

A Literature Survey on Emergency Patient Information Sharing and Secure Medical Data Management for MediFam

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Abstract: *Timely access to reliable patient information is a persistent difficulty in accident and emergency care, particularly when the patient is unconscious, unable to communicate, or not accompanied by family members. This paper presents a literature survey conducted to support the design of MediFam, an emergency medical and family information management system intended to give authorized medical personnel rapid access to essential patient data while preserving privacy. Ten peer-reviewed and institutional studies, eight of them published between 2020 and 2025, were selected and organized using a Collect, Classify, Compare, Critique and Conclude approach. Five themes emerged: emergency medical information and patient-carried data, electronic health records and information exchange, mobile and prehospital applications, secure emergency (break-glass) access control, and digital identification through QR codes. The surveyed work shows that stored clinical records are valuable in emergencies but are frequently not consulted, that patient-carried identification is feasible but underused, and that emergency access requires accountable authentication. However, few studies combine a structured emergency dataset, family contact support, authenticated access and usability evaluation under emergency conditions within one lightweight solution. This gap motivates MediFam, and its planned features are mapped to the reviewed evidence, with literature-supported features distinguished from features proposed specifically for the project.*

Keywords: Emergency Healthcare, Patient Information, Electronic Health Records, Mobile Health, QR Code, Medical Data Security

I. INTRODUCTION

Accidents and medical emergencies often require clinicians to act within minutes, frequently with little knowledge of the patient. Research on out-of-hospital trauma care notes that decisions about advanced resuscitative procedures sometimes have to be made on very limited data [1]. Emergency department clinicians likewise depend on efficient access to patient information that may be held outside the record system of the treating hospital [2]. The problem is most acute when the patient is unconscious or unable to give consent, a situation in which access to protected health information may be critical to saving life [3].

Information about allergies, current medicines, earlier diagnoses and discharge summaries is the kind of content that national electronic health record platforms are designed to hold [2]. Digital records have been introduced widely in emergency departments, yet a systematic review reported that record access in the emergency department varied widely between studies and was most frequently below 20% [4]. In prehospital care, a United Kingdom study found that only about half of the ambulance services were using electronic records at the time of data collection, with considerable variation in hardware and software [5]. The availability of digital records therefore does not guarantee that the right information reaches the clinician at the point of care.



Patient-carried approaches attempt to reduce this dependency. Smartphone emergency medical identification applications allow health and identification details to be viewed without unlocking the device, although their use by patients and clinicians has been low [6]. QR-code identity tags and mobile health systems have been proposed to link a worn or printed code to detailed patient information [7], [8]. At the same time, making sensitive data available in emergencies raises access-control questions: a recent systematic review lists emergency access among the unresolved issues in EHR access control [9], and break-glass mechanisms have been proposed to address it [10].

A literature survey is therefore required to establish what existing work offers, where its limitations repeat, and what remains unaddressed before MediFam is designed. MediFam is an emergency medical and family information management system intended to supply essential patient information (profile, blood group, allergies, medical conditions, medications, medical history and emergency contacts) to authorized medical personnel when the patient cannot communicate and family members are not immediately available. The scope of this survey covers emergency access to patient information, EHR and health information exchange (HIE) use in emergency settings, mobile and prehospital applications, patient identification technologies, and secure emergency access. Clinical decision support, diagnostic algorithms and telemedicine are outside the scope.

II. LITERATURE SURVEY METHODOLOGY

A. Scope and Search Strategy

The survey followed a five-stage approach: Collect, Classify, Compare, Critique and Conclude. The topic was defined as the availability and secure sharing of essential patient information during emergencies, with attention to patients who cannot communicate. Searching was carried out in October 2026 using a general web search engine. Each candidate was then traced to its PubMed/PMC entry, publisher or proceedings page, the Directory of Open Access Journals (DOAJ), or an institutional repository to confirm authors, venue, volume, pages and DOI. Search terms were combinations of: “emergency patient information system”, “emergency medical information sharing”, “electronic health records emergency”, “health information exchange emergency care”, “mobile health emergency”, “prehospital patient information”, “secure medical information sharing”, “digital patient identification emergency”, “QR code patient identification”, “smartphone medical ID” and “break-glass emergency access”.

