Towards Formalized Models of Patients’ History Taking

Author: Md. Shehabul Islam Mazumder

Author: Md. Shehabul Islam Mazumder
Main supervisor: Stefano Bonacina, PhD. Department of Learning, Informatics, Management and Ethics, Karolinska Institutet
Examiner: Prof. Dr. Sabine Koch, PhD. Department of Learning, Informatics, Management and Ethics, Karolinska Institutet
Affirmation

I hereby affirm that this Master thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text. This work has not been submitted for any other degree or professional qualification except as specified; nor has it been published.

Stockholm, May, 2016

Md. Shehabul Islam Mazumder
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Abstract:

**Background:** History taking is a complex task which is one of the regular tasks of physicians. The process of history taking consumes a large amount of time and effort from the physicians. Often, it is observed that due to time constrains physicians keep inadequate histories which impacts on clinical research as well as coordinated care. Current process of history taking is time consuming and left some physicians to keep incomplete histories. An improved method or model is needed that can combines the domain expert knowledge and computer questioning. The model can be used to design and develop computer based clinical support systems for collecting patients histories directly from the patients that can save physicians time. Patients can be allowed to provide their medical histories on the computer systems by themselves by following a set of structured and staged questionnaire as per the physicians clinical reasoning process.

**Objective:** The aim of the study is to attempt to formalize a model on the process of medical history taking. The objectives are to identify the clinical process that the physicians use at the clinical setting while taking patient history and to formalize a model on the process of medical history taking.

**Methods:** A qualitative method is used as well as the reviews of published journal articles are done using PubMed database search engine. Qualitative data is collected from 7 expert physicians by face to face and online interviews followed by a subsequent discussion session involving 5 participating physicians.

**Results:** The conceptualization of a model on the process of patient history taking is developed. Also, the step by step clinical process of patients’ history taking is identified along with a computer based questioning model for specific condition i.e. back pain.

**Conclusion:** Implementation of a model on patients’ history taking can assist in the design and development of computerised questioning in order to pose the right questions to the patients for medical history taking on computer systems.

**Keywords:** Process modelling, patient history taking, back pain
Acknowledgements

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List of abbreviations

CRP                  Centre for the Rehabilitation of the Paralysed
GP                   General Practitioner
ICDDRB              International Centre for Diarrhoeal Disease Research, Bangladesh
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1. Introduction

1.1 History taking

Medical history taking is the starting point and the most important pre requisite for recognizing any medical problems among the patients [1]. History taking is importantly relevant for making clinical diagnosis and managing medical problems [1]. During history taking the physicians establish rapport with the patients by verbal communication e.g. asking relevant questions to the patients for clinical decision making. In addition, the physician also observes the non-verbal cues of the patient during taking medical history related interviews [2].

1.1.1 Physician Approaches to the patient

The total duration of history taking interviews are normally controlled by the physicians [3]. Physician uses specific cognitive knowledge domain while taking patient medical history [4]. This cognitive knowledge allows the physicians to ask or modify questions according to the needs and demands to find out the source of the problem. Physicians often do not sufficiently document the detailed history and evidence for making clinical decisions [10]. Observation shows that in traditional way of history taking physicians often discourage the voicing, concerns and expectations from the patients which are necessary and important for clinical decision making [2]. This insufficient data recording affects in clinical research. In addition, as the time slots are limited it is not always possible for the physicians to complete all the information from the patient interviews [5]. Moreover, physicians may often interrupt the patients during history taking interviews [3, 6] in order to save time and may skip some parts of questioning. This results in loss of important and relevant information [5].

In summary, traditional way of history taking is time consuming and left some physicians to keep incomplete histories [2, 7] as because of limited time period for documenting patients’ information by the physicians themselves. If the time consuming activities like typing for documenting patient histories by the physician can be reduced, then the actual time span for delivering medical care can be improved [2].

1.1.2 Use of computers for medical history taking

Various research articles showed that computer programs are effective solution [1-2] for collecting in depth and complete patient histories compared to physicians collected histories [7-11]. As part of regular activities and repetitive tasks, physicians often keep inadequate and inaccurate [2, 7] histories due to limited time. The use of computers has been shown to be effective and good solution in case of collecting patient medical histories in a sufficient manner [2, 7-11] that implies a good solution for saving physicians time. Questionnaire can be programmed in computers [2] to capture all the relevant information from the patient. Previous studies showed that the use of a questionnaire processed by computer systems has collected more
information and patients satisfaction [34] compared to physicians collection [1-2]. Patients felt happy with the process of computer based history taking as they have more time to think to document their symptoms [35] and past medical histories through questionnaire checklist [2, 12]. Some studies [35, 36] outlined the fact that physicians preferred computerized history taking than the traditional way and showed their interests and approval. Physicians had more time to review the systematically processed information to get insight into the patients’ medical histories and symptoms [36] as well as get more time to deliver medical care to the patients [2].

1.1.3 Computer processed questionnaire

Various studies showed that computer processed questionnaire was successfully implemented at different clinical settings like Lahey Clinic foundation [13], Duke Medical Centre, [14]. Studies have also showed that the data provided by the patients themselves through computer processed questionnaire was found reliable as well as the patients also accepted the process with their satisfaction [15-20, 35]. The use of questionnaire can provide a general structure for interviews that can be easily filled by the patient at their ease at home or at the clinic. The computer questioning can act as an ideal checklist for the patients [2]. For instance, study findings [34] showed that gynecological patients preferred the computer questioning more favorable for them rather than the physicians interview as because they can be asked questions more privately on the computer systems and can provide more information on their health status on the computer systems. Anderson et al. [35] have conducted a study where computer based comprehensive medical questionary had been developed and sent to the patients before their outdoor appointments. The patients were asked to fill the medical questionary be coming to the physician. The objective was to observe the benefits of saving time and to elicit the forgotten symptoms and to capture important information on the patients’ medical history. Findings revealed that questions were answered by the patients reliably as the verification was easy on the computer systems by computer analysis which is done before their appointments [35].

