Applied Clinical Informatics

EHR Documentation and Referrals for Intimate Partner Violence and Sexual Assault


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Abstract:
Background: Hospital settings provide a unique opportunity to screen for interpersonal violence (IPV) and sexual assault (SA) yet often lack health IT solutions for generating reliable and valid medico-legal documentation via forensic reports.
Objectives: The objective of the project was to evaluate a pilot, technology “tool” for documenting cases of IPV and SA that could support forensic nurse examiners and related stakeholders in generating high quality documentation and coordinating victim support services.
Methods: The tool was a digital health intervention implemented for use among forensic nurse examiners, law enforcement, victim support organizations, and more within four counties of California. We conducted a mixed-methods pilot study that captured data around the adoption, use, and impact of having access to the newly implemented tool.
Results: The tool successfully went live in all four pilot counties at different time points with different proportions of use by county and form type: exams, referrals, addenda, risk assessments, and other. Participants were motivated to use the tool out of a perceived need for data handling functionalities that went beyond traditional manual (paper) means. Key functionalities included body mapping, data quality controls within validated forms, attaching addenda to already existing case reports, and the means to distribute data to external recipients. Further study and development are needed on functions to incorporate into body maps and forms, and understanding the information needs of law enforcement and victim support organizations.
Conclusions: Our evaluation demonstrated the feasibility and acceptability of a health IT tool to support forensic nurse documentation of IPV and SA, and direct information to multiple legal and support-related stakeholders. Areas of future development include integrating IPV and SA-related data standards for digitized forms, enhancements to the body mapping feature, and understanding the needs of those who receive digital data from forensic nurse examiners within the tool.

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1. Abstract

**Background:** Hospital settings provide a unique opportunity to screen for interpersonal violence (IPV) and sexual assault (SA) yet often lack health IT solutions for generating reliable and valid medico-legal documentation via forensic reports.

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Conclusions: Our evaluation demonstrated the feasibility and acceptability of a health IT tool to support forensic nurse documentation of IPV and SA, and direct information to multiple legal and support-related stakeholders. Areas of future development include integrating IPV and SA-related data standards for digitized forms, enhancements to the body mapping feature, and understanding the needs of those who receive digital data from forensic nurse examiners within the tool.

Keywords: Medical Informatics; Forensic Nursing; Intimate Partner Violence

2. Background and Significance
Interpersonal violence (IPV) and sexual assault (SA) are highly prevalent in the United States; 47.3% women and 40% men report experiencing sexual violence, physical violence, and/or stalking victimization by an intimate partner in their lifetime. Two million Americans each year are treated for physical or sexual assault in emergency departments (EDs), thereby giving hospitals a unique role in screening for SA and IPV in patients. Forensic nurses (FNs) can furthermore provide crucial trauma-informed care to the treatment of IPV and SA victims.

FN documentation is highly variable, often by state. Forensic exam reports, victim service referrals, and the exams themselves vary by state, county, and hospital. Exam forms are often completed on paper (Figure 1) and then may be faxed or emailed to law enforcement officers (LEOs) and victim service providers (VSPs). These practices can result in challenges with litigation because forensic reports may not contain sufficient data nor conform to the necessary legal requirements to be admissible in court.

Effectively addressing IPV and SA requires documentation and data standards as well as coordination across multiple sectors including healthcare, justice, and victim support. These factors represent a “wicked problem” may explain why the field of health informatics has yet to robustly investigate and address user needs in this space. Yet, Kidenda et al. demonstrated that standardized documentation from health IT in a setting outside the United States (US) could enable stakeholders to better support victims of IPV and SA in hospitals for future litigation, care delivery, and care coordination.

For this pilot study, we partnered with a third-party software vendor to field test a web-based “tool” designed to be a “one-stop-shop” for forensic examination forms, reports, and
referrals for victims of IPV and SA within test sites of the four counties. The tool allows FNs to
create forensic reports in hospitals and securely transmit them to authorized recipients at LEOs.
It also equips FNs to electronically refer victims to VSPs with victim consent, facilitating warm
handoffs that enable proactive outreach to victims. The tool can securely generate and transmit
medico-legal documentation and facilitate the proactive delivery of services to victims of IPV
and SA. Without the tool, case reports would be generated with pen and paper, or completed in a
fillable PDF, and then faxed to LEOs. To our knowledge, our pilot study is the first example of a
health IT tool’s use in the US for documenting and sharing forensic case reports of victims due
to IPV and SA.

