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# Evaluating the utility and challenges associated with "unknown" and fictional patients in the electronic medical record

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A B S T R A C T

Electronic medical records (EMRs) allow for the creation of "fictional" and unknown patients within the EMR production environment. Surprisingly, there is sparse literature regarding the use cases for these patients or the challenges associated with their existence in the EMR. Here, we identified three classes of patients in regular use at our institution: true fictional patients with medical record numbers (MRNs) used to test EMR functions in the production environment, "confidential patients" used to store sensitive data, and "unknown" patients that are assigned temporary MRNs in emergency situations until additional information can be acquired. A further layer of complexity involving the merging of records for unknown patients once they are identified is also explored. Each class of patients, real or fictional, poses a variety of challenges from a clinical laboratory standpoint, which are often dealt with on a case-by-case basis. Here, we present a series of instructional cases adapted from actual patient safety events at our institution involving fictional, confidential, and unknown patient records. These illustrative cases highlight the utility of these fictional and unknown patients, as well as the challenges they pose on an institutional and individual level, including issues that arise from merging clinical data from temporary MRNs to identified patient charts. Lastly, we provide recommendations on how best to manage similar scenarios that may arise.

*Keywords:* Blood-borne pathogens, Blood transfusion, Electronic health records, Emergency treatment, Software validation, Unknown patient

## Introduction

According to the Centers for Disease Control and Prevention, electronic medical record (EMR) use by practicing physicians in the United States is greater than 85%, with near-universal adoption by major medical systems and growing use by smaller medical practices.[1] EMRs are now being implemented in all practice models, expanding the user base far beyond larger health systems that often have additional resources and a greater depth of informatics expertise.[2–5] As such, logistical issues and problems that arise with routine EMR use are impacting a wide range of individuals and are often dealt with on a case-by-case basis, necessitating the ever-growing body of literature on solutions to recurring problems as they arise.[6–8] Here, we will focus our attention on the use of fictional, confidential, and unknown patients within the EMR. With the exception of unknown patients, we have found little published literature on this topic.

EMRs generally consist of multiple "environments," or versions of the final product, each with their own functionality and many of which are restricted to a subset of users.[9–11] One such environment is the production environment of an EMR. This is the environment in which most users interact with and consists primarily of discrete patient records. Importantly, in addition to actual patient records, it can be advantageous to generate "patients" within the production environment. This may be done for a variety of purposes, including validation and troubleshooting of EMR functions, protection of patient confidentiality for certain sensitive purposes (e.g. infectious disease testing for employee blood-borne pathogen exposure), or creation of "John Doe" or "Jane Doe" type records for patients whose identity is unknown at the time of clinical presentation. There is some variability in the literature on the terminology of these types of fake EMR patients. Here, we focus on three categories that we term "fictional patients", "confidential patients", and "unknown patients" (defined in the "Materials and Methods").

Briefly, "fictional patients" do not contain any actual patient data and are commonly used in functions such as test validation and troubleshooting issues within the EMR. While there are frequently additional EMR environments (e.g. support, "playground," or validation environments) available for these purposes, they cannot exactly mimic the production environment. "Confidential patients," are those that are used to aggregate data from multiple individuals into a single medical record so these data can be made accessible within the production environment. Confidential patients can simplify information security and/or store data that should not be located by law or regulations within individual private patient records. Finally, there are numerous issues that arise when dealing with "unknown patients" (colloquially "Jane" or "John Doe"). These issues occur at the time of clinical presentation and are compounded when identification is subsequently made. Many of the medical consequences related to the identification errors of unknown patients have previously been identified,[12–14] and a system for mitigating adverse

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events related to misidentification prior to the widespread implementation of EMRs have been proposed.[15] We will therefore, focus our discussion on issues of identification related to the EMR and emphasize the challenges that arise after an identification has been made, including the challenges of merging data from unknown patient MRNs to specific patient records. We provide our institution's experience from the pathology perspective to add to this literature. Our objective is to define the use of fictional, confidential, and unknown patients in order to highlight the problems within the EMR they are intended to solve along with the potential challenges associated with their use.

