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A qualitative analysis of Emergency Department physicians' practices and perceptions in relation to test result follow-up

Joanne Callen[a], Andrew Georgiou[a], Mirela Prgomet[a], Richard Paoloni[b], Johanna Westbrook[a].

[a] *Health Informatics Research and Evaluation Unit, Faculty of Health Sciences, The University of Sydney, Australia.*
[b] *Concord Repatriation and General Hospital, Sydney, Australia*

Abstract

Follow- up of abnormal test results for discharged Emergency Department (ED) patients is a critical safety issue. This study aimed to explore ED physicians' perceptions, practices, and suggestions for improvements of test result follow-up when using an electronic provider order entry system to order all laboratory and radiology tests and view results. Interviews were conducted with seven ED physicians and one clinical information system support person. Interviews were analyzed to elicit key concepts relating to physicians' perceptions of test result follow-up and how the process could be improved. Results described the current electronic test result follow-up system with two paper-based manual back-up systems for microbiology and radiology results. The key issues for physicians were: responsibility for test follow-up; the unique ED environment and time pressures, and the role of the family physician in test result follow-up. The key suggestion for improvement was a complete integrated electronic information system with on-line result endorsement. The study highlighted the complexity of the test result follow-up process and the importance of engaging clinicians in devising solutions for improvements.

Keywords:

Test result follow-up, Computerised provider order entry systems, Electronic medical records, Patient safety, Laboratory test results, Emergency department, Family physician.

Introduction

Problems with follow-up of test results have been identified in a number of studies [1, 2]. Physicians acknowledge that they need safe and efficient processes to manage test result follow-up [1, 3]. Emergency Departments (EDs) have been shown to be complex, interrupt driven environments with rapid throughput of patients and team-based care delivery [4]. It is understandable that in this environment, particularly for discharged ED patients, follow-up of results presents challenges for physicians and safety concerns for patients. The test follow-up process, therefore, needs to be systematic to ensure diagnoses are not delayed or missed and patients receive appropriate treatment in a timely fashion [5-7].

A number of studies have explored the extent of failure to follow-up test results in the ED [5, 7-12]. The extent of the problem varies depending on the study methods used and test type examined. However rates of failure to follow-up laboratory tests for ED patients have been found to range from 3% for microbiology tests [9] to 75% for pregnancy tests [7]. Radiology lost to follow-up is also an area of concern with one study finding that for 6% of ED patients who had a missed diagnosis of cervical spine injury, the error was due to the treating surgeon not seeing the radiographs [10].

The systems used to manage test results in EDs vary with studies reporting physicians using completely manual systems [7], completely electronic systems [11] or more commonly a mix of electronic and manual systems [8, 9]. Suggestions for improvements to the test result management process have suggested further utilization of electronic test management systems [13, 14]. However, studies have shown that electronic systems can create their own problems and hinder rather than assist clinical processes [15, 16]. Given that lack of follow-up of test results is a critical problem for ED clinicians, there needs to be an exploration of physicians' perceptions of the test management process and how technology might assist. We could find no published studies which investigated the practices of result follow-up and opinions of ED physicians already using an electronic test management system. This study aims to fill that gap by exploring in-depth, physicians' perceptions, practices and suggestions for improvements of follow-up of test results in an ED which used a computerised provider order entry system to order and view all laboratory and radiology test results.

Methods

Design and setting

A qualitative study design using interviews to explore ED physicians' current test management work practices was undertaken. The ED was situated in a 400 bed metropolitan teaching hospital which had 25,000 attendances per annum of which 17,000 were discharged (68%). Physicians in the ED used a commercial computerised provider order entry (CPOE) system, which had been in place since 1992, to order laboratory and

radiology tests and view test results for all in-patients and ED patients.

Sample

Five consultant physicians, one ED resident physician and the ED clinical director (n=7) were interviewed. An Information Systems Department clinical support person (n=1) was also interviewed to describe features of the CPOE system.