B. Inclusion and Exclusion Criteria

Studies were included when they (i) addressed access to, sharing of, or identification for patient information in emergency, trauma or prehospital settings, or addressed access control relevant to such access; (ii) were peer-reviewed journal articles, conference papers or an institutional research report; (iii) were written in English; and (iv) had bibliographic details that could be verified from at least one authoritative source. Publications from 2020 to 2026 were preferred. Two studies from 2016 were retained because they describe QR-code identification, a technique not represented among the more recent records that could be fully verified. Studies were excluded when they dealt only with clinical outcomes or decision support without an information-access component, when they were news items, patents or commercial web pages, or when their bibliographic details could not be confirmed.

C. Shortlisting and Analysis

Records returned by the searches were screened by title and abstract, and the remaining papers were examined further. Ten studies were shortlisted. For each study, the research problem, method or technology, application domain, principal findings, strengths, limitations and relevance to MediFam were extracted. The studies were classified into five themes, compared across common dimensions (Section V), critically appraised, and used to derive the research gap (Section VI). The strengths and limitations stated in this paper are appraisals made for the purpose of this survey and are not necessarily statements made by the original authors. Because the sample is small and purposive, the survey is a focused review for project planning and not an exhaustive systematic review.



III. THEMATIC LITERATURE REVIEW

A. Emergency Medical Information and Patient-Carried Data

Early information about an incapacitated patient can come from the patient rather than from an institutional record. Smartphone emergency medical identification (SEMID) applications illustrate this idea, because they store health and identification information that can be viewed without entering the device passcode [6]. In a survey at an urban trauma centre, 51% of smartphone owners knew that the feature existed, but only 31% used it, and only 21% of the providers who had treated unresponsive patients carrying smartphones had queried the device; nevertheless, 73% of those who did so found the information helpful [6].

These findings point to a gap between availability and routine use. The approach appears to depend on each owner configuring it in advance and on a clinician remembering to look for it, and the owner may allow the data to bypass the lock screen, which places convenience ahead of access control [6]. Compared with the institutional records discussed in Section III-B, patient-held data are independent of any single hospital, but their completeness and governance are left to the individual. These characteristics are directly relevant to MediFam, which also relies on patient-supplied data but must provide a more structured and controlled route to it.

B. Electronic Health Records and Health Information Exchange

A substantial body of work examines whether electronic records improve emergency care. A systematic review of studies on EHR use in hospital emergency departments identified seven types of health outcome and three types of efficiency gain associated with EHRs, and reported that rates of record access in the emergency department ranged from 1.46% to 56.6%, most often below 20% [4]. Unlike earlier reviews, it also reported moderate to significant increases in admission rates associated with EHR use [4]. Log-data evidence from an Australian hospital is consistent with the low-access pattern: the national My Health Record was opened in 19.60% of 47,266 emergency presentations, mostly by pharmacists, although use rose steadily over the two-year period [2].

Both studies show that record availability does not translate automatically into record use. The authors of the log-data study suggest that clinicians may see no need to consult the record for minor presentations [2]. A further limitation is structural. In the Australian setting the record is opened from the hospital patient file and only when a patient record is available [2], which implies that the patient must first be identified and registered. For an unconscious patient without identification, this precondition may not be met. The records hold rich content, including allergies, medicines, pathology reports and discharge summaries [2], which confirms the kind of information emergency clinicians value but does not solve the problem of reaching it quickly.

C. Mobile and Prehospital Emergency Applications

Prehospital care presents a different information problem because the clinician works away from hospital systems. A multiple-methods study of United Kingdom ambulance services found that only about half were using electronic health records at the time of data collection, that hardware and software varied considerably, and that some services reverted to paper while changing systems [5]. Ambulance clinicians often worked with partial or unclear information and used indirect data entry such as writing on a glove, and the main function of the records was to store patient data [5]. These observations suggest that prehospital information is fragmented and that records are not necessarily designed for rapid onward sharing.