## Materials and methods

### *Institution*

The University of Iowa Hospitals and Clinics (UIHC) is an 866-bed academic medical center that includes a 190-bed children's hospital. UIHC offers a full range of adult and pediatric inpatient and outpatient services, including level 1 trauma center and specialty intensive care units, with numerous affiliated outpatient sites located throughout the region. As one of only two level 1 trauma centers in the state, a disproportionate volume of trauma cases and critically ill patients present to the emergency department (ED). Since May 2, 2009, UIHC has used the Epic EMR system (Epic Systems, Inc., Madison, WI). The institution switched the laboratory information system (LIS) to Epic Beaker Clinical Pathology in August 2014 and Epic Beaker Anatomic Pathology in October 2015.[16,17] Thus, our medical center is an example of an institution that uses an integrated system where the EMR and LIS are from the same vendor.

### *Protocols and definitions*

**Fictional patients** are commonly used in functions such as test validation and troubleshooting EMR workflows. Importantly, fictional patients do not contain any actual patient data. They are generally created by select users with specific patient registration privileges. At UIHC, validated MRNs are tracked by hospital information technology (IT) staff, who further monitor downstream processes such as billing and relative value unit (RVU) records. We have adopted a naming convention for such patients beginning with a string of Z's (e.g. ZZZZtest, Patient) to prevent confusion with real patients that may have a similar MRN or similar appearing name (an issue that occurred in the past with a different naming convention for fictional patients). Once generated, fictional patients can be utilized by any user in the production environment to test functions prior to applying them to a real patient. Common examples at our institution include the following: placing orders to provide troubleshooting assistance to ordering providers; testing of new order sets or best practice alerts; writing clinical notes to test new templates; validating laboratory test changes; and providing examples of reports for lab testing without private patient information.

**Confidential patients** at our institution are used to aggregate data from multiple individuals into a single MRN within the production environment. The common use within our medical center is for tracking infectious disease results for blood-borne pathogen exposures. In the case of infectious disease exposure testing for workplace blood-borne pathogen exposure, confidential patient MRNs aggregate data from multiple exposures over time, with identifying details such as source patient MRN or affected employee identification number protected by "break-the-glass" security (which includes a warning against access of data by unauthorized individuals and potential downstream auditing of who accesses this information). Confidential patients are created and monitored by various administrative entities, such as hospital IT, the department of pathology and hospital compliance, along with the end-user. Separate from the confidential patient records containing aggregated data discussed above, our institution also has procedures for enhanced security for certain individual medical records. Break-the-glass is one possible mechanism that may be used in select cases, although other security tools are also available.

**Unknown patients** are used for patients who come for medical care to UIHC and cannot be identified (e.g. trauma victim lacking identification cards, like a driver's license or without an accompanying person who can help with identification). These are assigned an unknown patient MRN according to institutional policies. Briefly, after every attempt has been made to identify the patient, the charge nurse (or designee) determines if the patient best falls under the category of "adult" or "pediatric" based on observable characteristics. This information is relayed to the patient account representative, who then assigns an unknown patient MRN from a pool designated for unidentified patients. To generate this record, a name, date of birth (DOB), and sex are required. Name is assigned as room number, patient (for example a patient in room 10 would be assigned the name Ten, Patient). Legal sex is assigned at the discretion of the provider. DOB is assigned as January 1, 1910, for adults and January 1, 2010, for pediatric patients. As of January 2023, adult patients assigned a sex of female or unknown are assigned a birth date of January 1, 2000, if they appear to be $< 50$ y old.

### *Data retrieval and chart review*

A list of fictional, confidential, and unknown patients, with associated MRNs, was generated by hospital information technology (University of Iowa Health Care Information Systems; hereafter referred to as "hospital IT"). This search retrieved 910 fictional patients, 10 confidential patients, and 1129 unknown patients (following the convention First Name = Patient, Last Name = Room #). The fictional patients contain a variety of data, including demographics, clinical notes, laboratory results, and imaging studies. The confidential patients are all utilized for workplace blood-borne pathogen exposure infectious disease testing by various categories of employees or trainees. We did not investigate the data deposited in these confidential patients, as all have "break-the-glass" security restrictions. We reviewed 100 randomly selected, unknown patient records. The majority of these were found to be "empty" and contained no demographic information, laboratory results, medication administration records, or clinical notes. A small minority (3/100, 3%) represented unknown patients for whom we were not able to identify the actual patient but contained limited data from what was likely a brief emergency department encounter, such as a short clinic note and basic laboratory test results.