1.1.4 Patient computer interviews:

The strength of patient computer interviews is that the interviews are structured and more relevant information can be documented related to patients’ medical histories [12, 34]. This is because, the computers never forgets to ask any questions which they are programmed to ask [35]. Meanwhile, physicians are not so consistent. So, generally computer programs provide more in-depth information than the physicians collected histories [12, 21]. Examples included in case of study conducted on gynecological patients [21] showed that patients provided 1.6 times more information relevant to their medical histories in computer systems compared to physicians collected histories. In addition, more sensitive information can be obtained through the computers programs [22]. Computer programs are very useful for collecting sensitive information from the people, as some people often find it difficult to discuss their sensitive medical information in front of people or face to face interviews [22]. Moreover, patients are not interrupted in providing their medical histories in computer systems. In addition, by following a
questionnaire checklist [35], encourage the patients to provide more detailed medical histories in an inexpensive way [2]. However the computer programs are unable to detect patients’ nonverbal cues and cannot sense the patients’ mood and behavior which can be easily detected by the physicians [2].

1.1.5 Patient Physician Communication: There are several non-medical factors which affect the communication between a patient and the physician. Studies have shown that the cultural and ethnic background of the patients has special influence on the understanding of their medical problems or illness and how they report their symptoms to the physician [2]. Meanwhile, physicians’ manner, behavior and thinking process towards the patients depends on their education background, clinical specialty, training opportunity and how they perceive their patients [2]. Physicians show different approaches for collecting medical histories from the patient. The main approach is to make the patient comfortable to explain his health status as well as build trust with the physicians for undertaking treatment strategies for better outcomes.

1.1.6 Formalized Models:

A model represents a knowledge base which can be used for problem solving [4]. Models can represent the structure for collection of facts; analyze them in order to represent suitable findings for problem solving. Standardized models can be very useful in order to design and develop computers programs for clinical problem solving [2] [11].

Previous published articles and document reviews shown that the process of data collection and interpretation is an iterative process [4]. The process of history taking and data collection begin when a physician asks a patient few questions related to his chief complains [1, 4]. Studies have also shown [4] that the expert physicians have some initial cognitive hypothesis while listening to the answers to the patient. This cognitive knowledge domain allows the physicians to ask the next additional questions in order to find out the source of the problem. A model that combines the domain expert knowledge i.e. physicians cognitive thinking and computer questioning can assist in the design and development of computer based clinical support systems. The systems can be used to collect patient histories from the patients directly on the computer systems. The model can be used to develop and program a set of questions on the computer systems in order to pose the right questions to the patients that are staged and sequential as per physicians’ clinical reasoning process [2, 4]. The patients can provide their data on their medical histories directly to the computer systems based on the programmed questions on the computer systems.

1.2 Problem analysis:

History taking is one of the regular tasks of the physicians [1, 4] for patient consultation, diagnosis and management. History taking tasks are repetitive and needed to be performed with each patient on this appointment list of the physicians’ regularly. The history taking tasks consumes a large amount of time and effort from the physicians on their every working day [2].
For example, if a doctor consults 15 new patients a day then he has to manage time to collect medical histories of all the patients one by one. The task is repetitive and requires a good amount of time from the physicians. At some point physicians often keep inadequate and incomplete histories due to time saving and minimize their efforts which impacts on clinical research [2, 7] as well as the quality of medical care.

Often some physicians become overloaded due to the repetitive history taking tasks and unable to provide the patients more time for their treatment purpose [2]. Studies have shown that an expert physician uses cognitive thinking and clinical reasoning while taking patient medical history and information [4]. The cognitive thinking and reasoning implies a certain amount of time for asking and modifying questions according to the needs and demands of the history taking in order to identify the source of the problem. So, implementing computer based support systems for capturing patients medical histories directly from the patients can be a good option for saving physicians time and effort.

Computer systems are widely used in various clinical setting since a long period of time [1-2, 7-12]. Already computer based history taking is proved to be effective [1-2] in various clinical settings. However, the traditional way of history taking lacks in some aspects. For example, computer questioning is used to capture complete medical information from the patient [35]. But the combination of physicians’ cognitive thinking or reasoning with the computer questioning is a missing part [36]. Some intelligence is required to pose the right questions to the patients in order to mimic the real doctor patients’ encounter [7-9]. An improved method or model is required to combine the physicians reasoning with computer questioning [12] in order to capture all the relevant information from patients on their medical histories to be taken on the computer systems. A model on patients’ history taking can be used to design and development of computer based clinical systems for collecting patients’ histories in a sufficient manner.

1.3 The scope of the study

The research work responds to research problem by exploring, the clinical reasoning process that the physicians use while taking patient histories and then formalize a model on the process of patient history taking. The findings can contribute to the design and development of computer based clinical support systems for patients’ history taking.

1.4 Research Aim

The aim of the study is to attempt to formalize a model on the process of medical history taking.

