall A, Cohen T, Fiekert K, White RG. The impact of COVID-19 on TB: a review of the data. Int J Tuberc Lung Dis. 2021;25(6):436-46. [PMID: 34049605, PMCID: PMC8171247, https://doi.org/10.5588/ijtld.21.0148].
16. Ortiz-Martínez Y, Rodríguez-Morales AJ, Henao-Martínez AF. Decreased notification of TB cases during the COVID-19 pandemic. Int J Tuberc Lung Dis. 2022;26(2):177-8. [PMID: 35086633, https://doi.org/10.5588/ijtld.21.0651].
17. Brito C, Silva L, Xavier C, Antunes V, Costa M, Filgueiras S. The way of life of the unhoused people as an enhance for COVID-19 care. Revista Brasileira de Enfermagem. 2021;74. [https://doi.org/10.1590/0034-7167-2020-0832].
18. Sousa IV, Brasil CCP, Silva RMD, Vasconcelos DPE, Silva KA, Bezerra IN, et al. Participatory diagnosis to identify health problems in a socially vulnerable community. Cien Saude Colet. 2017;22(12):3945-54. [PMID: 29267711, https://doi.org/10.1590/1413-812320172212.25012017].
19. Laycock KM, Enane LA, Steenhoff AP. Tuberculosis in Adolescents and Young Adults: Emerging Data on TB Transmission and Prevention among Vulnerable Young People. Trop Med Infect Dis. 2021;6(3). [PMID: 34449722, PMCID: PMC8396328, https://doi.org/10.3390/tropicalmed6030148].
20. Zhu A, Bruketa E, Svoboda T, Patel J, Elmi N, El-Khechen Richandi G, et al. Respiratory infectious disease outbreaks among people experiencing homelessness: a systematic review of prevention and mitigation strategies. Ann Epidemiol. 2023;77:127-35. [PMID: 35342013, https://doi.org/10.1016/j.annepidem.2022.03.004].
21. Alsaïdi I, De Sousa Santos F, Plard B, Janvier E, Tinland A, Hafni A, et al. Factors associated with SARS-CoV2 infection and care pathways among the most vulnerable populations living in Marseille: a case control study. BMC Public Health. 2021;21(1):1704. [PMID: 34538240, PMCID: PMC8449995, https://doi.org/10.1186/s12889-021-11716-6].
22. da Silva Campana P, da Silva ATC, Klautau GB, Rujula MJP, Salles MJ, de Castro MC. Impact of the COVID-19 pandemic on unfavorable tuberculosis outcomes: a comparative analysis of unhoused and general populations. BMC Public Health. 2025;25(1):2260. [PMID: 40604738, PMCID: PMC12219442, https://doi.org/10.1186/s12889-025-23491-9].
23. Di Gennaro F, Lattanzio R, Guido G, Ricciardi A, Novara R, Patti G, et al. Predictors for Pulmonary Tuberculosis Outcome and Adverse Events in an Italian Referral Hospital: A Nine-Year Retrospective Study (2013-2021). Ann Glob Health. 2022;88(1):26. [PMID: 35582409, PMCID: PMC9053535, https://doi.org/10.5334/aogh.3677].
24. Gabdullina M, Maes EF, Horth RZ, Dzhazybekova P, Amanova GN, Zikriyarova S, et al. COVID-19 pandemic and other factors associated with unfavorable tuberculosis treatment outcomes-Almaty, Kazakhstan, 2018-2021. Front Public Health. 2023;11:1247661. [PMID: 37808989, PMCID: PMC10552263, https://doi.org/10.3389/fpubh.2023.1247661].
25. Vidal AA, Coelho KSC, Merhy EE. [The street as a space for care production: the singular therapeutic project and tuberculosis management in people experiencing homelessness during the Covid-19 pandemic in the city of Rio de Janeiro]. Salud Colect. 2024;20:e4774. [PMID: 38457779, PMCID: PMC11822893, https://doi.org/10.18294/sc.2024.4774].
26. de Medeiros MM, Dias ALM, Figueira PB. Analysis of the proportion of homeless individuals diagnosed with pulmonary tuberculosis among the total cases, by Brazilian region, in the period from 2019 to 2021. 2023. Available from http://educapes.capes.gov.br/handle/capes/737291.