3. Objectives

The objectives of the project were to determine the feasibility and acceptability of a tool
among end users within four counties in California, and quantitatively and qualitatively assess its
impact on documenting cases of IPV and SA and coordinating follow-up support services to
victims.

4. Methods

4.1 Settings and Eligibility

This pilot study was conducted with hospitals and associated stakeholders including LEOs
and VSPs within the four counties. FNs used the platform to document injuries for individuals
who were 18 years of age or older, sought help at a participating hospital due to an incident of
SA or IPV, and received a forensic exam. We were unable to track the number of patients who
received care without the use of the tool because hospital records could not be made available
and in some settings, this documentation continues to be on paper in confidential patient files.
Depending on the county, FNs’ use of the tool was required or optional. Exam data were stored with the software vendor outside of each hospital’s electronic health record system. As warranted, forensic examiners had the option to share data with external recipients including LEOs who use the documentation for police reports and VSPs who use the documentation to manage support services. For example, LEOs often receive PDF versions of forensic reports, which could include state-mandated forms, body maps, and any other information that supports future legal proceedings or counseling. VSPs receive referrals and risk assessments with victim consent to facilitate warm hand offs to services. Data were made accessible within the tool to authorized users that had requisite usernames, passwords, and data access privileges.

4.2 Testing

We conducted functional and end-to-end testing of example workflows to ensure the system and its content were accurate and behaved in accordance with PDF and paper versions of predetermined state-mandated forms. We documented discrepancies that were identified during rounds of testing, shared with the software vendor, and updated the tool accordingly. We identified and resolved issues such as poor findability and unnecessary mouse clicks.

We also conducted usability interviews with FNs prior to rollout to gauge their ability to access the tool, complete at least one test patient case, and execute fundamental actions such as accessing a forms library. We report three example functions below: forms, validation, and body maps.

4.3 Tool Features

4.3.1 Forms library

A forms library enabled users to select forms for capturing structured and unstructured data about a patient case (Figure 2).
4.3.2 Interactive Forms

Electronic forms based on standard state-based paper forms enabled users to capture structured and unstructured data about a patient case (Figure 3). Data and form validation functionalities enabled alerts when a field was left blank, and enabled FNs to lock a report for sharing with LOEs and VSPs after review and approval.

4.3.3 Body Maps

Body maps (graphical depictions to document the placement, type, and severity of injury) comprised a key function (Figure 4).

4.4 Evaluation

We gathered data from tool log files at the user level (e.g., user count) and form level (e.g., count of reports created) across all four counties. Qualitatively, we conducted 30-90 minute virtual semi-structured interviews (see appended interview guide) with 17 interviewees, which represented each of the defined stakeholder areas: FNs (N=10), LEOs (N=2), and VSPs (N=5). Interviewees were recruited based on their participation as “super users” as well as referrals to additional interviewees (snowball sampling methodology). Interview data were recorded as notes.
which were then deductively coded using the Consolidated Framework for Implementation Research-Process Redesign (CFIR-PR) framework. Codes that did not fit within pre-defined CFIR-PR domains and constructs were logged separately and then inductively merged into general themes. Details about the coding method and results will be reported in a separate forthcoming manuscript.

The authors declare that they have no conflicts of interest in this research. The study was considered quality improvement and was therefore exempt from Institutional Review Board review.

5. Results

The tool went live in the first of four counties in September 2022, and was live in the remaining counties by April 2023. Use of the tool differed by county, as some were quicker than others to train users and adopt it into regular practice. Interviews with five forensic examiners from all four counties and five forensic team leads from three counties found that users were accepting of the tool and found that it provided them with numerous advantages from improved legibility and standardized documentation of reports (including the ability to digitally capture injuries via body maps), to promoting information sharing between FNs, LEOs, and VSPs.

5.1 Quantitative Results

Table 1 reports aspects of the tool’s use including user counts and logins, forms and body maps created, and reports transmitted or downloaded. The adult/adolescent sexual assault report, domestic violence report, and victim referral were the most commonly used forms.

[INSERT TABLE 1]
Log data demonstrated proportions of form use, a capability that counties had lacked, for key medico-legal documentation: exams, referrals, addendums, risk assessments, and other (Figure 5).