1.5 Research Objectives

- To identify the clinical process that the physicians use at the clinical setting while patient history taking
- To formalize a model on the process of patient history taking
1.6 Research Question

Based on the problem description, the following research questions have been formed:

- What clinical process do the physicians use at the clinical setting during patient history taking?
- How to formalize a model on the process of patients’ medical history taking?
2. Methodology

2.1 Study design:
Mainly published article review is done as well as qualitative study method is used to explore relevant aspect on this topic. Article reviews are important to identify the existence of those models [23]. Qualitative data is collected from the expert physicians in order to identify the process of history taking and to formalize a model on the process of patients’ medical history taking. Qualitative data collection is suitable because it is important to take physicians opinion and recommendation that can solve the research problem [24, 25]. Article review and document study is relevant and important to observe [23], if the research problem is grounded on previous literature or not. Article reviews are done using the PubMed database search engine. Moreover, document study is done from various web sources, online books to sort out the relevant information on this topic. The qualitative data collection and analysis results in the conceptualization of the model on patient history taking [25].

2.2 Article searching process: Articles searching is conducted on the PubMed database search engine in order to explore the relevant articles and studies to this topic. The keyword that is used to search the article is ‘computer based patient history taking’. With this keyword total 188 articles were found on the database.

- Inclusion criteria:
  1. Reviewed and published in English
  2. Published from January, 1966 to March, 2016
  3. Provide qualitative or quantitative information on the use of computers in relevance to patient history taking.

The reference lists for the selected articles were also searched and checked by using the same inclusion criteria for relevant findings and additional information on patient history taking.

- Exclusion criteria:
  1. Articles that do not match the inclusion criteria.

2.3 Article selection: as mentioned above article reviews are done among the published articles on PubMed database search engine in between, January, 1966 to March, 2016. Total 188 articles were found on the PubMed database search engine with the search keyword ‘computer based patient history taking’. After screening the titles, 102 articles were excluded that does not meet the inclusion criteria. Then in the next step title and abstract screening are done and 44 articles were excluded that does not discuss on the use of computer intervention on patient history taking. 26 studies were excluded after the full text article screen because of no identified relevance to the topic issues or problem description. Finally 16 articles were found most relevant and meet the inclusion criteria and were reviewed for this study purpose. Please see, Picture 2.3.1, for the flow chart on article selection.
Flow chart on article selection:

2.4 Participants / Sampling

Purposive sampling technique is used to select participating physicians. The researcher selected the experienced physicians purposefully, in order to obtain the most relevant information on the research problem [25]. Purposive sampling is suitable for this topic as because the expert and experienced physicians who have previous clinical work experience on patient history taking can provide important and relevant information on this topic. In qualitative research the minimum sample size should be at least six [29]. So, data is collected from 7 participating physicians in order to meet the minimum requirement of samples and to uncover important issues [29]. However, as this is a master’s thesis project the data saturation point cannot be exactly ensured as the study is conducted within short time period of four months and with a small sample size.
➢ **Inclusion criteria:**

- Participants’ should be a Doctor / General Practitioner (GP)
- Participants’ should be working or have work experience with hospital / clinic
- Participants’ should have at least 3 years’ of clinical work experience
- Participants’ should be aged between 28-70 years.
- Participants’ should be proficient in English language

➢ **Exclusion criteria:**

- Participants who don’t meet the inclusion criteria
- Participants with mental retardation or mental illness

➢ **Time Framing:** The data collection started from 8 April, 2016 and finished at 2 May, 2016.

### 2.5 Data Collection Methods

A review of existing literature documents and published research articles are done by using PubMed database search engine. Moreover, books and web page search is conducted in order to explore relevant issues. Qualitative data is collected from 7 physicians [24] by face to face interviews (P1, P3, P7) and online by using Google form (P2, P4, P5, P6). The researcher initially contacted with the potential physicians physically and by email [25]. When they agreed to participate, an online questionnaire along with the informed consent form was sent to them [25]. The online questionnaire was formed in a semi structured manner which contains a set of open-ended and closed-ended questions for easy understanding by the participants. The semi structured questionnaire is used to obtain large amount information [25-28] from the physician’s perspectives on patients’ history taking. Online questionnaires are useful to collect data in a simple, inexpensive and easy way from the participants [23, 25]. However, some demerits are that participants can misunderstand some questions and can reply according to their level of understanding [23].

Face to face data collection was done by from 3 physicians (P1, P3, P7) working at Centre for the Rehabilitation of the Paralysed (CRP), hospital Dhaka along with audio tape recording. Meanwhile, online data collection was done by using Google form from other four participating physicians (P2, P4, P5, P6), who did not have time to participate in face to face interviews. Google form was sent to the private email address of the 4 participating physicians (P2, P4, P5, P6) who have working experience from International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDB), Popular Medical Hospital, Dhaka, Bangladesh and Marie Stopes clinic, in Dhaka, Bangladesh. The four participants’ provided their descriptive data on the Google form and the responses were documented on a separate spreadsheet, where the researcher can easily read the obtained data to find out the main findings. Moreover, at the end of the data collection the researcher facilitated a discussion session including 5 participating physicians (P1, P3, P4,
P5, and P7). Within the discussion session, 3 physicians participated who gave their data by face to face interviews and 2 of them provided their data online using by Google form. Please see Table 3.2, for participants’ demographic data.