Mobile applications have been explored as an alternative channel. In a retrospective study of 43 patients with traumatic cardiac arrest, notifications from a public mobile application arrived on average 12.9 minutes before the standard emergency medical services radio notification and were generated for 84% of the patients, giving a secondary information source for resuscitation decisions on arrival [1]. Although this study concerns event alerts rather than patient histories, it supports the view that mobile channels can shorten the delay before information reaches the receiving team. Its limitations are the retrospective design, the narrow patient group, and the unresolved question of how such an application should be integrated into existing trauma systems [1]. Taken together, [5] describes



organizational fragmentation and [1] demonstrates a technical remedy for one aspect of it, but neither focuses on delivering a patient's allergies, medicines or emergency contacts to the clinician.

D. Secure and Privacy-Aware Medical Information Sharing

Making patient data available in emergencies conflicts with the need to restrict access. A systematic review of access-control solutions in EHR systems analysed 20 articles under the categories of identification, authentication, authorization and accountability, and found attribute-based access control (ABAC) to be the most frequently used authorization mechanism [9]. It reported 12 studies on credential systems, 10 on authentication and only 2 on accountability, and it listed missing multi-factor authentication, emergency access, patient consent and accountability among prominent gaps [9].

Studies that specifically address emergency access propose break-glass mechanisms. One conceptual model combines ABAC, blockchain and the InterPlanetary File System (IPFS) to give healthcare professionals access only in emergencies while respecting privacy settings previously defined by the patient [10]. A more recent framework uses blockchain and smart contracts so that an emergency duty doctor must obtain approval from a senior colleague through multi-signature transactions; the patient or an emergency contact is then notified, all actions are recorded as immutable audit logs, and a Proof of Compliance consensus mechanism checks adherence to policy [3].

Although these approaches improve accountability, they remain limited by complexity. Both depend on distributed-ledger infrastructure, and the available descriptions emphasize design rather than usability under real emergency conditions [3], [10]. Nevertheless, they agree on three principles relevant to MediFam: emergency access should be restricted to authorized personnel, patient preferences should be respected, and every access should be traceable. The notification of an emergency contact in [3] is notable because it treats the family as a stakeholder in the access process.

E. Digital Identification and Rapid Access to Patient Information

QR codes offer a low-cost way to link a person to stored information. A QR Code Identity Tag system designed for the Turkish healthcare system provides medical identification alerts and in-hospital patient identification; the tag can be worn as a bracelet or necklace or carried as an ID card, and scanning it with a smartphone or standalone scanner opens a website holding detailed information [7]. Authorized personnel such as paramedics, firefighters or police can reach more detailed patient information than an ordinary smartphone user, and the system was tested with 174 participants in Istanbul using the System Usability Scale [7]. The authors favor QR codes because of their simple technological base, which needs no special tags such as radio-frequency tags [7].

A different emphasis appears in QRM, a mobile health information system in which a QR-code-based patient identification mechanism addresses identification and data privacy problems while allowing patients or authorized others to view the patient's EHR, personalized education material and emergency contact information [8]. A user evaluation found that participants favored the system and reported high perceived usefulness and intention to use it [8]. The two studies agree that QR identification is feasible and acceptable, but they differ in orientation: [7] targets first responders and hospital identification at national scale, whereas [8] targets patient-centred care with emergency contact viewing as one function. Neither reports measured effects on emergency outcomes in the sources reviewed.

IV. LITERATURE REVIEW COMPARISON MATRIX

Table I summarizes the ten selected studies. Entries in the Limitation and Relevance columns are appraisals made for this survey.