Data collection

Semi-structured interviews were conducted with the eight participants over a one week period in August 2007. The lead questions included: How do you manage your test results currently? What factors impact on your current management of viewing test results, for example, handover, team-based care etc? Can you suggest ways in which the follow-up of test results might be improved? Which features of the current system hinder you in tracking test results? How could the computerised test management system be used to improve tracking of test results? Each interview took approximately 25 minutes and was undertaken during work hours in an administrative area of the ED. The study was approved by the Human Research Ethics Committee of the study site.

Data analysis

Interviews were taped and transcribed to allow for qualitative analysis using a thematic grounded theory approach. Two researchers (JC & MP) independently analysed the interview text to elicit key concepts. These two researchers then discussed their independently derived concepts and agreed on a final set to accurately reflect perceptions and practices of the respondents in relation to test-result follow-up.

Results

The results are presented in four sections: demographics of study participants; description and perceptions of current test result follow-up processes; key concepts in relation to what impacts on the result follow-up process, and physicians' perceptions of how follow-up could be improved using the electronic test management system.

Demographics of participants

Six of the physicians interviewed were emergency specialist physicians and this represents the population of specialist physicians for the ED. One physician interviewed was a registrar. Five of the staff specialists, including the ED Director, were male with ages ranging from 30 to 52 years with one female 30-35 years of age. The registrar was a 25-29 year old male.

How do ED clinicians follow-up test results?

Description of current process

ED physicians use a computerised provider order test management system (*Cerner Powerchart*) to order and view all diagnostic laboratory and radiology tests. Clinicians almost always accessed test result electronically, except sometimes for urgent results they would phone the laboratory.

"I would wait for results to come up on Powerchart unless it was a particularly urgent result, for example, raised potassium which I would let the lab know the urgency of the result and get them to either ring it back down or ring them up directly" (Doctor 5)

Some physicians built their own personal *patient list* in the *Powerchart* test management system (by ward or specialty) to assist them manage their results, however only two of the seven clinicians described doing this. At the time of the study there was no operational function to allow physicians to endorse test results on-line. There was a *bookmarking* function which enabled the user to indicate they have seen all the results of one patient on the screen; however this was used intermittently by only one ED clinician.

In the ED there is an additional manual back-up practice specifically for radiology and microbiology test results as these may arrive after the patient is discharged home.

"So particularly with micro results and things like that by the time you actually grow something…by the time a result's back it's maybe four days so the patients gone home" (Doctor 7)

Radiology and microbiology results for discharged ED patients were reported electronically and also sent to a dedicated printer in the ED. Staff specialists in the ED department are rostered to administrative duty for one shift per week and it is their responsibility during this shift to check all manual radiology and microbiology results to ensure they have been seen and acted upon, that is, appropriately followed up. To do this the ED staff specialist on administrative duty checks all printed radiology and microbiology results and any abnormal results are checked against the electronic discharge summary or the manual medical record to ensure the patient's family physician or general practitioner (GP) has been alerted to the outstanding result. In some cases the ED specialist will contact the patient or the family physician to ensure follow-up of the abnormal result has occurred. To further ensure that there is no duplication of follow-up for microbiology results which may have a number of interim reports printed with the final report coming through days after the initial interim report, the physician who sees the abnormal result and follows-up with appropriate action, will document this in an 'Abnormal result log book'.

ED physicians' perceptions of the current process

All clinicians liked the electronic process of ordering and viewing test results using the current computerised system. Two clinicians mentioned that they were not very good at typing with one stating, *"Well I'm just slow at typing" (Doctor 2)* and one admitting that he *"still liked pen and paper"* and typing was *"like a two finger job, very slow" (Doctor 1).* One of these clinicians (Doctor 1) suggested that a voice recognition system would be useful to improve the tracking of test results.

"If you had a little mike system and you could talk into it and it automatically typed for you.." (Doctor 1)

Key concepts in relation to what impacts on ED clinicians' follow-up of test results

The three key concepts derived from the data were: responsibility for test result follow-up; busy ED environment and time pressures, and the role of the family physician in test result follow-up.

Concept 1: Responsibility for test result follow-up

There were mixed opinions regarding the extent of the physicians' responsibilities in following up discharged ED patient's test results. Most ED staff specialists agreed that they had final responsibility for following up their patients results.