Face to face data collection was done from the 3 physicians at their workplace. The researcher physically contacted with the physicians and describes the research purpose and the objectives of the research project. And when they agreed to participate for this thesis project then face to face data collection was done along with audio tape recordings. The interviews were conducted by following the few steps below:

- Introducing the Interviewer: Study purpose and objectives and the educational background.
- Introducing with the Interviewee: The participation physicians work station, clinical Speciality, experience on patient history taking for brainstorming on this topic.
- Introducing with the thesis concepts and ideas: Describing the ideas, objectives of the thesis.
- In-depth interview taken with detailed conversation: for identifying the process of their clinical history taking, physicians approach to the patient and the use of computers for history taking and the factors that affect trustful medical history taken from the patient.
- More data obtained from the physicians in relation to clinical reasoning: Participants were asked to reflect on the clinical reasoning process that they use while patient history taking and how they manage the situation.
- Conceptualization of the model from physicians’ reflection: a sort of workflow or conceptualization of the model on patient history taking. Please see Picture 3.2.1 for the step by step Interview Model

Before data collection the research questionnaire and the Informed Consent form was developed in consultation and discussion with research supervisor from Karolinska Institutet. In addition, pilot study was conducted with some physicians who had working experience from different hospitals in Dhaka city. The pilot study was done for making the research questions simple and understandable for the physicians.

The semi-structured questionnaire design with open ended and close ended questionnaire enables the researcher and the participants to talk freely and to think and reflect on the process of patients’ history taking as well as the clinical reasoning they use while taking patient history. In depth responses were recorded from the physicians both from the face to face interviews as well as from Google form in connection to patient history taking. The obtained data from the physicians combines their thinking process, reflection and the reasoning process that they use at clinical setting.

At the end of data collection the researcher invited the participating physicians to participate in a discussion session in order to reflect their views on the clinical process of history taking for specific condition i.e. back pain. This was done as part of the interview in order to reflect their views on the clinical process of history taking for specific condition such as back pain. The
discussion session took place in a seminar room at Centre for the Rehabilitation of the Paralysed (CRP), hospital in Dhaka including 5 participating physicians (P1, P3, P4, P5, and P7). 3 of them participated in face to face interviews and 2 of them provided their data online using by Google form. The participating physicians discussed on the clinical reasoning process as well as the step by step questioning that they use while collecting patient history for diagnosing specific condition i.e. back pain. During the discussion session, the researcher himself documented the data from the physicians’ replies and reflections in order to sort out the workflow on the process of patient history taking.

2.6 Data collection tools: Written questionnaire, Informed Consent form, audio tape recorder was used for conducting face to face interviews. Moreover, for the discussion session on clinical process of history taking for specific condition i.e. back pain marker pen, white board, flip chat is used to note down and identify the process of history taking from the physicians’ reflection. This was done as part of the interview involving 5 participating physicians in a seminar room. Google form is used as a software tool for creating the online questionnaire for data collection. Within Google form the collected data (participants’ responses) are recorded [30]. After collecting all the responses from the samples, it is easy to read the textual data for several times with in a separate spreadsheet in order to interpret the responses [30]. Also, it is easy to observe the recurring themes within the narrative text responses in order to categories them to reveal the findings. Google form is selected as it is easy and convenient to analyze data online [30].

2.7 Data Analysis:
The data collection involves face to face interviews as well as online interviews and a post interview discussion session with 5 participating physicians’ to reflect their views on the process of patients’ history taking for specific condition i.e. back pain. All data inputs were documented, recorded and stored by the researcher himself.

After completion of data collection the researcher heard the audio recording for several times, then review the notes and manuscripts from face to face and online interviews as well as from the discussion session for several time to identify the underlying themes [31] and findings. Matching and content analysis is done to identify the meaningful and recurring themes [31]. From data analysis a sort of workflow is generated on the process of patients’ history taking. From that workflow conceptualization of the model is identified which is represented in the result section.

Thematic content analysis [24] is done on the obtained data by following a number of steps:
- Read and make notes for organizing the data for data preparation.
- Analyzing the data from the written notes, audio transcripts and also from Google form
- Sorting out the data for Categorize them for data labeling and segmenting.
- Identifying the correct themes.
- Relating and connecting the data with the research questions. Please see Picture-2.7.1 below for the data analysis process.
Data Analysis Process

- Data collected by face to face interviews
  - Audio Tape recording done
  - Researcher heard the audio recording several times and make notes for data preparation

- Data Collected by discussion session
  - Researcher kept written notes and transcripts
  - Researcher read the responses several times for data preparation

- Data collected Online by using Google form
  - Responses are recorded in Google form
  - The researcher read the responses for several times and make notes for data preparation

Analysing the data from notes and transcripts

- Sorting the data by data labeling, categorizing, and segmenting

- Identifying the themes and categories

- Matching & connecting the data with the research questions

Picture 2.7.1 - Data Analysis Process
2.8 Research Ethics

Informed consent form was sent to the participating physicians informing them about the purpose of the study, anonymity, their rights to refuse answering any question and the data security issues [32]. Participants were given the right to withdraw their participation at any point of the study. Participants were assured that there is no such risks involved with this study accept the privacy issues of the collected data [32].

Data collection was done at Centre for the Rehabilitation of the Paralysed (CRP), hospital in Dhaka by face to face interviews along with audio tape recording from the 3 physicians. In addition, Google form was sent to the private email address of other four participating physicians who were from International Centre for Diarrhoeal Disease Research, Bangladesh (ICDRRB), Popular Medical Hospital, Dhaka, Bangladesh and Marie Stopes clinic, Dhaka, Bangladesh. Please see Table 3.2, for participants’ demographic data.

The online responses from the participants were documented in a separate spread sheet on Google form, where the researcher had only access to the data. After filling up the online questionnaire the participants was provided special thanks for their participation.