[INSERT FIGURE 5]

5.2 Qualitative Results

FNs were motivated to use technology to improve the ways that patient cases were documented and shared. For example, one FN commented that paper forms were out of date and inefficient because they required FNs to skip multiple sections depending on the exam. The tool lessened this behavior due to embedded logic-based rules that triggered skip logic if one question made the next non-applicable.

5.2.1 Interactive Form Validation

FNs expressed frustration that they would receive an alert that a form was incomplete when it was in fact complete. This would lead to an FN reviewing an entire report, looking for the missing sections when in fact it was complete. In addition, FNs could not “lock” a form to send unless it was complete, so they would sometimes have to enter non-applicable text to enable locking or provide a justification for why the report was incomplete. A lesson learned is to improve form usability such that FNs have greater flexibility around locking forms.

5.2.2 Forms and Information Sharing

The tool enabled the sharing of forms and information that users found important for connecting and coordinating around cases. One FN noted that the tool provided a means to share data with other agencies, while another found the tool offered a “better connection” to LEOs and advocacy, which was a “better” way to communicate. A third FN felt the information sharing with advocacy led to “more accountability” among users on both sides of the referral stream. These positive sentiments were shared by one LEO representative who found the data they
received more legible than documents in the past, while a VSP representative described being more prepared for when a victim would be coming to receive support. A lesson learned is that the tool improved aspects of multi-stakeholder communication that could positively impact how law enforcement and support services could be extended to victims.

5.2.3 Body Maps

FNs valued digital body maps yet desired additional functionality. Some FNs wanted standardized body maps that could be make the records more easily interpretable in future court proceedings. FNs observed that digital body maps had less flexibility than paper-based maps, and required using multiple drop down menus and “a lot” of clicking to document. In addition, text boxes for capturing unstructured text increased the time required to complete body maps. Finally, FNs found the labels used to identify findings to be confusing or unwieldy when body maps were printed, and attached photographs sometimes did not print correctly. Some FNs experienced difficulties uploading photographs early in the pilot. A lesson learned is that FNs desired functionality to take photographs directly through the platform without the need to first save and then upload.

6. Discussion

To our knowledge, ours is one of the first evaluations of a tool for documenting and transmitting reports for IPV and SA in health settings. We found that users were motivated to use the tool and that there is ample room for further development in this nascent space of informatics and thereby represents an opportunity to address a wicked problem that transcends healthcare, justice, and victim services. We share overarching lessons learned that can inform future research and tool deployments.
A first lesson learned is the need to standardize forensic documentation in cases of IPV and SA. Our pilot study lends credence for leveraging electronic forms for effective documentation in hospitals, and future research could determine any differences in uptake and use by clinical or non-clinical setting (e.g., Sexual Assault Center). Standardization to digital evidence-based forms vetted by experienced professionals may also direct benefits to care quality and broader impacts on care equity and continuing education for FNs by ensuring that injuries (and thus, forensic evidence) are documented to the same high-quality degree for all victims. However, given that the current state for forensic exam forms is paper-based, or in PDF formats, it would require policy discussions at state and federal levels to initiate such an endeavor. The GRAVITY Project, for example, has generated IPV-related data elements as part of social risk and it has published value sets in the NLM’s VSAC. In addition, more research is needed to understand how digital tools can specifically assist in the accuracy, comprehensiveness, and timeliness over traditionally paper-based case reports for victims of IPV and SA.

Another lesson learned is the need for enhanced digital body mapping tools given their fundamental role in documenting forensic findings. While we qualitatively determined that FNs greatly appreciated access to digitized body maps, they stressed that they wanted to go beyond point-and-click functionality to enable handwritten graphics along with structured data capture. FNs particularly called for enhancements to photography capabilities, which could provide greater detail in forensic reports and enhanced information sharing with LEOs. Yet given the variability and acceptability of photography for forensic purposes, more work could be done to ensure that photographic quality and secure means for “release and transfer” are achieved.

A third lesson learned is that there is a need for better understanding the information needs and workflows of LEOs and VSPs as to how IPV and SA data need to be presented and
structured to meet medico-legal and victim support requirements. LEOs, for example, have particular requirements for handling medico-legal documentation from FN examiners that may not align well with what the tool produced. Further work may be necessary to assess data quality from LEO of what’s collected through the tool versus what was collected using pen and paper to determine whether standardized, electronic systems improve the quality of forensic exam data as it relates to admissible evidence. For VSPs, more research is needed to better understand how technology could be used to support referral receipt and whether an electronic referral more effectively connects them to victims.

