



Original Research Article

IMPACT OF INTEGRATION OF THE SPECIALTY OF FORENSIC MEDICINE ON THE QUALITY OF MEDICO-LEGAL DOCUMENTATION IN A TRAUMA CENTER: A BEFORE-AND-AFTER STUDY

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Received : 29/04/2026
Received in revised form : 03/06/2026
Accepted : 22/06/2026

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DOI: 10.70034/ijmedph.2026.3.12

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 74-79

ABSTRACT

Background: Medico-legal cases form an important component of emergency and trauma care. The medico-legal report has clinical and legal value, and incomplete documentation may affect investigation, judicial proceedings and patient rights. This study assessed the effect of integrating the speciality of Forensic Medicine on the quality of medico-legal documentation in an anonymised level 1 trauma centre.

Materials and Methods: This before-and-after retrospective observational study was conducted at an anonymised level 1 trauma centre over a three-year period. The pre-integration period was from April 2022 to March 2023, and the post-integration period was from April 2023 to March 2025. A total of 3768 medico-legal case records were reviewed, comprising 840 cases in the pre-integration period and 2928 cases in the post-integration period. Demographic profile, nature of injury, dominant type of injury and predefined documentation errors were analysed using frequencies and percentages.

Results: Males constituted 82.5% of medico-legal cases, while females constituted 17.5%. The commonest age group was 18–35 years, accounting for 64% of cases. Road traffic accidents were the most common cause of injury, accounting for 62.8% of cases, followed by falls at 12.6%. Blunt injury was the predominant type in 82.8% of cases. After the integration of the speciality of Forensic Medicine, the average monthly number of medico-legal cases increased from 70 cases/month in the pre-integration period to 122 cases/month in the post-integration period, representing a 1.75-fold increase. Missing date and time of examination decreased from 28.5% to 2.45%, improper documentation of mark of identification decreased from 65.7% to 14.75%, missing injury size decreased from 54.2% to 3.27%, missing injury site decreased from 38.5% to 2.45%, and missing age of injury decreased from 91.4% to 8.2%.

Conclusion: Integration of the speciality of Forensic Medicine was associated with increased medico-legal case documentation and a reduction in major documentation errors. The findings suggest that structured involvement of Forensic Medicine may improve the completeness and quality of medico-legal documentation in tertiary trauma care settings.

Keywords: Forensic Medicine; medico-legal case; medico-legal report; documentation errors; emergency department; trauma centre,

INTRODUCTION

Medico-legal cases are clinical encounters in which the attending doctor, after obtaining the history and performing the examination, determines that an investigation by law enforcement agencies is necessary to establish responsibility under the law. These cases commonly include road traffic accidents, assault, poisoning, burns, falls, occupational injuries, suicide attempts, sexual offences, brought-dead cases and other presentations with suspected legal implications.^[1-4]

The emergency department is often the first point of contact for medico-legal cases. The treating physician has the dual responsibility of providing immediate clinical care and preparing accurate medico-legal documentation. The medico-legal report serves as written medical evidence and may assist police investigation and judicial proceedings.^[1,2] Errors or omissions in documentation may weaken the evidentiary value of the report and may delay legal processes.^[1,5]

In addition to providing patient care, the physician has a medico-legal responsibility to prepare a precise, standardised and unbiased medico-legal report and to report relevant findings to the concerned legal authorities. A well-prepared medico-legal report should include patient identifiers, physician details, the date and time of admission and examination, the history of the incident, consent, the patient's general condition, a detailed description of the injuries, the dimensions and location of the injuries, and an opinion regarding age, severity, and the possible causative weapon or mechanism.^[1]

Essential elements of medico-legal documentation include patient identifiers, marks of identification, date and time of examination, history in the patient's or attendant's words, injury type, site, size, shape, colour, age of injury, direction, nature of injury, opinion, evidence preservation, signatures, seal and proper record preservation.^[3,4] Previous audits and observational studies have shown frequent deficiencies in medico-legal reports, including incomplete documentation of examination findings, injury details, event timing, triage status, physician details and authentication-related entries.^[1,2,6,7]

Integration of the speciality of Forensic Medicine into emergency and trauma care may improve medico-legal work by involving forensic medicine specialists in the examination, documentation and review of medico-legal cases. The objective of this study was to assess the impact of integrating Forensic Medicine experts on the quality of medico-legal documentation in an anonymised tertiary trauma centre, and to provide an additional description of the demographic and injury profiles of medico-legal cases.

MATERIALS AND METHODS

Study design and setting: This was a retrospective, before-and-after observational study conducted at the

XYZ Trauma Centre in India. The study assessed the quality of medico-legal documentation before and after the integration of Forensic Medicine experts into the medico-legal reporting workflow.