The collected data was kept confidential where the researcher had only access. The collected data, notes, manuscripts’, audio recordings will be stored till the completion of the research project. The stored data and all other collected documents will be destroyed after the final approval of the research project.
3. Results

3.1.1 Findings from the article review on the use of computers for patient history taking

The sixteen articles were published between 1967 to 2016 and report results from 16 independent studies [1-2, 8-11, 13-16, 18-19, 21, 34-36]. Key features are provided below in Table 3.1.

<table>
<thead>
<tr>
<th>Author &amp; Title</th>
<th>Description &amp; Intervention</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zakim et al. (2008) [1] “Underutilization of information and knowledge in everyday medical practice: evaluation of a computer-based solution”</td>
<td>Patient histories are collected by the physicians in traditional way and also by a computer program. Physician-acquired and computer-acquired histories were compared for the 45 patients.</td>
<td>The computer histories reported 160 problems not recorded in physician histories. Computer histories reported more problems than physicians’ acquired histories that are important for preventing morbidity.</td>
</tr>
<tr>
<td>Bachman et al. (2003) [2] “The patient-computer interview: a neglected tool that can aid the clinician”</td>
<td>Use of computer interviews for reviewing the process by the patients’ themselves in order to identify the strengths and weaknesses of computer interview.</td>
<td>Computer interviewing identified positive findings to assist physician to gather more data and gives the patient more time to complete an interview as well as to uncover more sensitive information; provides more adaptability structured information for research.</td>
</tr>
<tr>
<td>Slack et al. (2012) [8] “Evaluation of computer-based medical histories taken by patients at home”</td>
<td>Computer-based history taking applied to 40 patients in their homes over the internet before their first visit to primary care doctor,</td>
<td>The doctors strongly favored the idea of computer based history taking with routine use of the modules for all their new patients.</td>
</tr>
<tr>
<td>Lucas et al. (1976) [9] &quot;Computer Interrogation of Patients”</td>
<td>Use of a computer system for routine interrogation has been evaluated for accuracy on eliciting symptoms and acceptability to the patient.</td>
<td>Findings indicated that machines can be programmed to undertake the routine interrogation of patients that can elicit symptoms and calculate the probabilities of disease as effectively as doctors.</td>
</tr>
<tr>
<td>Zakim et al. (2010) [10] “Computerized history-taking as a tool to manage dyslipidemia”</td>
<td>Computerized history-taking program is compared with the routine care of 213 patients for LDL-cholesterol.</td>
<td>Study showed that routine care typically did not collect sufficient information to stratify risk. The computerized interview program outperformed routine care for treatment target.</td>
</tr>
<tr>
<td>Lilford et al. (1985) [11] “Computerized histories facilitate patient care in a</td>
<td>An inexpensive microcomputer was programmed to obtain histories from patients attending</td>
<td>The computer provides a much more complete history than the pre-existing manual system. Also</td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Title</td>
<td>Methodology</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>Rockart et al. (1973) [13]</td>
<td>“An automated medical history system: experience of the Lahey Clinic Foundation with computer-processed medical histories”</td>
<td>A computer processed questionnaire is used for more than 40000 patients.</td>
</tr>
<tr>
<td>Bradford et al. (1993) [15]</td>
<td>“Accuracy of self-reported health histories: a study”</td>
<td>Self-reported histories on computer systems compared with documented histories for military doctors.</td>
</tr>
<tr>
<td>Jeanty C. (1976) [16]</td>
<td>“The computerized medical record in gastroenterology, I: medical history-taking using questionnaires”</td>
<td>Computer processed questionary for history collection</td>
</tr>
<tr>
<td>Harlow et al. (1989) [18]</td>
<td>“Agreement between questionnaire data and medical records: the evidence for accuracy of recall”</td>
<td>Use of questioning on computer systems</td>
</tr>
<tr>
<td>Collen et al. (1969) [19]</td>
<td>Reliability of a self-administered medical questionnaire</td>
<td>Self-administered questionnaire on computer systems was tested for reliability.</td>
</tr>
<tr>
<td>Bingham et al. (1984) [21]</td>
<td>“Strengths and weaknesses of direct patient interviewing by a microcomputer system in specialist gynecological practice”</td>
<td>An inexpensive microcomputer system has been used to obtain histories in the gynecological clinic.</td>
</tr>
<tr>
<td>Slack et al. (1968) [34]</td>
<td>“Patient reaction to 300 patients interviewed for their medical history by the</td>
<td>300 patients interviewed for their medical history by the</td>
</tr>
</tbody>
</table>
3.2 Findings from the Interviews

Seven participants were selected until the data saturation reached a certain level. Data was collected for the working physicians from different hospitals and clinics in Bangladesh. Participants were selected from Centre for the Rehabilitation of the Paralysed (CRP) hospital Dhaka, International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDRB), Popular Medical Hospital Dhaka, Bangladesh and Marie Stopes clinic, Bangladesh.

The Study participants’ demographic data are presented below in Table 3.2

<table>
<thead>
<tr>
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<th>Workplace</th>
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<td>37</td>
<td>CRP Hospital</td>
<td>7</td>
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Table 3.2, Participants demographic data
After data collection the researcher read the documented data for several times in order to identify the correct themes that was related and connected to the research question. Thematic content analysis [24] is done on the interview data in order to identify the recurring theme. This is commonly used in qualitative research method [31]. In this case, the narrative textual responses are analyzed by reading them for several times, categorizes them for matches with the research question.