This study had limitations that should be noted. This was a pilot study that involved voluntary adoption among pilot counties, which led to variability in the duration of the data collection period. This study took place in California, which had county- and state-specific requirements for forensic exam documentation. This meant that the tool was tailored to meet pilot county-related reporting needs and therefore could impact how the tool could be implemented in additional counties and states. Finally, we were unable to access hospital records that may have given insights into how patients visits were handled with or without the tool.

7. Conclusions

Our evaluation found that users were accepting of health IT that captures medico-legal documentation for forensic exams and facilitates referrals in support of victims of IPV and SA. The tool enabled users to locate, create, and transmit reports via interactive forms along with annotated body maps. Feasibility could be improved through future developments including further sophistication of digital forms with data that adhere to uniform standards, body mapping that enables handwritten notes and integrated forensic photographs, and understand the information needs by recipients of the reports and referrals that FNs generate.
8. **Clinical Relevance Statement**

Each year, two million people are treated for physical or sexual assault in emergency departments across the United States, yet often time rely on manual solutions for documenting and transmitting data to interested stakeholders including law enforcement agents and victim support service providers. We conducted a pilot study of a digital tool used in four counties in California for victims in interpersonal violence (IPV) and sexual assault (SA) to determine the acceptability of the technology, use, and recommendations. The implications call for continued development, and enhancement, of the tool and its features to further support end users in their ability to address the medico-social-legal needs of victims of IPV and SA.

9. **Acknowledgments**

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10. **Conflict of Interest**

The authors declare that they have no conflicts of interest in the research.
11. Human Subjects Protections

The study was considered quality improvement and was therefore exempt from Institutional Review Board review.

12. Multiple Choice Questions

Question 1: What stakeholder/end user type was not included in this study?

A. Forensic nurse examiners
B. Law enforcement agents
C. Family justice center agents
D. Medical billers

The correct answer is D. Medical billers were not included as part of this study although in California they have a role to play in initiating state-based reimbursements to victims of IPV and SA and therefore rely on the quality of forensic exam documentation.

Question 2: What feature was not included as part of the tool?

A. Validated forms
B. Body mapping
C. Photography
D. Form transmission

The correct answer is C. The tool did not include a photography feature, which can be an important component in documenting forensic exams of victims of IPV and SA.
13. References


Figure 1: An Example of a Handwritten Forensic Exam Report

Figure 2: Screenshot of Browse Reports Screen with Test Data

Figure 3: Screenshot of Create Report Screen

Figure 4: Screenshot of a Body Map that Indicates Areas and Types of Injury

Figure 5: Percentages of Form Use by Type and County
Forensic Examiner Lead Interview Guide

PLANNING (5 MINUTES)

First, I would like to learn about how you heard about “the tool” and what interested you in this platform.

1. In one or two sentences, can you tell me how you were first introduced to “the tool”?

2. Was there a particular problem or issue you were hoping “the tool” could address? If not, what led you to want to use it?
   
   o OPTIONAL PROBE: What system were you using prior to adopting “the tool”?

ENGAGING (10 MINUTES)

Next, I would like to talk about what the process was like to prepare for using the platform at your place of work.

3. How were you engaged in the planning for deployment of “the tool”?

4. From your perspective, who were key individuals that had to get on board with using “the tool”? And why was that important?
   
   o OPTIONAL PROBE: When did you start talking to your internal partners/agency (e.g., hospital leadership, IT department, etc.)?
   
   o OPTIONAL PROBE: When did you start talking to your external partners (e.g., District Attorney’s office, family justice center, victim advocacy, law enforcement)?

5. How, if at all, were you involved in getting these individuals on board?

EXECUTING (20 MINUTES)

We are also interested in what your experience has been like using “the tool”.

[5 MINUTES]

6. When did you start using “the tool”?

7. Is “the tool” required or is there an option to continue using previous processes?
• Probe: Who made that decision and what is their role?

[15 MINUTES]

“The tool” can be used for a variety of tasks, including filling out forensic examination forms, sharing those forms with colleagues or external entities, and connecting victims to supportive services.