## Results

### *Fictional patients*

The main challenges we have faced with fictional patients have mostly arisen from scenarios where there is a lack of recognition of the MRN being associated with a fictional patient. The following are examples we have encountered.

First, fictional patients have triggered alerts within the clinical laboratory (e.g. delayed turnaround time log). This may cause confusion, especially for less experienced laboratory staff.

Second, fictional patients may have results that trigger notification to public health authorities (e.g. infectious disease testing, heavy metal toxicity) unless there is a mechanism to prevent this. This is especially prone to happening for tests set up to automatically transmit to state health authorities using an established direct interface.

Third, "procedures" ordered on fictional patients may have RVUs assigned to the ordering provider and thus falsely boost RVU generation for that provider. In our department, validation testing using fictional patients predominantly uses the laboratory medical director and a relatively small group of other pathologists as "ordering providers." For this reason, the department laboratory director was briefly one of the top RVU generators for the institution until it was recognized that fictional patient ordering was the cause.

Fourth, testing ordered on fictional patients may enter billing queues if not screened out. Fifth, utilization reports aimed at monitoring high-priced but rarely ordered laboratory tests can be skewed by the presence of fictional patients that had testing validation and "ordering" performed. This type of effect is much less likely to significantly skew data for frequently ordered testing, as the number of real patients typically far outweigh a small number of fictional ones in those types of reports.

Lastly, informatics tools within our EMR (e.g. Epic Reporting Workbench, data warehouse queries) can contain fictional patients that need to be filtered out prior to quality assurance or research analysis. If not recognized, fictional patients captured in the reports can skew the data, including rate of positive results and patient age distribution. In a worst-case scenario, these artificial data points from fictional patients could potentially confound research and lead to inappropriate conclusions that are ultimately published.

For all the scenarios above, multiple stakeholders need to be aware of the possible presence of fictional patients within the production environment. The naming convention we have adopted does help people more quickly recognize that the medical record is not that of an actual patient, although some could think that these might be actual patients whose identities are being protected. Critically, hospital revenue and billing as well as those mining EMR data for research purposes need to be aware of fictional patients and appropriately filter them out to avoid confusion.

### *Confidential patients*

While confidential patients in our system generally function as intended, there have been several issues with their use. These issues mainly relate to the workflow of pairing test results with the corresponding individual, which has primarily manifested in delayed turnaround times for infectious disease testing. Improving the workflow for blood-borne pathogen exposure testing required multidisciplinary committee work at our institution. A major impediment to achieving timely treatment is that the workflow for filing these results in confidential patient records ends up being cumbersome, ultimately impacting the overall turnaround time for results to enter the confidential patient's record. As an example, decisions regarding HIV exposure prophylaxis are time-sensitive, with 2 h established as an ideal time window to start postexposure prophylaxis.[18–21] Reporting test results to confidential patient records by designated users and then reporting these results to those who review the results (e.g. employee health director or designees) adds complexity to an already tight time window. When discussions first began at our institution about achieving source patient HIV screening turnaround time within 2 h of collection, the HIV screening assay used in the medical center core clinical laboratory had an instrument analysis time of approximately 50 min. Per manufacturer recommendations, all initially positive screens had to undergo one additional repeat analysis (adding another 50 min). If the first and second screens were discordant, then a third repeat analysis was performed. Turnaround time within 2 h was only realistic if the screening results were negative or if preliminary results were reported for the initial positive screen, a situation that was technically challenging using our confidential patient record process. Therefore, a workflow to provide preliminary positive notification was developed, with the advice to check the final verified results when those are completed. When the core laboratory switched to an HIV screening assay on the main automated chemistry line with much shorter instrument analysis time, then it was feasible to complete the full testing, even for positives, within 2 h. As such, maintaining staff familiarity with this workflow, especially during off-hours, can be challenging given that the manual process of filing results in the confidential patient records is significantly slower than if results were simply auto verified to specific patient records, as in typical clinical laboratory testing workflow. Our experience illustrates the importance of multidisciplinary discussion and workflow optimization.

