The impact of computerised physician order entry systems on pathology services: A critical review

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KEYWORDS

CRITICAL REVIEW

CPOE SYSTEMS

PATHOLOGY

COMPUTER ORDER ENTRY

QUALITY ASSESSMENT

ABSTRACT

Purpose: The purpose of this paper is to assess the quality of the systematic review: The impact of computerised physician order entry (CPOE) systems on pathology services [1,2].

Methods: This paper presents a critical review of the impact of CPOE on pathology services. Stepwise the article will be assessed and their methods, results and conclusion will be described. In the discussion the complete article will be discussed about its limitations and strengths.

Results: The authors of the paper have found a lot of studies (nineteen in total) and they have identified 10 areas of impact and 39 indicators to measure the impact of CPOE.

Conclusion: The systematic review provides a good overview of the subject; nevertheless there are some remarks about the research that has been done and further research is required to get hard evidence of the impact of CPOE systems on pathology services.

1. INTRODUCTION

The internet and ICT technology is rapidly changing and new systems are frequently introduced. It is difficult to see which systems are usable and possible to fit in your own organisation. The healthcare area is no exception just as the systems developed for the healthcare institutions. All these systems also try to improve or better the organisational setting or the information flow. Systems in healthcare intent to better the patient care, but which system is the most perfect system for which setting?

One of the systems that has been developed to better the healthcare processes and improve patient care is the CPOE system. It has many potential benefits; those benefits have been identified as shown in the article [1]. The CPOE improved the ordering patterns of physicians, showed there was more compliance to guidelines, and facilitate in communication processes in the healthcare. CPOE will be esteemed as an important building block for implementing and establishing the electronic patient record (EPR) [3-5].

So far only benefits are named, but the major drawback is that designing and implementing a CPOE system is costly and complex [6,7]. There is not much known about the effect and impact of CPOE on clinical outcomes either. Therefore the authors decided to do research on this topic; to review the current evidence of the impact of CPOE on hospital pathology services.

2. METHODS

The authors performed a literature review and the only criterion used was that a selected study was experimental or quasi-experimental. To find these studies databases were searched: MEDLINE, CINAHL, EMBASE, SocScience Index and Cochrane Databases of Systematic Reviews. The studies that were found were reviewed by two reviewers.

To review the impact of CPOE on pathology services they divided the pathology process in three sub processes; (1) the test ordering process, (2) test processing, and (3) application of pathology test results. The results will be discussed throughout these processes.

3. RESULTS

Before showing the results, some remarks about the studies that were included. There were 19 studies identified; eleven studies compared CPOE to no CPOE, four of these studies compared CPOE with decision support to no CPOE and the other eight studies compared CPOE with decision support to CPOE without any decision support.

Of the 19 studies[1] there were seven of them that are randomised clinical trials, eight of them are before and after studies, one of them is a laboratory-based quasi-experimental study and one was an interrupted time series study.

3.1. Stage one – test ordering

There were five impact factors determined in this stage of the pathology process – including the physician decision to order a pathology test. All these factors were in favour of the CPOE system – in other words – the CPOE system positively influenced the impact factors.

Eleven studies have done research on *impact on test volume* – this is the first impact factor – seven reported a decrease in test volume, three showed no change and one reported an increase. The second impact factor was *impact on test costs*; five studies were done and four of them showed reductions and one study showed no change. Only two studies performed research on the third impact factor *impact on redundant test rates*; both showed a reduction. Four studies showed that CPOE *impact on compliance with guidelines* – the fourth impact factor – improved the compliance. The last impact factor had to do with *impact on work practices*. Only three studies have done research on this topic and two studies showed an increase of work time and one study showed a decrease.

[1] For more information about these studies, please go to the reference list of the article which this quality assessment is about. I do not reference to every study that has been included in the article 'The impact of computerised physician order entry systems on pathology services: A systematic review'.

3.2. Stage two – test processing within the pathology department

At this stage CPOE could reduce errors made during the test processing within the pathology department, because of the effect that in a CPOE system everything has to be filled in. This could reduce errors like missing values, missing patient identifier, and etcetera. Only one study performed a research, the looked at the telephone activity but could not directly relate it to errors, or to CPOE that could reduce this kind of errors.