The researcher follow step by step process for data collection and data analysis from the starting point in order to generate the workflow from which conceptualization of the model can be developed. Content analysis [31] is done on the obtained data in order to identify the:

I. Step by step process of medical history taking

II. Formalize a model on the process of medical history taking

Please see picture 3.2.1 for the step by step interview model

*Step by step Interview Model:

Picture 3.2.1, Step by step Interview Model*
3.2.1 Main themes that emerged from the key findings of the study are presented below:

**Conveying greetings and brief introduction to the patients at the beginning:** The data analysis showed that most of the physicians start the process of history taking by conveying greetings and brief introduction to the patients in order to make the session comfortable. All the physicians mentioned that they normally ask questions on the following sections e.g. patients’ present health status, chief complaints, history of present illness, past medical history, family history and social history etc. for taking medical history from the patient at the clinical setting. Physicians also replied that while listening to the patients reply they elaborate the questioning process by adding more questions according to their clinical reasoning process in order to capture all the relevant data on patients’ medical history such as the duration of the problem, site and onset of the problem, associated causes, any relevant family or social history etc.

**Good consultation skills, active listening is important:** Physicians replied that good consultation skills, active listening and showing sympathy and empathy to the patients are the main factors to establish rapport with the patients during history taking. Most physicians agreed that around 12 to 15 questions they normally ask for history taking while for complicated case the question number may increase up to 20 or even more. All physicians mentioned that normally 10 to 15 minutes time is required for patients’ history taking. However, for complicated cases more time may be required they replied.

**Patient should have basic computer skills and health literacy:** Physician showed mixed responses in reply to the question on patients’ history taking by using computer systems. They mentioned while the process can be satisfying for the patients, however, patient should have basic skills for computer usage as well as they must have certain level of education and health literacy before they can take their medical histories on the computer systems. Most physicians think that trustful data taking on the computer systems from the patients depends on certain factors like the patients’ health literacy, socio demographic characteristics, their education level and the capacity to understand the context of in order to describe their health status on the computer systems.

**Computer interviews can be a good option for physicians’ time saving:** 5 out of 7 physicians think that time saving can be a good reason for having medical history taken on the computer systems by the patient themselves. However, all of them agreed that patient should have basic computer skills and health literacy before they can provide their data on the computer system. Most of the physicians mentioned that a doctor’s clinical expertise and knowledge cannot be translated in to the computer systems. However, they mentioned that the system should be developed in such a way that it can provide a list of questions as per physicians’ reasoning process for diagnosing specific cases with certain disease condition.
3.2.2 Findings from the physicians’ reflection on the process of history taking:
From data analysis the conceptualization of a model on the process of medical history taking is identified and represented in the findings section (please see picture 3.2.2.1 for the conceptual framework of the model). Physicians’ data analysis assists to sort out the step by step process of medical history taking please see picture 3.2.2 for the step by step clinical process of medical history taking for specific condition i.e. back pain).

All the respondents replied that the first approach to collect information on patient usually starts with conveying greetings and introducing with the patients in order to manage the situation in a professional way and to assure patient's comfort before asking them any history taking question questions. After the initial introduction they start the history taking process by asking few questions relevant to patients medical history, followed by general-physical examination, systemic examination and related clinical investigation if needed.

“My first approach to collect information on patient is history taking, followed by general-physical examination, systemic examination and related clinical investigation if needed. I usually convey greetings to assure patient's comfort before asking any questions and then start history taking, asking questions following the standard order provided in the hospital” (Participant 6)

“Asking candid questions to start the conversation, i.e. "how are you doing today" or just by asking name and home town and to get use to the environment. In this way I also try to build up a rapport with the patient” (Participant 4)

“Conveying greetings is a great way to start the history taking, especially for senior citizens. Again, the technique of history taking also depends greatly on patient's age group and socio-demographic characteristics. For example, with children, the main aim is to make them comfortable with the whole situation to get more support from their side” (Participant 2)

All physicians think that building initial rapport with the patients is a vital strategy and can be done by warm introduction and active listening skill or showing interest and attention to the patient. Some other factors are also important like good consultation skill and leading questions in order to assure patients comfort. Most the participating physicians think that health literacy, education level and sociocultural background are the common factors that affect a trustful medical history taking by the patient.

“The total history taking and rapport building process is different from patient to patient. It depends on the socio-demographic characteristics of the patient as well as the severity/nature of the disease. So, there are no strict rules for this process, rather dealing each patient according to what the situation demands. However, following several rules from the codebook always makes things easier and also helps to avoid unpleasant situations. For rapport building, there are several things very important, for example, trust, sympathy and empathy towards the patient. Also removing barriers for effective communication is important i.e. asking parents to leave while taking sensitive history from adolescents (e.g. teenage sexual problems)” (Participant 4)
“I think warm introduction, good consultation skill, active listening showing interest and attention, open questions and leading questions are the main factors to establish rapport with the patients while taking history” (Participant 6)

“Finding a balance between professionalism and empathy is the most important factor in rapport building” (Participant 2)

Moreover, all the clinicians think that the amount of time and the number of questions to be asked mainly depends on patient’s complaints, sign symptoms and the condition. Some symptoms require a very detailed history taking and some symptoms are quite straightforward and do not require many follow-through questions.