### *Unknown patients*

The final category of patients discussed here are those that arrive without identifying information. To generate an MRN for such unknown patients (aka John/Jane Doe), a name, legal sex, and DOB must be entered into the EMR. The process for generating this information is outlined in the Materials and Methods and summarized in Fig. 1. Importantly, it is our practice to assign standard birth dates to unknown patients to streamline the process of generating an MRN. Historically, we used two potential dates designed to stratify patients into adult or pediatric populations, most recently January 1, 2010, for pediatric patients and January 1, 1910, for adults.

To highlight the drawbacks of this approach, consider the following case. An adult female estimated to be between 30 and 40 y old presented to the ED following a motor vehicle accident. She was found unresponsive and without identifying information and was thus assigned a temporary MRN with a DOB of 1/1/1910. On admission, retroperitoneal hematoma and right renal vein avulsion were identified, and emergency release blood was requested to stabilize. At UIHC, emergency release blood is available in the ED, operating rooms, and labor and delivery from blood kiosks (Haemobank™, Haemanetics). These kiosks are programmed to release blood based on the age and sex of the patient according to commonly practiced transfusion guidelines. Thus, male patients and women of nonchildbearing age (>/ = 50 yo) will receive O-Pos units, whereas females of child-bearing age (<50 yo) and patients with unknown legal sex in the EMR are given O-Neg units. In the case of this patient, her DOB as an unknown patient was assigned as 1/1/1910 making her 112 yo at the time of transfusion, and thus, she was erroneously given two units of O-Pos RBCs.

After this occurrence, we retrospectively reviewed the emergency release of blood products from our blood kiosks in the ED and found 197

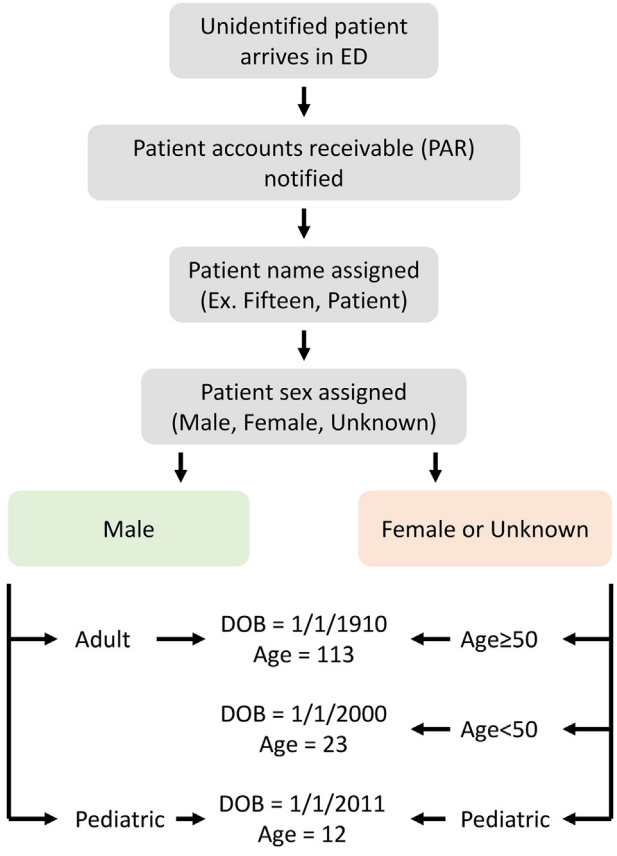


**Fig. 1.** Institutional protocol for assigning MRNs to unidentified patients. MRNs, medical record numbers.

**Table 1**
Effect of additional age stratification on emergency issuance of appropriate blood products for adult females in the emergency department.

| | | Prior to age stratification for adult females (2021–2022) | | With age stratification for adult females (January to July 2023) | |
|---|---|---|---|---|---|
| | | O + Units | O- Units | O + Units | O- Units |
| Unidentified | 50 y or older | 2 | 0 | 1 | 0 |
| | Less than 50 y old | 2 | 2 | 0 | 4 |
| Known identification | 50 y or older | 26 | 1 | 13 | 0 |
| | Less than 50 y old | 0 | 16 | 0 | 8 |

