



POLICY BRIEF

Management of Road Traffic Injuries in Healthcare Facilities: Challenges, Policy Recommendations, and Implications for Policymakers

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ABSTRACT

Road traffic accidents in Iran impose a considerable burden of mortality and disability. Despite widespread attention to prehospital interventions, the quality and coherence of trauma patient management in healthcare facilities remains one of the critical yet less well-organized components of the care continuum. This policy brief aims to identify key challenges in hospital-based trauma management and present actionable options to reduce preventable adverse outcomes. This study employed an analytical-participatory approach, beginning with a brainstorming session with selected stakeholders from Tehran University of Medical Sciences and a review of the evidence. Three authors independently analyzed the session data and existing evidence, and through subsequent consensus meetings, shared challenges were identified. Moreover, drawing on the same data, best available evidence, and the authors' initiative, actionable policy options were formulated. Challenges were identified at four levels: 0) resource-level (workforce shortages, inadequate payment systems, technological and equipment deficiencies, and consumable mismanagement), 1) operational and clinical (team coordination failures, overcrowding, and inconsistent protocol implementation), 2) systemic and referral (fragmented care pathways, inadequate post-discharge follow-up, and scattered data systems), and 3) governance and intersectoral (weak accountability, insufficient continuous quality improvement, and lack of structured inter-organizational collaboration). Four complementary options were proposed: strategic resource optimization and sustainable trauma financing, standardizing emergency response to severe trauma, integrating the care pathway from admission through discharge and follow-up, and establishing performance monitoring and quality improvement mechanisms within hospitals. Prioritized and phased implementation of these options, tailored to hospital capacity, can reduce preventable delays, improve clinical outcomes, and strengthen post-hospital follow-up.

Keywords: Health Management, Health Policy, Trauma, Healthcare Systems

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Introduction

The global burden of disease is increasingly shaped by road traffic injuries — a critical public health challenge that disproportionately affects low- and middle-income countries and stands as a

leading cause of mortality and disability-adjusted life years (DALYs) (1, 2). In Iran, the burden of traffic-related injuries remains substantial; road traffic crashes contribute a significant share of

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national mortality and disability. Moreover, following a period of decline, traffic fatalities have been on the rise again since approximately 2016 (3, 4).

While prevention and pre-hospital emergency care have received considerable attention (5), the trauma care continuum cannot be complete without effective in-hospital management. Evidence indicates that Iran's trauma care system continues to face structural and operational challenges in referral coordination, care pathway integration, and service organization (6). Domestic research further underscores the role of multilevel factors in traffic-related mortality, and qualitative studies have identified barriers to hospital-based trauma care across key areas including process standardization, team coordination, resources and infrastructure, and continuity of care (7, 8).

This policy brief identifies the principal challenges in hospital-based trauma management and presents evidence-informed, actionable policy options. Its aim is to enable near-term decision-making that reduces preventable mortality and disability in healthcare facilities.

Policy Analysis

Policy Brief Development Approach: This policy brief was developed using an analytical-strategic and participatory approach. The core methodological component was a structured brainstorming session held on December 29, 2025. Participants were purposively selected from Tehran University of Medical Science's distinguished talents; all completed an informed participation form. The session included 4 faculty members (specialists in emergency medicine and trauma research, including the deputy director of the Trauma Research Center) and 16 students. Data collection proceeded in two phases: first, a situational analysis and mortality statistics on traffic crashes were presented; participants then responded to two guiding questions: (1) identifying the most critical challenges and causes of preventable deaths in trauma care, and (2) proposing actionable policy options to reduce

disability and mortality. Responses were recorded in writing and through facilitator notes.

Three authors independently reviewed and coded the responses alongside existing evidence. Through consensus meetings, challenges were thematically synthesized into four levels, prioritized by frequency of mention, impact on outcomes, and feasibility of hospital-level intervention. Drawing on the same integrated dataset and the authors' initiative, corresponding policy options were then formulated.

Key Challenges in existing policies and practices

In response to the question "What are the most significant challenges in healthcare facilities that lead to preventable death or disability?", participants identified the following challenges across **four** levels: (0) resource management, (1) operational and clinical, (2) systemic and referral-related, and (3) governance and cross-sectoral.