"If you order a test you should be checking the results." (Doctor 2)

In response to how a result is followed-up if it is abnormal and the patient has been discharged, most physicians said they would contact the patient or the GP.

"So generally we will contact the patient. ...I see it as our job to try and organize what's going to happen and not just fob it off on the general practitioner." (Doctor 3)

Some however thought that if the result was written as 'outstanding – GP to follow-up' in the discharge summary, then it was the patients and GPs responsibility to follow-up the result.

"… the letter says for the GP to follow that up. Now I don't go and ring the GP because I think patients should have some responsibility for their own health." (Doctor 1)

"..it's clearly impractical for us to verify that they have gone and seen their general practitioner. And on the other side you know people do have to assume some responsibility for their health" (Doctor 3)

"So with us the delineation of who is going to follow-up the result is much clearer – it's not us because we are an isolated emergency visit. So for patients it's very clear. That's it, you're out. We won't be seeing you again. Whereas they have an ongoing relationship with the GP…" (Doctor 7)

The complexity of the decision of whether to contact the patient or not post-discharge regarding an abnormal result was highlighted by one clinician who reported in relation to an elbow x-ray which might state 'cannot exclude fracture':

"…if it's reasonable that the thing does exist rather than it's just 'it might be' because obviously you don't want to create unnecessary distress or panic amongst people when it's not a conclusive finding….These judgments are not easy…myself and other clinicians do them slightly differently…" (Doctor 3)

"…this is why we have senior clinical people doing this job [in reference to the administrative staff specialist checking all hard copy microbiology and radiology results of discharged ED patients]*...because there's a lot of subjectivity around well which ones do you follow- up and which ones don't you follow-up and what advice do you give and do you always ring the GP, you know there are a lot of 'ifs' in there and that's why ..it does need a senior clinician to make those sort of judgement decisions and assume the responsibility." (Doctor 3)*

Concept 2: ED environment and time pressures in test result follow-up

The clinicians highlighted their time pressures, unique ED work environment and the large number of test results which come through.

"…it takes a lot of time going through all the results and then checking the letter [discharge summary] to see if they've [the GP] been asked to follow-up." (Doctor 1)

"…you know it's well known that no matter what the error rate is the more volume you've got the higher your absolute number of errors are going to be….you're never going to be able to eradicate errors even putting in whatever sense of follow-up you want to do there's still so many subjective steps in there that it's never going to be possible to have an error rate of zero" (Doctor 3)

Two clinicians raised the issue of the absence of an on-going relationship between ED physicians and ED patients:

"..as an inpatient consultant you have accepted responsibility for an inpatient admission ... there is absolutely no doubt that everything that happens to that person is your responsibility. The situation in emergency is much less clear and different departments do it in different ways. I mean here everything is done under the name of the director…that's just the way we do it here." (Doctor 3)

"… it's very clear that we have no ongoing relationship with the patient when they leave us." (Doctor 7)

Concept 3: The role of the family physician in test result follow-up

A key issue raised by most respondents was the problem of the electronically created discharge summary at the study site which was not transmitted to the patient's family physician either electronically by email or by facsimile. The hospital had a system whereby an electronic discharge summary was created on-line and then printed and the hard-copy was given to the patient to give to their family doctor or GP. Most ED specialists thought that the family physician should play a key role in following up test results which were outstanding at the time of the patient's discharge from the ED.

"We have looked at the issue of faxing or emailing to GPs. There's still a lot of security issues around that….I mean the system has the capability…it's a security issue." (Doctor 3)

"The main difficulty as an ED specialist in following up results is actually tracking down the local doctor." (Doctor 5)

Another issue raised in relation to the discharge summary was the difficulty of completing summaries for all ED patients due to time constraints.

"I must admit that I don't do them all…It takes time." (Doctor 2)

How could test result follow-up be improved using the electronic test management system?

When asked how the current test result follow-up system could be improved most clinicians responded that they would like "all the information in one place." They acknowledged that

there were currently electronic and manual test management information systems and this created problems.

"I think a lot of the way it could be improved is actually just to have all the information in one place…I think that we've done a pretty good job of centralizing the information, although obviously the reliance on it still being a piece of paper that can be lost, destroyed not printed…" (Doctor 3)

Verifying on-line that a test result was seen and what action was taken was also seen as a positive advance with a reduction in reliance on the manual medical record.