TABLE I: Comparison Matrix of Selected Studies

No.	Author & Year	Research Problem	Method / Technology	Key Finding	Limitation	Relevance to MediFam
1	Kelly & Clare, 2020 [1]	Limited information available for prehospital decisions in traumatic cardiac arrest	Retrospective observational study of the Citizen mobile app; 43 patients	App notification preceded EMS radio notification by 12.9 min on average; notification generated for 84%	Narrow patient group; event alerts, not patient history; integration into trauma systems unresolved	Shows value of mobile channels for early prehospital information
2	Mullins et al., 2021 [2]	Extent of clinician access to a national EHR in the emergency department	Retrospective analysis of log data; 47,266 ED presentations at one hospital	Record accessed in 19.60% of presentations; use rose over time; mostly by pharmacists	Single site; access does not prove effect on care; requires an existing record	Confirms that stored records are underused in emergencies
3	Amin et al., 2025 [3]	Compliant and auditable emergency access to PHI when the patient cannot consent	Blockchain and smart contracts; multi-signature approval; Proof of Compliance consensus	Policy-checked access, immutable audit logs, notification of patient or emergency contact	Design-oriented; heavy infrastructure; suitability for small deployments not shown in abstract	Supports approval, audit trail and family notification
4	Mullins et al., 2020 [4]	Effect of EHR use in the ED on outcomes and efficiency	Systematic review of peer-reviewed studies	ED record access varied (1.46–56.6%), mostly below 20%; seven outcome and three efficiency types	Hospital-record focus; does not address unconscious or unidentified patients	Establishes both the value and the underuse of records in the ED
5	Porter et al., 2020 [5]	How electronic records are used in UK ambulance services	Multiple methods: rapid review, survey of 13 services, four case studies, workshop	About half of services used EHRs; hardware and software varied; clinicians handled partial information	UK context; organizational rather than patient-facing	Shows prehospital data are fragmented; motivates a concise portable dataset
6	Vella et al., 2020 [6]	Use of smartphone emergency medical ID for injured patients	Survey of a convenience sample at a US Level I trauma centre	51% of owners aware, 31% used it; 21% of providers queried phones, 73% of them found it helpful	Convenience sample; relies on patient set-up and clinician habit	Supports patient-held emergency data; shows adoption barriers



No.	Author & Year	Research Problem	Method / Technology	Key Finding	Limitation	Relevance to MediFam
7	Uzun & Bilgin, 2016 [7]	Patient identification and medical alerts in emergencies	QR Code Identity Tag (bracelet, necklace, card) linked to web records; SUS test with 174 participants	Authorized personnel reach more detail than ordinary users; usability evaluated	National context; depends on carrying the tag; usability, not clinical impact	Direct precedent for QR-based emergency access with authorization levels
8	Zhang et al., 2016 [8]	Secure, ubiquitous patient access to EHR with identification and privacy safeguards	QR-code-based mHealth system (QRM); user evaluation	Participants favored the system; high perceived usefulness and intention to use	Perception-based evaluation; not tested in real emergencies	Combines QR identification, emergency contact view and privacy mechanism
9	Cobrado et al., 2024 [9]	Access control solutions in EHR systems	Systematic review (PRISMA 2020) of 20 articles; IAAA categories	ABAC most common; gaps include multi-factor authentication, emergency access, consent, accountability	General EHR scope, not emergency-specific	Defines the security requirements MediFam must address
10	Saberi et al., 2021 [10]	Break-glass access to EMRs in emergencies	Conceptual ABAC model with blockchain and IPFS	Grants emergency access to professionals while respecting patient-defined privacy settings	Conceptual design; field validation not reported in abstract	Supports patient-controlled privacy with emergency override

V. COMPARATIVE ANALYSIS

Table II compares the ten studies across the dimensions considered relevant to MediFam. Four technology families can be distinguished: institutional electronic records [2], [4], [5]; mobile alerting [1]; patient-carried or QR-based identification [6]–[8]; and security architectures for emergency access [3], [9], [10].

TABLE II: Feature Comparison Across Selected Studies

Ref.	Technology	Information Type	Emergency Accessibility	Mobile / Cloud Support	Security / Authentication
[1]	Mobile app notifications	Public-safety event alerts for prehospital use	Early prehospital notification	Mobile	Not reported
[2]	National EHR opened via hospital system	Allergies, medicines, pathology, discharge summaries	After patient is identified and a record exists	Web-based national record	Password-protected hospital access



Ref.	Technology	Information Type	Emergency Accessibility	Mobile / Cloud Support	Security Authentication
[3]	Blockchain and smart contracts	Protected health information	Emergency request with senior approval	Private blockchain network	Multi-signature approval; immutable audit log
[4]	EHR / HIE (review)	Clinical records	ED access, often below 20%	Not addressed	Not addressed
[5]	Ambulance EHR	Ambulance patient records	Prehospital use	Varied hardware and software	Not addressed
[6]	Smartphone medical ID	Health and identification data entered by owner	Lock-screen access without passcode (owner option)	Mobile device	Passcode bypass by design
[7]	QR tag with web database	Detailed patient information	Scan by smartphone or scanner	Web and mobile	Extended access for authorized personnel
[8]	QR-based mHealth system	EHR, education material, emergency contacts	Emergency contact viewing	Mobile	QR identification addressing privacy
[9]	Access-control review	Identification, authentication, authorization, accountability mechanisms	Emergency access reported as a gap	Not addressed	ABAC, credentials, access logs
[10]	ABAC with blockchain and IPFS	Electronic medical records	Break-glass in emergencies	Distributed storage	Patient-defined privacy settings