Level 0: Management of Resources

0.1. The Challenge of Specialized Workforce Shortage in Healthcare Facilities

A critical factor limiting effective accident victim care is the shortage of specialized physicians and healthcare staff, especially in trauma and emergency medicine. This deficiency degrades service quality and delays rescue efforts. The field of emergency medicine struggles with a severe workforce shortage due to poor income generation potential, high job stress, and inefficient personnel utilization within healthcare facilities.

0.2. Deficiencies in Payment Systems and Financial Management in Trauma Care

A primary reason for the reluctance of healthcare staff to pursue specialized training and serve in critical trauma-related departments (such as hospital emergency rooms) is the mismatch between their compensation and the volume and intensity of work in these units. Furthermore, the absence of a comprehensive and efficient system for managing trauma-related costs disrupts timely and equitable payments, especially in underdeveloped and underserved regions.

0.3. Technological and Infrastructural Challenges in Medical Equipment

Regarding the status of medical equipment, two critical and vital challenges are apparent and require immediate attention:

0.3.1. Investment Gap in New Medical Technologies: Lack of access to and adoption of up-to-date technologies in medical centers reduces the quality of diagnostic and therapeutic services and undermines competitiveness.

0.3.2. Deterioration, Inefficiency of Existing Equipment, and Exorbitant Maintenance Costs: A significant portion of equipment is worn out, obsolete, and requires major repairs. Costs associated with maintaining, repairing, and sourcing parts for these devices have become exorbitant, severely depleting financial resources and creating a vicious economic cycle.

0.4 Management of Consumables in Trauma Incidents

Inefficient management of consumable resources in medical centers leads to widespread wastage of essential items, particularly medications and dressing supplies. Weaknesses in strategic planning for optimal resource utilization and insufficient attention to the standard and timely maintenance of medical equipment significantly increase the costs associated with providing healthcare services.

Level 1: Operational and Clinical Challenges

1.1 Disrupted Team Coordination and Delays in Initial Response

Lack of coordination among involved units — from admission and triage through the emergency department and relevant specialties — combined with ambiguity in role delineation and overcrowding from unnecessary personnel in confined spaces, can result in delayed critical interventions and the loss of the golden hour.

1.2 Insufficient Capacity and Skill Heterogeneity in Life-Saving Procedures at Major Trauma Centers

In certain critical locations, the capacity of major trauma-receiving centers is inadequate or services are inequitably distributed. Bed and equipment capacity, alongside variability in proficiency for life-saving procedures — such as airway management and other advanced interventions — directly affects patient outcomes. Domestic evidence has documented associations between care-related factors and clinical conditions with higher mortality risk, highlighting the necessity of care standardization and skills enhancement (8).

1.3 Inconsistent Implementation of Standard In-Hospital Protocols and Pathways

Despite the existence of clinical guidelines, their application varies across shifts and teams, or differing interpretations of the standard of care are observed. As a result, care quality becomes dependent on individual personnel and shift assignments, increasing the likelihood of delays, redundant efforts, and medical errors.

Level 2: Systemic and Referral Challenges

2.1 Neglect of the Disability Burden and Inadequate Post-Discharge Follow-Up

Policy attention and reporting are predominantly focused on mortality, while many trauma survivors are left with lasting disabilities. The absence of structured post-discharge follow-up and rehabilitation programs diminishes quality of life and increases the incidence of complications and readmissions. Furthermore, the lack of systematic outcome tracking after discharge constrains quality evaluation and data-driven planning.

2.2 Weak Integrated Approach and Poor Coordination across the Trauma System and Its Impact on Hospital Performance

Although multiple organizations are involved in injury prevention, management, and rehabilitation, a coherent, system-level approach to trauma care remains underdeveloped, and inter-organizational coordination gaps have been documented (6). This fragmentation can disrupt referral pathways and the continuity of care across pre-hospital, facility-based, and rehabilitation phases, ultimately

undermining hospital performance.

2.3 Inadequate Information Integration across Phases of Care

Data pertaining to the incident, pre-hospital interventions, in-hospital treatment, and post-discharge outcomes are recorded — when recorded at all — across separate systems and disparate channels. This data fragmentation limits the monitoring of care pathways and the evaluation of referral and treatment performance.