Study duration: The study was conducted over a three-year period. The pre-integration period was from April 2022 to March 2023, and the post-integration period was from April 2023 to March 2025.

Participants: The study included medico-legal case records documented during the complete study period. A total of 3768 medico-legal case records were included, comprising 840 cases in the pre-integration period and 2928 cases in the post-integration period.

Inclusion criteria

All medico-legal case records registered in the emergency/casualty department during the study period were included. Records from both phases of the study, comprising one year before and two years after integration of the speciality of Forensic Medicine, were included irrespective of age, sex, nature of injury or type of medico-legal case.

Exclusion criteria

Non-medico-legal cases, duplicate entries, repeat visits for the same medico-legal event, cases referred from other centres where the medico-legal report had already been prepared elsewhere, and records that were unavailable or completely illegible for review were excluded. Records with missing individual documentation fields were not excluded; such deficiencies were assessed as documentation errors.

Sample size: A total of 3768 medico-legal cases were included in the study. The pre-integration period included 840 cases over 12 months, and the post-integration period included 2928 cases over 24 months.

Intervention or exposure: The exposure assessed was the integration of Forensic Medicine into the medico-legal documentation process.

Data collection and variables: Data were collected for age, sex, nature of injury and dominant type of injury. Documentation quality indicators assessed before and after integration of the speciality of Forensic Medicine included date and time of examination, marks of identification, patient identifiers, injury size, injury site, age of injury, signatures with dates, Emergency Medical Officer signatures with complete names, and stamp status.

Outcome measures: The primary outcome was the change in selected medico-legal documentation errors before and after the integration of Forensic Medicine experts. Secondary outcomes were total and average monthly medico-legal case volumes, and the distribution of demographic and injury-related characteristics.

Ethical considerations: Institutional ethics approval was obtained before conducting the study. Patient identifiers were not disclosed, and data were analysed in anonymised form.

Statistical analysis: Data were summarised using frequencies and percentages. Medico-legal case

volume was expressed as the total number of cases during each study period and the average monthly cases. Documentation errors were expressed as average monthly frequencies and percentages.

RESULTS

Demographic profile of medico-legal cases: Males constituted 82.5% of medico-legal cases, while females constituted 17.5%. The largest proportion of cases was in the 18–35-year age group, accounting

for 64%. The 36–60 years age group accounted for 24.8%, patients above 60 years accounted for 7%, and patients below 18 years accounted for 4.2%.

Injury profile of medico-legal cases: Road traffic accidents were the most common cause of injury, accounting for 62.8% of cases. Falls accounted for 12.6%, physical assault for 4.8%, injury at workplace for 1.8%, other causes for 7.4%, and unspecified nature of injury for 10.6%. Blunt injury was the dominant type of injury in 82.8% of cases, followed by sharp injury in 8.7%. Dominant injury type was unspecified in 8.5% of cases.

Table 1: Demographic characteristics of medico-legal cases

Variable	Percentage
Sex	
Male	82.5%
Female	17.5%
Age group	
<18 years	4.2%
18–35 years	64%
36–60 years	24.8%
>60 years	7%

Table 2: Nature and dominant type of injury among medico-legal cases

Variable	Percentage
Nature of injury	
Road traffic accident	62.8%
Injury at workplace	1.8%
Fall	12.6%
Physical assault	4.8%
Unspecified	10.6%
Others	7.4%
Dominant type of injury	
Blunt injury	82.8%
Sharp injury	8.7%
Unspecified	8.5%

Change in medico-legal case volume after integration of the speciality of Forensic Medicine

A total of 840 medico-legal cases were documented during the pre-integration period, and 2928 during the post-integration period. The average monthly medico-legal case volume increased from 70 cases/month before integration to 122 cases/month after integration, representing a 1.75-fold increase.

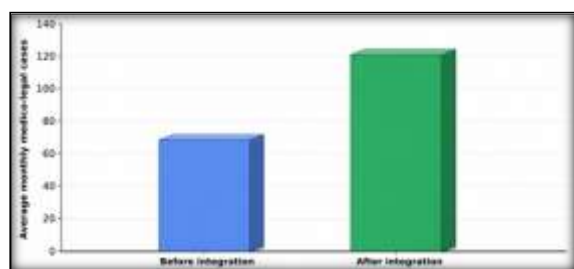


Figure 1: Average monthly medico-legal case volume before and after integration of the speciality of Forensic Medicine.