RBCs and 66 units of plasma were issued in the calendar year 2022, though not all of these are transfused. Importantly, 50% (2/4) of unidentified female patients who should have received O-Neg units instead received O-Pos RBCs. In contrast, no identified females (0/16) received O-positive units if of childbearing age (Table 1). Given these findings, we have modified our approach to unidentified patients to include age stratification for adult females. Per the new protocol, any unidentified female patient visually estimated to be < 50 y old is assigned the DOB of 1/1/2000. Since implementing this change, 100% (4/4) of unidentified females <50 yo have received O-Neg RBC units (Table 1).

A similar set of problems arise when unknown patients are assigned the legal sex of "Unknown." As all patients must have a legal sex assigned to generate an MRN, a legal sex of "Unknown" is sometimes used, often with the intent to update to "Male" or "Female" later. While this may seem like an inconsequential decision in emergency settings, there are many potential consequences of this decision, some related to the interpretation of laboratory results that have defined sex-specific ranges. For example, our institution experienced a case where a patient with sex registered as unknown was found to have alanine aminotransferase (ALT) and aspartate aminotransferase (AST) > 1500 U/L (reference range: ALT, <33 U/L; AST, <32 U/L). Because reference ranges were not previously defined for an unknown sex, these results were not flagged as abnormal and the provider failed to recognize the abnormalities and act on them until recognizing the issue the next day. To address this specific issue, we now report the reference intervals for unknown legal sex for selected tests that have sex-specific reference intervals as the highest upper limit of normal for male or female to the lowest lower limit of normal for male or female, such that abnormal values will clearly flag if outside both the standard male and female reference intervals. This also allows for critical values to be associated with tests if patient's sex is unknown. In a previous study, we have ascertained that a patient's legal sex of unknown occurred in three main circumstances: (1) temporary occurrence in an emergency pending later official entry of Male or Female for legal sex into patient's UIHC medical record, (2) legal sex not provided for a laboratory specimen from a patient not yet registered in the UIHC system, or (3) patient had legal sex changed from Male or Female to Unknown through an official process (typically for a gender-identity of nonbinary).[22]

### *Considerations after an unknown patient has been identified*

A further complication in dealing with unknown patients arises after an identification has been made. Any time key demographic information such as patient name, legal sex, or DOB change, a new medical record must be created, and the charts must then be merged. While this most commonly occurs in the setting of a change of legal name after marriage or shortly after birth (name change from the generic Baby Girl/Boy to their given name), a similar process is needed for any patient assigned a temporary chart when they were unidentified at presentation. In principle, chart merging is performed to prevent the existence of incomplete and redundant medical records for a single individual; however, the process of merging is not without complications. Most importantly, with the current functionality of our EMR and LIS, at the time a record is merged, all future/uncollected laboratory orders, pending consults, and future appointments are canceled. Furthermore, pending laboratory tests with longer turnaround times, such as complex genetic studies, send out testing to a reference laboratory, and microbiology cultures not yet finalized will result in the "old" MRN and not the new MRN that has been merged with it. Finally, the "old" MRN often remains in the EMR as an empty record, and thus the majority of unknown patients that remain in the EMR are the MRNs of patients that have since been merged. To assess the magnitude of this, we searched the EMR and retrieved approximately 1100 anonymous patients (following the convention First Name = Patient, Last Name = #). A review of 100 such charts that were randomly selected revealed the majority were "empty" and contained no demographic information, laboratory results, medication administration records, or clinical notes. A small minority (3/100, 3%) represented anonymous patients for whom we were not able to identify the actual patient; these 3 records contained some information, usually basic laboratory result(s) and brief clinic encounter notes. Presumably, these patients were briefly within the hospital and then left the hospital system without definitive identification.