Level 3: Governance and Cross-Sectoral Challenges

3.1 Absence of Structured Mechanisms for Hospital–NGO Collaboration and Data Exchange Constraints

Non-governmental organizations (NGOs) can play a meaningful role in patient support, follow-up, and conveying operational feedback; however, the absence of stable channels for defining roles and enabling operational collaboration with healthcare facilities undermines their contribution and makes post-discharge follow-up more difficult.

3.2 Weak Accountability and Quality Improvement Mechanisms for Trauma Care in Healthcare Facilities

In many healthcare facilities, a sustainable mechanism for monitoring trauma care quality and tracking corrective actions — including regular review of problematic cases, systematic feedback, and implementation of improvement measures — has not been sufficiently institutionalized. Consequently, error and delay identification remains case-by-case, and corrective interventions remain episodic rather than systematic.

Policy Implications, Options, and Recommendations

Policy Options and Actionable Strategies

In light of the challenges identified in the policy analysis section, and informed by participants' responses to the question “What strategies exist to address the challenges in healthcare facilities that lead to preventable death or disability?” , and

alongside a review of the evidence ,four actionable options are proposed across four levels. These options are complementary and may be implemented in a phased or combined manner, depending on the capacity of individual healthcare facilities.

Option 1 — Strategic Resource Optimization and Sustainable Trauma Financing

At the foundational resource level, the proposed strategy targets workforce retention, equitable compensation, and asset efficiency. To mitigate workforce shortages and reluctance to serve in high-stress emergency environments, traditional fee-for-service payments should be augmented with value-based frameworks that reflect the acuity of trauma care. A proportion of mandatory third-party motor vehicle insurance premiums, which currently fund post-crash care, can be allocated directly to specialist trauma teams as performance-based supplemental payments, managed by the hospital's finance unit under Ministry of Health oversight. Structured task-shifting to trained mid-level practitioners will further optimize human resource utilization and reduce physician burnout. To address the equipment investment gap and high maintenance costs, facilities should transition toward Equipment-as-a-Service (EaaS) models and regionalized maintenance contracts, coordinated by the medical equipment department, shifting capital expenditure to predictable operational costs. Smart inventory management systems, overseen by hospital pharmacy and logistics units, should deploy data-driven predictive models to anticipate trauma surges, while standardized pre-packaged “trauma kits” streamline emergency responses and minimize wastage.

Option 2 — Standardizing in-Hospital Trauma Response

At the operational level, severely injured patient care in the emergency department is standardized through a four-pillar trauma response model, led by the emergency medicine department with trauma committee oversight. A trauma code is activated based on pre-defined criteria to minimize

delays. The division of responsibilities within the multidisciplinary team — including physicians, nurses, and paramedical staff — is clearly defined so that coordination does not depend on individual personnel or shift assignments. Paraclinical services and blood products are delivered through an expedited, trauma-priority pathway. A designated trauma care zone with regulated entry rules prevents unnecessary personnel from entering, enabling a safer, and more focused environment.

Option 3 — A Continuous Care Pathway from Admission through Discharge and Follow-Up

At the systemic level, an integrated care pathway is established from EMS handover through intra-hospital transfers, discharge, and post-discharge follow-up. Responsibility for pathway coordination rests with a designated trauma case manager, bridging EMS, hospital wards, and rehabilitation services. Patient handover from pre-hospital to in-hospital care is structured to ensure transfer of relevant clinical information. Transfer criteria to imaging, the operating room, or ICU are standardized, as is documentation of a minimum trauma dataset with key time-stamps. For high-risk patients, post-discharge follow-up and referral to rehabilitation are systematically incorporated into the discharge protocol.

Option 4 — Accountability and Continuous Quality Improvement (CQI) in Hospital Trauma Care

At the governance level, a sustainable mechanism for monitoring trauma care performance and tracking corrective actions is established. A hospital trauma committee, chaired by the medical director, oversees a limited set of key indicators, reviews selected cases with adverse outcomes or significant delays, provides structured feedback to clinical teams, and follows up on corrective measures. To strengthen post-discharge follow-up, collaboration with NGOs is formalized — with clear data confidentiality safeguards, defined referral pathways, and delineated responsibilities — to support post-discharge monitoring and family education.