8. Compared to how you used to complete these tasks, what has your experience been like using “the tool”?
   • Working with law enforcement, how has that process gone? If they are still using their own system, who do you talk to about that?
   • Filling out forensic examination forms and documenting injuries?
     • Managing your team?
   • Connecting victims to supportive services?
   • Sharing these forms with colleagues or external entities?
   • Will you have any formal relationships (i.e., with a memorandum of understanding) with any of these partners?

9. Have you had any technical difficulties using the system, and what did you do to resolve those issues?

REFLECTING & EVALUATING (15 MINUTES)

My last set of questions ask you to reflect on your experience using “the tool” and how you feel about using the platform in the future.

10. Has “the tool” met your expectations so far? Why or why not?
   0 [If there was a specific problem in PLANNING they were hoping “the tool” could address] Has “the tool” helped solve the problem(s) you thought it would?

11. How, if at all, has “the tool” affected your relationship with other agencies and organizations using the system, for example law enforcement?
12. [IF TIME ALLOWS]

- What kinds of changes do you think will need to be made to “the tool” so that it works well for your team long-term?

- [IF “TOOL” USE IS REQUIRED] I am curious, would you use “the tool” if it wasn’t required? Why or why not?

- What one or two things are you most excited about in the future?
  - OPTIONAL PROBES: What kind of changes do you think will need to be made?
  - OPTIONAL PROBES: Other partners to bring on? (e.g., crime laboratory)

This is my last question of the day…

13. How committed are you as a team lead to using “the tool” beyond 2023?
DOMESTIC VIOLENCE INJURY DOCUMENTATION/RISK ASSESSMENT

History of domestic violence? [ ] suspected [ ] reported

Date/Time of injury [ ] reported [ ] not reported

Time presented to ED

Law enforcement agency involved [ ] Social service notified [ ] Pt primary language

VICTIM INFO

Age [ ]
Sex [ M ] [ F ]
Y N Possibility of pregnancy? [ Y ] [ N ]
LMP [ ]
G P AB [ ]
Y N History of violence in home? [ ]
Y N History of drug or ETOH use? [ ]
Y N History of Psych? [ ]
Y N History of suicide attempts in past? [ ]
Y N History of sexual assault current or past? [ ]
Y N History of abuse toward children? [ ]

CHIEF COMPLAINT: mechanism of injury, inciting incident

SUMMARY OF PHYSICAL INJURIES: describe injuries, and bx required, disposition, follow-up

RELEVANT HISTORICAL INFO: medical record review, reported by family etc.
<table>
<thead>
<tr>
<th>CASE #</th>
<th>VICTIM</th>
<th>REPORT TYPE</th>
<th>EXAM TEAM</th>
<th>EXAM DATE</th>
<th>INVESTIGATOR</th>
<th>EXPIRES</th>
<th>ELIGIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-001</td>
<td>Test Patient 1</td>
<td>DV Exam</td>
<td>Hospital X</td>
<td>2 hours age</td>
<td>X. Jones</td>
<td>31 days</td>
<td></td>
</tr>
<tr>
<td>Ex-002</td>
<td>Test Patient 2</td>
<td>Child SA</td>
<td>Hospital X</td>
<td>5 hours ago</td>
<td>Z. Smith</td>
<td>31 days</td>
<td></td>
</tr>
<tr>
<td>Ex-003</td>
<td>Test Patient 3</td>
<td>Adult SA</td>
<td>Hospital X</td>
<td>Yesterday</td>
<td>X. Jones</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Ex-004</td>
<td>Test Patient 4</td>
<td>Child SA</td>
<td>Hospital X</td>
<td>Yesterday</td>
<td>Z. Smith</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Ex-005</td>
<td>Test Patient 5</td>
<td>Elder Exam</td>
<td>Hospital X</td>
<td>dd/mm/yyyy</td>
<td>X. Jones</td>
<td>28 days</td>
<td></td>
</tr>
</tbody>
</table>
Locations

- A1 | Right Supraorbital Region
- A2 | Right Eye Periorbital
- A3 | Perioral
  - A3.1 Potential Contact DNA
  - A3.2 Laceration

Add Additional Findings to this Location:
- Finding
- Potential Evidence (swab)

Notes and Photos

Notes (optional):
Laceration on the left upper lip likely with indentations indicative of a bite.

Photos (optional) | Upload Photos

County A

County B

County C

County D