“My history taking mainly focus on the medical history of the patients. However, there might be some differences in the focus depending on the situation and/or disease condition. Asking relevant social and contextual questions always helps to understand the patient’s socio-cultural context which might be very important for treatment purpose. Additionally, some disease condition require additional question about sexual practices, lifestyle behavior, travel history etc.” (Participant 4)

“In general I ask around 14 questions. Questions that I usually ask the patients are, name, age, sex, address, occupation, marital status, history of present illness, past medical/surgical history, history of medications, history of allergies, history of smoking and alcohol, menstrual history (for female patient), family history, social history etc.” (Participant 6)

“There is no cut-off value for asking questions. However, for most of the common diseases, asking <= 20 questions is enough most of the time. For some conditions, further questioning might be needed” (Participant 2)

In response to the concept of medical history taken by the patient him/herself by using computers the 5 out of 7 physicians replied that it can be done only by providing specific questions that are generally asked to all patients for diagnosing specific cases e.g. back pain. However they replied that it will be quite complicated for designing and selecting the questions according to the clinical reasoning process of expert physicians for interviewing the patient on computer systems. Most of them mentioned that computer based history taking can save the valuable time of the clinicians.

“It can save valuable time given that the patient is educated enough to tackle the complexities of detailed history taking. however, this might mislead sometimes because for various reasons patients' lie or give socially acceptable answers which can only be identified by face to face interview by a competent doctor” (Participant 2)

“The doctors follow a specific pattern while asking questions regarding a symptom. For example, if a patient presents with history of fever, the doctor ask specific questions like pattern,
highest recorded temperature, frequency, associated symptoms etc. to reach to differential diagnosis. However, the system should be developed in a way that it will ask a specific set of questions based on patient’s registration of a symptom on the system” (Participant 4)

4 out of 7 physicians think that the computer based history taking requires that the patient is educated enough to tackle the complexities of detailed history taking questions. In addition, they also feel that the answers by the patient might mislead sometimes because for various reasons such as patients' may lie or give socially acceptable answers which can only be identified by face to face interview by a competent doctor.

“Of-course! Patient education is necessary. This system can only work in highly educated society with adequate resources and training. The training must focus on the things like computer skills, getting use to the system etc. In Low Middle Income Countries, this cannot be possible at all since many people are not literate, do not know how to operate computer. However, I think education on medical terminologies is not necessary, since most of the history taking use layman terms” (Participant 5)

“Again, this way of history taking has several limitations. Many patients will not be able to fill up the questions because of their illness. It will also be a hindrance to the less-educated people or people with minimum computer literacy. Furthermore, many educated patients are now browsing internet for diagnosis which in most cases, leads to wrong diagnosis. If the patient fills up the history sheet, there might be biased information based on previous information taken up from the internet. This will jeopardize the whole treatment process and might be harmful for the patients in some instances” (Participant 4)

“It can save valuable time given that the patient is educated enough to tackle the complexities of detailed history taking. However, this might mislead sometimes because for various reasons patients' lie or give socially acceptable answers which can only be identified by face to face interview by a competent doctor” (Participant 2)

All physicians focused on certain factors that are required for trustful medical history taking on the computer systems. Factors like the patients’ health literacy, socio demographic characteristics, their education level and the capacity to understand the context of in order to describe their health status on the computer systems are important.

“I assume provision of accurate and unbiased information based on the leading questions asked by the physician and/or the computer system can produce a trustworthy medical history. Alongside health literacy and education level are pertinent in this regard. Medical knowledge is not necessary, rather it might lead to wrong diagnosis. Most of the time internet is the only source to get medical knowledge which is not trustworthy at all” (Participant 4)

“Lack of medical knowledge is the main factor that can affect the trustful medical history taking most” (Participant 6)
4 out of 7 physicians mentioned that the process of history taking on the computer systems would differ from the real patient physicians encounter by influencing on the factors like trust, empathy and sympathy etc.

“A doctor's knowledge and intelligence cannot be translated into a computer system, unless it is an artificial intelligence (AI). Trust, sympathy and empathy are integral part in doctor-patient relationship which builds up during the history taking phase” (Participant 3)

“This whole process will be very impersonal; therefore will lead to lack of rapport and trust relationship between doctor-patient which is also a very important part for medical care” (Participant 5)

**Conceptualization of a model on the process of medical history taking**

Participants’ responses made it easy to understand the step by step clinical process that the physicians use while taking patients histories. From participants reply a sort of workflow is generated from which conceptualization of the model is developed. Please see the picture 3.2.2.1 below for the conceptual framework of the model.

The formalization of the model is identified by following step by step clinical process that the physicians follow at the clinical setting for medical history taking. Participants reply showed that the process of medical history taking starts with introducing and familiarize with the patients by asking few questions on patients demographic data, chief complaints, past medical history, family history, social history drug and allergy history etc. The selection of these questions are done by following evidence based medical consultation guide and the clinical reasoning process of the expert physicians and clinicians. For example, the Calgary-Cambridge Observation Guide [32] is a simple framework for taking medical histories that is followed by the medical practitioner and can be used as a training tool. The articles review and the document study revealed the medical consultation process that is important to guide the doctors through a patient consultation and history taking.

**3.2.2.1, Findings on the research questions:**

The focus of the study was to explore expert opinion in order to identify the clinical process of history taking and based on that formalize a model on process of medical history taking. Based on the research questions, the study should deliver the following main findings:

- Clinical process of history taking for specific disease condition i.e. back pain
- Formalize a model on the process of patients’ history taking.

The study finding generated the following findings:

I. Conceptual framework of the model. Please see picture 3.2.2.1.

II. Step by step clinical process of medical history taking used by the physicians at the clinical setting for specific condition e.g. back pain. Please see picture 3.2.2.2.