Type of information. Institutional records hold the richest content, including allergies, medicines, pathology reports and discharge summaries [2], but this content is tied to a health service. Patient-carried systems hold less, and in [6] the content is entered by the owner. QR-based systems [7], [8] link to web databases that can be extended, and [8] includes emergency contacts explicitly.

Emergency accessibility. Studies of institutional records [2], [4] show that access is conditional on identification of the patient and on the clinician's decision to consult the record. Smartphone IDs [6] and QR tags [7] remove the dependency on a hospital record, yet they require the responder to find and scan a device or tag. Break-glass designs [3], [10] address the authorization step rather than the discovery step.

Mobile and cloud support. Mobile delivery appears in [1] and [6]–[8], whereas [3] and [10] rely on blockchain-based or distributed storage rather than conventional cloud services. The studies [2], [4] and [9] do not report mobile support.

Security, privacy and authentication. A trade-off is visible. The lightweight identification approaches offer limited control: the smartphone feature in [6] can bypass the lock screen by owner choice, and [7] distinguishes authorization levels but is described mainly in terms of usability. The break-glass proposals [3], [10] provide stronger accountability through multi-signature approval, patient-defined settings and immutable logs, yet they have not been shown to be simple to deploy. The review [9] confirms that authentication and accountability receive uneven attention.

Real-time sharing. Only [1] measures timeliness directly, and [3] provides notification of the patient or contact once access is granted. The remaining studies do not report real-time sharing as a feature.

Advantages and limitations. Studies of institutional records contribute solid evidence on how records are used but offer no route for unidentified patients. Patient-carried and QR approaches offer such a route but with modest evaluation. Security frameworks offer accountability at the cost of considerable complexity. Convenience, completeness and control therefore tend to be improved at the expense of one another, and no reviewed study balanced all three.



VI. RESEARCH GAP

The reviewed literature shows clear progress. Electronic records contain clinically valuable emergency information [2], mobile channels can shorten information delays [1], QR-based identification is feasible and accepted by users [7], [8], and emergency access can be governed through attribute-based, approved and auditable procedures [3], [9], [10]. However, five recurring limitations indicate unresolved issues.

Unidentified patients. Existing studies have addressed the use of institutional records in emergency departments; however, limited attention has been given to patients who cannot be identified or who have no prior record at the treating facility. Record access remains low [2], [4], and in the Australian example it is possible only when a patient record exists in the hospital system [2].

Structured patient-held data. Existing studies have shown that patient-held information such as smartphone medical IDs can help clinicians; however, adoption is low and the content is left to the individual [6]. How a consistent set of essential data (blood group, allergies, conditions, medications, history and contacts) can be made reliably available to responders remains open.

Evaluation under emergency conditions. QR-code systems have been evaluated mainly through usability and user perception [7], [8]. Limited attention has been given to evaluation in realistic emergency scenarios or to combining QR identification with controlled doctor access.

Lightweight secure access. Emergency access control has been addressed through blockchain-based break-glass designs [3], [10], and a systematic review still lists emergency access, multi-factor authentication, patient consent and accountability as gaps [9]. The proposed solutions are, however, complex and described mainly at design level, so practical, lightweight and auditable access suitable for a small-scale system remains insufficiently explored.

Family involvement. Emergency contacts appear as stored data in [8] and as notification recipients in [3], but within the reviewed studies, family members are not treated as contributors who keep emergency information current and as parties informed when access occurs, inside a single doctor-facing system.