Implementation Prioritization

A phased approach is recommended. Short-term actions (implementable within 3–6 months) include: activation of a simplified trauma code protocol, introduction of structured pre-hospital to in-hospital handover, and revision of payment mechanisms to incorporate third-party insurance-linked incentives. Medium-term actions (6–18 months) include: establishment of the integrated care pathway with a designated case manager, deployment of smart inventory systems, and formalization of the trauma committee with a core indicator dashboard. Long-term actions (18 months and beyond) involve: transition to EaaS models for major equipment, full integration of post-discharge NGO collaborations, and scaling of CQI cycles across all trauma-receiving facilities. This sequencing allows immediate gains while building structural capacity for sustained improvement.

Expected Outcomes

Based on available evidence, the implementation of an enhanced in-hospital trauma care model can be associated with improved efficiency of emergency care, reduced in-hospital mortality, and a lower incidence of complications among patients with severe injuries (9). Reviewed evidence further indicates that the establishment of formal trauma systems, compared to the absence of such systems, is associated with improved survival, along with improvements in health-related quality of life following discharge and reductions in mean care costs. Finally, as trauma system maturity increases, greater gains in mortality outcomes are observed — such that comparisons between nascent and mature trauma systems have documented higher mortality odds in early-stage systems (10). These findings are directly relevant to Iran, where the trauma system remains in an early and fragmented stage of development, suggesting that even phased, hospital-level improvements could translate into significant reductions in preventable mortality and disability.

Conclusion

Road traffic injuries remain a leading cause of mortality and disability in Iran, with outcomes that

are amenable to improvement through enhanced in-hospital management. Challenges were identified across four levels: resource deficiencies (workforce, financing, equipment, and consumables), team coordination delays and emergency department overcrowding, heterogeneity in staff skills and protocol implementation, inadequate post-discharge follow-up, referral and information system deficiencies, and weak accountability and quality improvement mechanisms. In response, four actionable policy options were proposed: strategic resource optimization and sustainable trauma financing, standardization of emergency response to severe trauma patients, integration of the care pathway from admission through discharge and follow-up, and establishment of performance monitoring and CQI in healthcare facilities. Phased implementation of these options should be tailored to hospital capacity and operational feasibility. Hospital directors are urged to begin with immediately actionable measures — particularly trauma code activation and structured pre-hospital handover — as a near-term priority. Concurrently, the Ministry of Health and Medical Education is called upon to create the regulatory and financing environment needed to sustain system-level reforms, including the redirection of third-party insurance revenues toward specialized trauma workforce retention. Even in the absence of full system maturity, these facility-based steps can measurably reduce preventable deaths and long-term disability among road traffic victims in Iran.

Ethical considerations

This policy brief was based on evidence review and a participatory brainstorming session. Informed consent was obtained from all session participants. No personally identifiable information was collected or reported; therefore, formal ethical approval was not required for this activity.

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recommendations to the development of this policy brief.

Conflicts of interests

The authors declare no conflicts of interest.

Authors' contributions

Davodi Y, Pak A, and Gheisavandi O curated the data; Davodi Y, Pak A, and Mirparsa F analyzed the data; Gheisavandi O designed the study and developed the methodology; Davodi Y and Gheisavandi O managed the data; Davodi Y and Gheisavandi O administered the project; Davodi Y, Pak A, and Mirparsa F wrote the original draft; Davodi Y, Pak A, Mirparsa F, and Gheisavandi O reviewed and edited the manuscript; and Gheisavandi O supervised the study and approved the final version for publication. All authors contributed to the design and development of the content, synthesis of the findings, and revision of the manuscript, and approved the final version.

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Consent for publication

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Data availability

No datasets were generated or analyzed for public sharing.

Use of artificial intelligence

AI tools were used for language editing, improving textual flow, and rephrasing select Persian expressions. All outputs were reviewed, revised, and approved by the authors, who assume full responsibility for the scientific accuracy of the content, interpretations, and conclusions.

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