Medico-legal documentation errors before and after the integration of the speciality of Forensic Medicine. A reduction was observed in all assessed medico-legal documentation errors after the integration of the speciality of Forensic Medicine. The number of cases

with missing date and time of examination decreased from 20 cases/month to 3 cases/month, corresponding to an error reduction from 28.5% to 2.45%. Improper documentation of marks of identification decreased from 46 cases/month to 18 cases/month, corresponding to a reduction from 65.7% to 14.75%. Incorrect patient identifiers decreased from 20 cases/month to 2–3 cases/month, corresponding to a reduction from 28.5% to 2.45%. Missing injury size decreased from 38 cases/month to 4 cases/month, corresponding to a reduction from 54.2% to 3.27%. The number of missing injury locations decreased from 27 cases/month to 3 cases/month, corresponding to a reduction from 38.5% to 2.45%. The missing age of injury decreased from 64 cases/month to 10 cases/month, corresponding to a reduction from 91.4% to 8.2%. Signatures without dates decreased from 32 cases/month to 8 cases/month, corresponding to a reduction from 45.7% to 6.5%. Emergency Medical Officer signatures without complete names decreased from 42 cases/month to 8 cases/month, corresponding to a reduction from 60% to 6.5%. The stamp absence rate decreased from 60 cases/month to 30 cases/month, corresponding to a reduction from 85.7% to 24.5%.

Table 3: Comparison of medico-legal case volume and documentation errors before and after integration of the speciality of Forensic Medicine

Category	Before integration of speciality of Forensic Medicine	After integration of speciality of Forensic Medicine	Change
Total number of medico-legal cases during the study period	840 cases	2928 cases	Increase in documented case volume
Average monthly number of medico-legal cases	70 cases/month	122 cases/month	1.75-fold increase
Date and time of examination missing	20 cases/month	3 cases/month	Error reduction from 28.5% to 2.45%
Mark of identification documented improperly	46 cases/month	18 cases/month	Error reduction from 65.7% to 14.75%
Patient identifiers documented incorrectly	20 cases/month	2–3 cases/month	Error reduction from 28.5% to 2.45%
Injury size missing	38 cases/month	4 cases/month	Error reduction from 54.2% to 3.27%
Injury site missing	27 cases/month	3 cases/month	Error reduction from 38.5% to 2.45%
Age of injury missing	64 cases/month	10 cases/month	Error reduction from 91.4% to 8.2%
Signatures without dates	32 cases/month	8 cases/month	Error reduction from 45.7% to 6.5%
Emergency Medical Officer signatures without complete names	42 cases/month	8 cases/month	Error reduction from 60% to 6.5%
Stamp absent	60 cases/month	30 cases/month	Error reduction from 85.7% to 24.5%

Pre-integration period: April 2022 to March 2023, 12 months. Post-integration period: April 2023 to March 2025, 24 months. Total pre-integration cases were calculated as $70 \times 12 = 840$. Total post-integration cases were calculated as $122 \times 24 = 2928$. Documentation error values represent average monthly frequencies. EMO, Emergency Medical Officer.

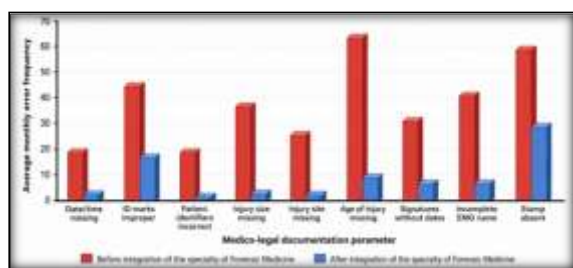


Figure 2: Average monthly medico-legal documentation errors before and after integration of the speciality of Forensic Medicine.

DISCUSSION

This before-and-after study found that integration of the speciality of Forensic Medicine was associated with increased medico-legal case documentation and a reduction in all assessed documentation errors. A total of 840 medico-legal cases were documented during the pre-integration period and 2928 cases during the post-integration period. The average monthly medico-legal case volume increased from 70 cases/month to 122 cases/month. Documentation errors decreased substantially for date and time of examination, marks of identification, patient identifiers, injury size, injury site, age of injury, dated signatures, complete Emergency Medical Officer signatures and stamp status.

The demographic profile showed male predominance, with males accounting for 82.5% of cases. The 18-35 year age group accounted for the largest proportion of medico-legal cases. Road traffic accident was the commonest nature of injury, and blunt injury was the dominant type of injury.

Male predominance in medico-legal cases has been consistently reported across emergency and casualty settings. Kumar et al. reported 85.77% male cases among 5702 medico-legal cases in New Delhi.^[9] Awasthi et al. reported a male predominance of 77% in a tertiary care teaching hospital in Uttar

Pradesh.^[10] Similar findings were reported by Yattoo et al. in North India, with 74.03% males, and by Malik et al. in Rawalpindi, with 81% male victims.^[11,12] This pattern is broadly comparable with earlier reports of male predominance among medico-legal cases.

