

CHAPTER III

METHOD

A. Inclusion exclusion criteria for considering studies for this review

Journals will be included if they are peer-reviewed papers mentioning the costs of building or implementing Hospital Information Systems. Papers published as predatory journals or from predatory publishers will be excluded. Grey literature will be excluded from this paper, these include: conference paper, conference proceedings, reports, thesis/dissertation, committee reports and other papers that are considered as grey literature. Journals that are not specifically mentioning costs of building or implementation of Hospital Information System, but are mentioning cost-effectiveness after implementation will be included. This is to ensure that we cover the possibility of those papers that are mentioning the costs of implementation of the system itself.

The Authors will only take into consideration journals that were conducted only in the hospital area, such as public hospitals, private hospitals, tertiary-care hospitals or teaching hospitals. Furthermore, the Hospital Information System in this context will be defined as whole or partial systems (i.e. EMR, CPOE, DSS) that is utilized fully in hospitals, or partially in specific departments in the hospitals itself. All journals that fit these descriptions will be included as basis for the review. However,

studies regarding Electronic Health Record (EHR) that covers local, regional, or national information system will not be included unless the papers specifically mention HIS. Only papers that are published in English will be included in this paper. Lastly, all methods of Hospital Information System obtainment will be taken into consideration including systems that were commercially acquired, free, or homegrown.

B. Search strategies for identification of studies

The search strategy will start by developing keywords. This will be done through discussion between researcher and expert, with supplementary literature review focusing on hospital information system and cost, to ensure that key points will be adequately covered in later search. A list of keywords that will be used as a basis for a more extensive literature search will be written in detail below.

A search will be performed in order to identify studies that were published between August 1st, 1982 (first launched of personal computer) and November 30th, 2017, in peer-reviewed publicly available international journals published in English. The following databases will be used to search the related journals: PUBMED, Sciencedirect, Ebscohost Research Databases (consisting of Ebscohost; Education Research Complete; Library, Information Science & Technology

Abstracts with Full Text; Literary Reference Center; Middle Eastern & Central Asian Studies) and ProQuest.

Boolean operators (i.e. AND, OR, NOT or AND NOT) will be used in conjunction to combine or exclude keywords in a search, thereby resulting in more focused and relevant results in PUBMED. The examples of search terms identified in this manner are “Hospital Information System”, “Medical Information System”, or any keywords related to hospital information system. This will be followed by combining results, using the Boolean logic AND, with words from cost domains such as “cost”, “expense”, “econom*”, “finance” or “financial” and the building cost of the system such as “build*”, “develop*”, “design”, and “create”. We will be using only the title/abstract in PUBMED in order to find more relevant results related to the keywords mentioned. This will be adapted accordingly for the other three databases. The researcher and supervisor will also carry-out a manual search of the references of identified studies in order to identify further relevant studies.

Table 1. Keywords that will be used in this systematic review using Boolean search strategy

No	Keywords
1	“Hospital information system”
2	Medical Records Systems
3	“Medical Records Systems Computerized”
4	“Electronic medical record”
5	“Electronic medical records”
6	EMR
7	“Electronic Patient Record”
8	EPR
9	“Computerized Provider Order Entry”
10	“Computerized Physician Order Entry”
11	CPOE
12	“Medical information system”
13	“Patient monitoring system”
14	“Picture archiving communication system”
15	“Cardiology Information System”
16	“Radiology information system”
17	“Hospital management information system”
18	“Clinical information system”
19	“Clinical decision support”
20	“Decision support system”
21	"electronic prescribing"
22	OR 1-21
23	economic
24	economy
25	cost
26	expense
27	management
28	marketing
29	finance
30	financial
31	OR 23-30
32	build*
33	develop*
34	design
35	create
36	OR 32-35
37	22 AND 31 AND 36

C. Data collection and analysis

The modified PRISMA protocol will be used in this study. All studies identified using the search strategy described will be screened for inclusion in the review using the eligibility criteria mentioned above. Duplicate publications of research results will be identified and treated as a single study for the purpose of the review with help from a management software, known as Zotero. Initially, a decision for potential inclusion of study will be based on titles and will be done independently by one reviewer, afterwards the reviewer will conduct the same procedure for abstracts. For each step, the reviewer will indicate whether it was 'yes', 'no' or 'maybe'. If there is uncertainty about whether a study meets the eligibility criteria, reviewers will meet together to discuss and examine the study until an outcome is agreed. This process will ensure that bias is minimized when deciding whether to include or exclude certain studies.

The selected papers which meet the inclusion criteria are then retrieved for the full paper analysis. The full paper analysis then will be analyzed using a developed checklist called rubrics. This rubric is developed together between researcher and supervisor. The initial review process will be done together for the first 3 papers using the same rubrics mentioned before. Both reviewers reviewed the papers using the rubrics

to reach the same understanding on how to use the rubrics to extract the data from the papers. And for the rest of the paper, both researcher and supervisor will be reviewing it independently. Two reviewers will analyze the selected papers independently to ensure the quality of the process. At the end of the process both reviewers will meet again to discuss any disagreement on their decision. Any differences in opinions will be resolved through discussion until a consensus is reached.

In order to maintain transparency in the review study selection process, a flow **diagram** is used to portray the number of studies remaining in each stage of the selection process. In addition, a list of the studies excluded from the review will be documented as an appendix with brief reasons for exclusion of the studies.