27. Zuim RCB, de Almeida JR, Soeiro I. Casos de tuberculose, cura e interrupção de tratamento na População em Situação de Rua, no estado do Rio de Janeiro, de 2016 a 2021: um estudo descritivo com base nos dados de vigilância. REPIS (Revista Educação, Pesquisa e Informação em Saúde). 2025. [https://doi.org/10.71209/repis.2025.3.e.0356].
28. Mohsenpour A, Bozorgmehr K, Rohleder S, Stratil J, Costa D. SARS-Cov-2 prevalence, transmission, health-related outcomes and control strategies in homeless shelters: Systematic review and meta-analysis. EClinicalMedicine. 2021;38:101032. [PMID: 34316550, PMCID: PMC8298932, https://doi.org/10.1016/j.eclinm.2021.101032].

29. Pavinati G, Lima LV, Ferreira MRL, Zanatta STP, Magnabosco GT. Trends and clusters of tuberculosis treatment interruption among people experiencing homelessness in Brazil: influence of individual, social and programmatic factors. Rev Bras Epidemiol. 2025;28:e250041. [PMID: 40802343, PMCID: PMC12333893, https://doi.org/10.1590/1980-549720250041].
30. Santos A, Brunfentrinker C, Pena LDS, Saraiva SDS, Boing AF. Analysis and comparison of tuberculosis treatment outcomes in the homeless population and in the general population of Brazil. J Bras Pneumol. 2021;47(2):e20200178. [PMID: 33656159, PMCID: PMC8332848, https://doi.org/10.36416/1806-3756/e20200178].
31. Gioseffi JR, Batista R, Brignol SM. Tuberculosis, vulnerabilities, and HIV in homeless persons: a systematic review. Rev Saude Publica. 2022;56:43. [PMID: 35649090, PMCID: PMC9126575, https://doi.org/10.11606/s1518-8787.2022056003964].
32. Berra TZ, Ramos ACV, Alves YM, Tavares RBV, Tartaro AF, Nascimento MCD, et al. Impact of COVID-19 on Tuberculosis Indicators in Brazil: A Time Series and Spatial Analysis Study. Trop Med Infect Dis. 2022;7(9). [PMID: 36136658, PMCID: PMC9500936, https://doi.org/10.3390/tropicalmed7090247].
33. Gao Y, Liu M, Chen Y, Shi S, Geng J, Tian J. Association between tuberculosis and COVID-19 severity and mortality: A rapid systematic review and meta-analysis. J Med Virol. 2021;93(1):194-6. [PMID: 32687228, PMCID: PMC7405273, https://doi.org/10.1002/jmv.26311].
34. Irfani TH, Siburian R, Nabila R, Umar TP. Tuberculosis and Coronavirus Disease 2019 (COVID-19) from A Clinical Perspective: A Systematic Review. Medeni Med J. 2020;35(4):338-43. [PMID: 33717627, PMCID: PMC7945727, https://doi.org/10.5222/MMJ.2020.36775].
35. Wang Q, Guo S, Wei X, Dong Q, Xu N, Li H, et al. Global prevalence, treatment and outcome of tuberculosis and COVID-19 coinfection: a systematic review and meta-analysis (from November 2019 to March 2021). BMJ Open. 2022;12(6):e059396. [PMID: 35725250, PMCID: PMC9213780, https://doi.org/10.1136/bmjopen-2021-059396].
36. Flores-Lovon K, Ortiz-Saavedra B, Cueva-Chicana LA, Aperrigue-Lira S, Montes-Madariaga ES, Soriano-Moreno DR, et al. Immune responses in COVID-19 and tuberculosis coinfection: A scoping review. Front Immunol. 2022;13:992743. [PMID: 36090983, PMCID: PMC9459402, https://doi.org/10.3389/fimmu.2022.992743].
37. Aoki L, de Carvalho Rodrigues J, Bertollini Lamy I, da Veiga GL, Alves BdCA, Pereira EC, et al. Impact of COVID-19 on Social, Economic, and Health Interventions for Tuberculosis and Leprosy. Hygiene. 2025;5(4). [https://doi.org/10.3390/hygiene5040053].