To highlight the challenges associated with merging MRNs, we summarize a case encountered at our institution. Approximately 40-y-old male was found unconscious in his motor vehicle during the winter. He was hypothermic to 31 °C with a systolic blood pressure of approximately 50 mm Hg. On arrival at the ED, he was unresponsive and without any identification cards, and thus was assigned a temporary MRN according to institutional protocol (Fig. 1). Initial testing revealed plasma glucose >1000 mg/dL (reference interval <140 mg/dL for random level; value was a critical value at our institution) and a metabolic acidosis, and he was diagnosed with severe diabetic ketoacidosis. He improved rapidly with treatment and was able to communicate with the team within hours of his arrival. At this point, his demographic information was made available; however, his chart was not merged to prevent errors in laboratory reporting. Over the next 3 d, he was transferred twice (medical intensive care unit followed by admission to the inpatient floor) and received multiple critical laboratory values including low potassium, high glucose, and abnormal blood alcohol levels. After discharge, his demographic information was finally updated and his record was merged. Had the merger happened sooner, there would have been a risk of loss of pending orders.

As highlighted above, it is crucial to perform a merge at the optimal time to prevent the loss of outstanding orders and difficulty in reporting laboratory results. The latter was especially important as this patient had multiple critical values called back during his short admission. At UIHC, merges are performed after discharge when possible and only on stable patients if a long-term admission is anticipated. An additional layer of complexity with merged patients that is more institution-specific is that our blood kiosks currently cannot issue blood to patients if their record has been merged, regardless of the reason the merge was required. In those cases, blood products must be issued directly by the blood bank.

We summarize some of the main risks and challenges with merging charts from previously known patients in Table 2. We further discuss general challenges with chart mergers in other settings (e.g. hospital that merge data from multiple EMRs to a single EMR) in the Discussion.

## Discussion

As EMRs reach near-universal adoption in the US, it is increasingly important to highlight common challenges that arise with their use and present potential solutions. Here we focus on the challenges associated

**Table 2**
Risks and challenges with merging charts from previously unknown patients.

| Issue | Risks/challenges of merging |
|---|---|
| Verification of patient identity | Need to confirm that an existing medical record does not already exist for the patient (including possibility of past name and/or legal sex changes) to prevent risk of creating a duplicate record in the system. |
| Pending orders | Depending on functionality of EMR/LIS[a], merging records may result in cancellation of pending laboratory orders, consults, and future appointments. There are risks of errors in re-ordering under new medical record. |
| Timing of merge | Merging after discharge may be easier for logistical (including billing) purposes, but patients with long inpatient stays will then have extended duration of time with a temporary unknown patient record. |
| Blood transfusion | Functionality of transfusion information system may have limitations related to patients with merged charts (e.g. inability to use automated blood kiosks). |
| Inability to identify patient prior to discharge | Can occur if patient leaves against medical advice. Medical information from encounter left in an otherwise empty unknown medical record. |

[a] Abbreviations: EMR: electronic medical record; LIS: laboratory information system.

with three categories of fictional/unknown patients in the production environment: fictional patients, confidential patients, and unknown patients (summarized in Table 3). Among these categories, fictional patients are the least likely to impact patient care if the institution adopts a naming convention that clearly separates them from actual patients. In rare instances, harm may be caused indirectly as clinicians may place orders for real patients in a fictional patient's chart, especially if they are placing orders after a visit and searching by patient's last name or MRN. Thus, we recommend, at minimum, using a clearly artificial naming convention (e.g. zzzzTest, patient) to distinguish these fictional patients from real patients that may have similar appearing names, especially for clinicians that are rushed or fatigued at the time of EMR access. In fictional charts that see a high volume of usage, such as the one used by clinical pathology at UIHC, we further distinguish them by using the patient photograph feature in the EMR to display an image of a cartoon character as opposed to leaving this blank. This provides an extra layer of security, as many patients decline a photograph, and thus a lack of a photograph does not raise scrutiny in the same way as a clearly fake/cartoon image does. By making these changes, we have reduced inadvertent access of fictional patient charts; however, it should be noted that this is particularly challenging at large institutions as individual departments may take different approaches to generating these fictional patients, making this difficult to standardize/control.