3.3. Stage three – application of pathology test results

Once the tests are processed on the pathology department than the results will be reported back to the clinician, they will be interpreted and incorporated into the patient management plan. There were three impact factors determined.

The first impact factor *impact on patient management and time following up results* was researched by three papers all of them said that the patient management increased. The second impact factor *impact on length of stay and cost* was researched by five studies. Most of these studies showed no change in the impact of stay; only one study concluded that there was a decrease in the length of stay. Three studies researched the impact on the costs, two of them said there was a decrease and one said there was no change. The last impact factor *impact on adverse events and safety* was studied by four studies; all of them said there was no change, except for one which said there was a slight decrease.

In between these stages there is an information flow, the question remains if CPOE could positively influence the *impact on turn-around-time (TAT)* of the laboratories (there were no other impact factors found in this area). Two studies have done research and they both showed a decreased TAT.

4. CONCLUSION

This systematic review has identified 19 studies which all have studied – some part – of the impact of CPOE on pathology services. All these 19 studies had included some form of control group featuring a variety of research designs.

In these 19 studies there were ten areas of impact found and 39 indicators were used to measure these areas of impact of the CPOE system on pathology services in the hospitals.

The most data that has been collected is suggesting that CPOE is beneficial in the three stages of the pathology process and the information flow in between. Only a few data are available in case of the impact of CPOE on patient outcomes. Therefore there remains a strong need for further research in this area, to provide robust evidence of the impact of CPOE systems on clinical and pathological work processes and information flow.

5. DISCUSSION

There are some limitations about the systematic review. The systematic review addressed an ICT healthcare topic and ICT products and systems are changing very fast, but many of the studies that

are included were over five years old and four of these studies were over a decade old. This can affect the outcome of the results both positively and negatively; for example: a CPOE of 1990 could be more time consuming than a 2000 version.

Besides the problem of the outdated material, there is another problem; the two reviewers. The systematic review has not told anything about their agreement or disagreement, the authors could have included the kappa to show this.

There were many studies included; seven of these studies were randomised clinical trials. The majority of the other – non-randomised clinical trial – studies were unclear about biases and confounders. When studies are unclear about biases and confounders than its conclusions are – practically – unusable; it is unknown what the effects of biases and confounders were. Most of the comparisons could not be done with the help of a randomised clinical trial, so it is understandable that other – less valued in the scientific way – studies were included.

The comparison of CPOE with decision support modules between no CPOE and CPOE without any decision support can affect the impact factors in certain ways; some CPOE systems with decision support barely have support – only reminders – while other systems had a lot of decision support, systems which have barely support showed less improvement at several impact factors. These two kinds of decision support are not comparable (or generalizable) with each other and are clouding the conclusions. Another generalization problem is that the results are not easily generalizable to other hospitals and other countries because of the different processes and preferences.

The authors came up with a new problem while it was not discussed in the results. In the discussion it was said that CPOE could induce new errors and there was an assumption that CPOE eliminates the old errors which are closely related to the paper record. There was no evidence presented in the results, therefore this passage may not be stated in the discussion.

As stated above it looks like the systematic review is not usable on the contrary it is usable, because it is a systematic review which included 19 studies among different countries (although many United States) and using different study designs (although in some cases the problem of biases and confounders) and gives a holistic overview. This study is more than only the 19 studies combined and tells more than just the sum of all the 19 studies.

They used the right study design; a systematic review is good to evaluate the current evidence of the impact of CPOE on hospital pathology services. By researching the literature to find the articles about evidence of the impact of CPOE – and find also the most recent articles – you have a pretty good view about the current evidence. A systematic review was necessary because the authors would like to explore relationships among phenomena when descriptive knowledge is known but relationships are not yet understood [8]. That is what is happening here, there is a lot of information about CPOE and their benefits, but is there a relationship between CPOE and pathology services, which is what the authors are intend to

find out. Therefore this article is level two in terms of the knowledge level.

Indeed it is necessary to perform additional research – the authors recognised that future research is required and recognised most of the limitations as stated in the discussion – it is possible to use this systematic review as a starting point or as a basis to perform new research.

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