"I think that if you could arrange for it to be transmitted electronically, reviewed electronically…that would be ideal" (Doctor 3)

Refining on-line endorsement for just critical results and only for senior clinicians to verify was suggested by one clinician.

"If it has a functionality that anything that you order comes to your in-box and then you have to sign off…now that could be made to work, that would make sense but only at a senior level. There's no point having RMOs and interns having every single electrolyte coming back to their in box, that's just useless….I mean for the bulk of tests there's no point and there'd be hundreds of them and you'd just get overwhelmed. You could have criticals coming back to the staff specialist that was on." (Doctor 7)

One staff specialist also emphasised that if the electronic system was used to assist with verifying results on-line it would have to be reliable and fast.

"..it would have to work all the time because if it doesn't work reliably we just stop doing it and go back to old ways that we know work all the time down here …if it works sometimes or it's too slow or when you've got downtime then that's a big problem." (Doctor 7)

Discussion

This study showed that the ED physicians at the study site, who work in an environment which uses a computerised provider order entry system to order and view all test results, would generally be comfortable moving to some form of integrated clinical information system with a complete electronic test result follow-up system. On-line electronic endorsement of test results presents as the logical next step to these ED physicians in assisting them track the large volume of test results they receive and particularly to assist them in tracking late arriving results of discharged ED patients. Some specific functionality requirements were requested, such as on-line endorsement of critical results only and endorsement by senior clinicians only, which reinforce the importance of involving physicians in any plans for developing and implementing such a system. A number of other studies support the importance of engaging clinicians to ensure an appropriate fit between the technology, the clinical environment and clinicians' work practices [17-21].

A combination of manual and electronic information systems presents challenges in terms of safety, with some items possibly being missed, and duplication of information, with wasting of resources and time [22, 23]. The printing of manual microbiology and radiology results for all discharged ED patients at the study site was seen to be an essential back-up system to the CPOE system as these results, particularly for microbiology, were likely to arrive several days post-discharge. The ED physicians however, acknowledged that the combination of manual and electronic test management systems was not ideal. When asked for suggestions for improvements to the current system a number stated that a completely centralized electronic medical record with on-line endorsement of results was preferred. The problem of a mix of electronic and manual information systems is shown in another study by Casalino et al. [24] who quantified the extent of failure to inform patients of abnormal results in 23 medical centres in the United Sates. They found that where there was a partial electronic medical record (electronic progress notes or test results but not both) it was associated with higher rates of failure to inform patients of clinically significant outpatient test results compared to not having an electronic medical record (OR 1.92, p=0.03) or with having an electronic medical record that included both progress notes and test results (OR 2.37, p=0.007) [24].

The results from our study show that the test result follow-up procedure is a complex and often subjective process for ED physicians. Decisions are made about whether to contact discharged ED patients or family physicians when results are abnormal depending on the context and level of abnormality of the result. There are subtle differences between clinicians' practices in relation to follow-up of test results for discharged ED patients. Differences between clinicians in the integration of information systems into their work practices have previously been reported [25]. Other studies have also reported that the test result follow up process is complex and multifaceted [26, 27]. It is important to recognize this complexity when designing and implementing clinical information systems.

Limitations:

This study was qualitative and undertaken in one Emergency Department so results may not be generalisable to other settings. The study did not explore physicians' perceptions of direct reporting of test results to patients through secure web-based portals however this has been reported in other studies as an option [26, 27] and future studies should investigate physicians' attitudes towards this.

Conclusion

Our study has highlighted the complexity of the test management process and the importance of engaging the users in any design and implementation of new systems. On-line test endorsement is perceived by ED physicians as a way to improve the efficiency of the test result follow-up process for clinicians.

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Address for correspondence

Dr Joanne Callen
Health Informatics Research and Evaluation Unit, Faculty of Health Sciences, The University of Sydney, PO Box 170, Lidcombe NSW 1825, Australia Joanne.callen@sydney.edu.au
www.fhs.usyd.edu.au/hireu