Taken together, none of the ten studies examined combined (a) a structured emergency dataset that remains available when the patient is unconscious, (b) rapid identification through a lightweight mechanism, (c) authenticated and auditable access for authorized medical personnel, and (d) family contact and notification support. This statement is restricted to the reviewed literature and does not imply that no such system exists. It indicates that the combination is insufficiently documented and evaluated, and that investigating it through a system such as MediFam is justified.

VII. RELEVANCE OF THE LITERATURE TO MEDIFAM

The reviewed evidence supports several planned MediFam features directly, supports others indirectly, and leaves some as project-specific proposals. Table III separates these categories.

TABLE III: Mapping of MediFam Features to the Reviewed Literature

MediFam Feature	Supporting Evidence from the Literature	Status
Patient profile and identification	Patient identification through QR tags and mobile systems [7], [8]; identification data stored in smartphone medical IDs [6]	Supported by literature
Blood group	Not examined as a specific field in any reviewed study	Proposed for MediFam
Allergies	Allergy information is held in national records used in the ED [2]; health information storable on phones [6]	Supported indirectly
Medical conditions and history	Discharge summaries and pathology reports in national records [2]; EHR value in the ED [4]	Supported indirectly
Medications	Medicines information in national records [2]	Supported indirectly
Emergency contacts	Emergency contact viewing [8]; notification of patient or emergency contact [3]	Supported by literature



MediFam Feature	Supporting Evidence from the Literature	Status
Secure, authenticated access	Access-control review [9]; break-glass models [3], [10]	Supported by literature
Audit trail	Accountability category and logs [9]; immutable audit logs [3]	Supported by literature
QR-code identification	QR identity tags [7]; QR-based mHealth system [8]	Supported by literature
Patient-defined privacy settings	Conceptual break-glass model respecting patient settings [10]	Supported (conceptual)
Family-to-doctor information sharing	Family appears only as contact data [8] or notification recipient [3]	Partly supported; integrated workflow proposed for MediFam

Features supported by the literature. The importance of allergies, medicines, medical history and test or discharge information is supported by the content of national records used in the emergency department [2] and by the association of EHR use in the emergency department with several outcome and efficiency categories [4]. Patient identification and emergency contact viewing through QR codes are supported by [7] and [8]. Controlled access, audit logging, patient-defined privacy settings and notification of a contact are supported by [3], [9] and [10].

Features proposed specifically for MediFam. Blood group as an explicit field was not examined in the reviewed studies and is proposed on the basis of the project's emergency scenario. The same applies to the integrated family-to-doctor workflow, in which family members help maintain the emergency profile and doctors obtain access after authentication. These are design hypotheses to be tested, not conclusions drawn from the literature.

Design implications. Three implications follow. First, because smartphone IDs [6] and institutional records [2] each depend on a discovery step, MediFam should provide a visible and simple identifier such as a QR code [7], [8]. Second, because lightweight solutions offer limited control, access should be restricted to authenticated medical personnel with logging and, where feasible, owner or family notification [3], [9]. Third, because existing evaluations are mostly perception-based [7], [8], MediFam should be evaluated for speed and usability in simulated emergency scenarios.

VIII. CONCLUSION AND FUTURE SCOPE

This survey examined ten studies on emergency patient information access and secure management. The literature shows that stored clinical information is valuable in emergencies but is often not consulted [2], [4]; that prehospital information is fragmented [5] although mobile channels can accelerate it [1]; that patient-carried identification is feasible but underused [6]–[8]; and that emergency access must be governed by authentication, approval and accountability [3], [9], [10]. The technologies identified were national and hospital EHR platforms, mobile applications, smartphone medical IDs, QR codes, attribute-based access control and blockchain-based break-glass mechanisms. Their main limitations are dependence on patient identification, low adoption, perception-based evaluation and architectural complexity.

The principal gap is the limited documentation of a lightweight system that combines an essential emergency dataset, quick identification, authenticated doctor access and family contact support. MediFam is relevant because it is intended to address this combination.

Future work includes building a MediFam prototype with QR-based identification, authenticated role- or attribute-based access and audit logging; evaluating it in simulated emergency scenarios by measuring the time needed to retrieve key data and collecting clinician feedback; examining the privacy and data-protection requirements that apply locally; studying how family-maintained data can be kept accurate and current; and extending this survey with a larger, formally systematic search and full-text appraisal of each source.



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