Young adults formed the largest group in this study. This pattern is comparable to earlier studies in which the 21–30 years age group was frequently the most affected age category. Kumar et al. reported that 36.30% of medico-legal cases belonged to the 21–30 years age group; Awasthi et al. reported 24.99% in the same age group; and Sonawane et al. reported 30.51% among 21–30-year-old injury-related medico-legal cases.^[9,10,13] This age distribution may reflect greater mobility, occupational activity and exposure to outdoor injury risks in young adults.

Road traffic accidents accounted for 62.8% of cases in this study. The predominance of road traffic accidents has been reported in several hospital-based medico-legal studies. Yattoo et al. reported road traffic accidents in 48.06% of cases, Malik et al. reported road traffic injuries in 40%, and Shah et al. reported road traffic accidents in 44.9% of medico-legal cases in an emergency department in Nepal.^[11,12,14] In contrast, some studies reported assault or fall as the leading category. Sonawane et al. reported physical assault as the commonest cause at 31.9%, followed by accidental falls at 26.7%, while Dhingra et al. reported fall from height as the commonest category at 34.01% in an insurance hospital setting.^[13,15] These differences suggest that medico-legal case patterns vary according to institutional setting, catchment population, occupation profile, regional injury pattern and reporting practice.

Blunt injury was the predominant type in 82.8% of cases in this study. Madadin et al. reported blunt injury as the dominant type in 81.8% of medico-legal cases, while Jadoon et al. reported blunt weapon

injuries in 65.85% of casualty medico-legal cases.^[1,16] These findings are comparable with the predominance of blunt injury reported in earlier medico-legal studies.

Documentation errors are a recurring issue in medico-legal practice. Madadin et al. reported that no medico-legal report in their study was free of errors, with missing time of admission in 100%, missing level of consciousness in 98.8%, missing injury size in 98.1%, incomplete injury type description in 41.9%, missing age of injury in 26.1% and missing injury location in 5.5%.^[1] Aktas et al. found incomplete recording of cooperation status in 82.7%, absence of identification of external traumatic lesions in 62.4%, and errors related to injury severity in 47.4% of forensic reports.^[2] Bozkurt et al. also reported deficiencies in emergency judicial reports, including missing event time in 49.3%, missing examination date in 30%, missing examination time in 37.9%, missing report date in 56% and missing report time in 78.4%.^[6]

This study demonstrated reductions in all assessed documentation errors following the integration of Forensic Medicine. The largest improvement was observed in age of injury documentation, which decreased from 91.4% missing to 8.2% missing. Injury size, injury location, date and time of examination, and patient identifiers also improved substantially. These parameters are directly relevant to medico-legal validity because standard medico-legal formats require precise recording of identification details, examination timing and injury description.^[3,4]

Sinha et al. audited medico-legal report documentation in an emergency department and found that patient-related information was documented accurately in more than 90% of cases, but documentation of examination findings, triage priority, vital signs, systemic examination and local examination required improvement.^[7] The present findings are consistent with the need for structured documentation processes and suggest that forensic medicine integration may reduce common documentation errors.

Integration of the speciality of Forensic Medicine into emergency and trauma care is intended to improve the quality of medico-legal work, assist in clinical medico-legal work, and prepare and review medico-legal reports. The present findings suggest that this model may improve documentation completeness and authentication-related parameters at the institutional level.

The increase in medico-legal case volume after integration of the speciality of Forensic Medicine should be interpreted as improved capture or documentation of medico-legal work within the hospital system. Without population-level incidence data, it should not be interpreted as a true increase in injury incidence or in hospital footfall.

The reduction in errors related to identity, injury documentation and report authentication is clinically and legally relevant. Documentation of injury type,

location, size, and age assists in interpreting the mechanism and timing of injury. Recording the date and time of the examination, patient identifiers, signatures, and stamp status supports the traceability and administrative validity of the medico-legal report. These elements are required in standard medico-legal workflows and report formats.^[3,4]

Strengths and Limitations: The strength of this study is its before-and-after design, which assessed the same institutional medico-legal workflow before and after the integration of Forensic Medicine. The study also combines case-profile data with documentation-quality indicators.

The study is descriptive and does not include inferential statistical testing. The before-and-after design cannot fully rule out concurrent administrative, staffing, or policy changes that may have influenced documentation practices. The findings represent a single anonymised tertiary trauma centre and should be interpreted within that setting.

Because the pre-integration and post-integration periods differed in duration, average monthly case volume and average monthly documentation errors were used for the before-and-after comparison.

CONCLUSION

Integration of Forensic Medicine was associated with increased medico-legal case documentation and a reduction in major documentation errors in an anonymised tertiary trauma centre. Improvements were observed in the recording of the date and time of examination, marks of identification, patient identifiers, injury size, injury site, age of injury, signatures and stamp status. Structured involvement of Forensic Medicine may improve the completeness and quality of medico-legal documentation in emergency and trauma care practice.

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