The use of confidential patients as described here should be reserved for cases where alternatives are not readily available. These workflows are complex and run the risk of attributing test results to the wrong individual if the process is not carefully adhered to. Generally, we find this to work best when only a limited number of well-trained individuals can access the information in these charts, and there are very clear protocols for data management and distribution. We did not find published literature on alternative approaches to this type of process. A research approach such as surveys of different institutions to identify best practices for infectious disease testing related to blood-borne pathogen exposure would be of interest as a future goal.

While fictional patients and confidential patients may not present as much of an issue for smaller institutions, unknown patients are relevant to health care practices of all sizes that provide emergency services or otherwise encounter patients that may be at least temporarily unidentified. While the approach taken to assign MRNs to unknown patients is likely variable, institutions should have a concrete policy in place that best reflects institutional practices, as the age and sex of an unknown patient can have unforeseen impacts on their care. Additionally, it is our recommendation that all institutions develop policies regarding the reporting of normal (reference) intervals for laboratory values for patients that are assigned a legal sex of unknown. As demonstrated in our study, this scenario can arise for a number of reasons, including gender-expansive individuals (including nonbinary and transgender persons) who would like to officially change their legal sex in the EMR to something other than male or female.[22] There is additionally the consideration that nonbinary and transgender patients may be receiving gender-affirming therapy (including hormones such as estradiol or testosterone) that can impact common laboratory tests.[23] Institutions should also have standardized protocols for merging information from unknown patients into identified patient records. This practice carrier some risk for accidently merging into the wrong identified patient record.

A further complication of chart merging not analyzed in our study occurs when two MRNs are made for the same patient across encounters.[24,25] For example, this may occur when a patient presents at a satellite location separate from the main hospital, such as a community outreach clinic, or when they present after a gap in their healthcare and are mistakenly given a new record (e.g. after the switch from paper records to electronic records, after a change in name, etc.). A more systemic version of this would be when two or more health entities merge, resulting in the difficult and large-scale task of integrating health care records and reconciling patients that have records in both systems. This type of scenario can present significant risk. In the event that multiple records for the same patient are not unified into one record, each separate record will have information from episodes of care at different points in time. The clinical impact of this will be variable. In a worst case scenario, a health care provider may access the record for a patient that is missing key information that then negatively impacts clinical decision-making. Another scenario with potential for severe harm occurs if separate patients with similar names (and perhaps also other demographic information) are mistakenly merged, resulting in erroneous information in one patient record and perhaps a missing patient record for the other patient. For pathology, laboratory outreach testing has a particular risk

**Table 3**
Summary of patient categories.

| Patient category | Definition | Use case(s) | Challenges |
|---|---|---|---|
| Test patient | Virtual patient used to simulate a real patient in the production environment | • Placing test orders/testing order sets<br>• Validating lab orders, best practice alerts, and order reports | • Confusion with real patient<br>• Accidental billing<br>• Triggering alerts within the lab or to local public health authorities<br>• Inappropriately assigning relative value units |
| Functional medical record number (MRN) | Virtual patient used to aggregate laboratory results from multiple sources | • Aggregation of deidentified laboratory results (employee health records) | • Cumbersome workflow<br>• Not completely deidentified<br>• Delays in reporting–delays in decisions for postexposure prophylaxis |
| Unidentified patient | Patients with temporary MRNs assigned until they can be identified | • Enable the treatment of patients without identification (trauma, emergencies) | • Merging records after identification results in lost information<br>• Inappropriate blood product administration<br>• Lack of age/sex-based reference ranges on laboratory tests |

for identification errors as specimens may arrive without a full set of identifiers and be mistakenly merged into the wrong patient record or mistakenly given an entirely new MRN when, in fact, the patient already has a record in the EMR.

While we offer our experience and suggestions in the cases above, it is important to emphasize that there are many approaches that can be taken to address the challenges posed in each scenario. It is our hope that a proactive consideration of the pros and cons of fictional patients and confidential patients will lead to wider implementation of these useful tools, and a streamlined approach to unknown patients will lead to improved patient outcomes.

## Contributorship statement

All components of this study, including the planning, conception, design, data collection/analysis, and manuscript preparation/editing/revisions were performed by KR, JB, and MK.

## Ethical approval

This study was conducted with ethical approval from the University of Iowa Institutional Review Board as a retrospective study with waiver of informed consent with the approval number 202301206.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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