III. Flow chart diagram on the questioning model for collecting patient history on back pain that outlines some of the logic used for questioning on computer systems as per physician reasoning. Please see picture 3.2.2.3.
Conceptual framework of the model

Minutes on the computer system before History taking
(Explaining the purpose & procedure to the patient & how long it may take)

Self information of the patient (Name, Age, Address)

History of the patient (Chief Complain, History of present complain)

Past Medical History (Open ended questions to allow patients to explain things in his or her words)

Family History

Personal & Social History

Drug and Allergy history

Disease Specific Questions
- Orthopedics
- Pediatrics
- Musculoskeletal
- Neurology
- Gynecology
- Gastro-Intestinal

Wrap Up questions

Picture 3.2.2.1. Conceptual framework of the model

Please see Picture 3.2.2.2, Step by step clinical process used by the physicians at the clinical setting for typical patient with back pain and Picture 3.2.2.3, questioning model on computer systems as per physician reasoning in order to collect patient history on back pain.
Clinical reasoning process that the physicians use for diagnosing a typical patient with back pain.

Start

Consider the Patient Situation:
Introduction, Greetings, Describe facts etc.

Collect Patient Information & Observe Non-verbal Cues:
Collect patient history, undertake assessments, investigate reports, use of clinical knowledge. For example: Pain on back, the pain radiates down to the legs, constant pain is present that increases by movement etc. X-ray or MRI report findings: Lumber slip disc at L5-S1 level.

Process Information:
Analyse the data to understand the symptoms, distinguish the most relevant symptoms. Match them to infer diagnosis, predict outcome (Expert process). For example: Pain is referred due to lumber/disc displacement at L5-S1 level that compress the sciatic nerve root.

Identify the problem:
Synthesis of all facts and inferences to make a definite diagnosis. Match the patient's problems with past patients. For example: Make Diagnosis: PLID (L5-S1) with radiating pain to the legs.

Establish Goals & Implement Treatment:
Set desired actions for outcomes within a time frame. Implement available treatment options for the desired outcome. e.g. Prescribe Medication: Naproxen sodium (600 mg) three times a day; Back extension exercise; Use lumbar corset belt.

Evaluate the Treatment Outcome:
Evaluate the effectiveness of the actions and the outcomes. Has the situation improved or need further investigation? For example: review the patient's progress: shows that the pain decreased by 70% after 7 days and the constant leg pain is abolished.

Reflection Process:
New learning. Reflect on what could be improved or done differently. For example: Follow up advice on household activities for future prevention; if no progress then modify treatment options and implement new strategies.

End

Picture 3.2.2.2, Step by step clinical process of medical history taking used by the physicians at the clinical setting for specific condition e.g. back pain.
Picture 3.2.2.3, questioning model on computer systems as per physician reasoning in order to collect patient history on back pain.
4. Discussion

Various research articles are published on the use of computer questioning [13-20, 35] for collecting patients’ medical histories and have proved the effectiveness for capturing patients’ history information in sufficient manner [35]. Patients have also favored the process of computerized history taking by themselves in many cases [34] [35]. There are abundance of evidence from scientific study where physicians supported the process of computer based history taking, which is beneficial for time saving at the clinical setting [36].

In this study the objective was to formalize a model that can combine the physicians’ cognitive thinking or reasoning with the computer questioning which was indeed a missing part within the existing systems [36]. The research works combines the experienced physicians’ reflection for identifying the clinical reasoning they use while collecting patient histories for specific condition i.e. back pain and a questioning model is developed based on physicians’ discussion and reflection. The questioning model can assist in the design and development of clinical support systems for capturing medical histories from the patients with back pain. Computer systems can be programmed based on the questioning models that can pose the right questions to the patients and modify accordingly as per the physicians’ cognitive thinking and clinical reasoning for diagnosing a case with back pain.

The study add a new dimension on how to combine the physicians thinking process with computer questioning though the generated model on patients history taking. The model is being developed by considering a specific condition i.e. back pain and in consultation with the physicians from mainly orthopedic specialties. However, similar type of models can developed for other conditions such as diabetics or stroke which can be done by discussion and reflection of expert physicians with different specialties like diabetologists or neurologists. The main objectives would be to combine the physicians reasoning with computer questioning, so that all the relevant information from patients can be captured in an accurate manner on the computer systems. For this master’s thesis, the study delivered the following main findings:

- Clinical reasoning process of history taking for specific disease condition i.e. back pain
- Conceptualization of a model on patients’ history taking.

4.1. Discussion on the Main findings:
The generated data from the participating physicians helped to identify the clinical process of history taking as well as conceptualization of the model on patients’ history taking. The formalization of the model is based on the step by step clinical process that the physicians follow at the clinical setting for diagnosing specific cases with back pain. However, the model can show us the pathway what main points to consider while patients’ history taking that can be used to design and development of computer based clinical systems as per physicians clinical reasoning.
The flow chart diagram on Picture 3.2.2.3 on the logical use of questioning for the typical patients with back pain provides the guideline to the readers and the new health informatics professionals on how to combine the physicians reasoning with in the computer based questioning. As the flow chart is built by the step by step questioning as per the physician use while taking patients history at the clinical setting for a typical patient with back pain, the research got a good idea on how to build further questioning model for other disease condition such as diabetics or stroke. Now, the some other points needs to be considered for building these systems for instance, the history taking questions should be selected by following evidence based medical consultation guide and involving expert physicians comments. The Calgary-Cambridge Observation Guide [33] is a simple framework that can be followed for selecting appropriate questions for computer based patient history taking.

The Picture 3.2.2, on the clinical process used by the physicians at the clinical setting adds a further guideline for the readers and the new health informatics professionals as well as the researchers on the fact that the physicians’ follow step by step points for selection of history taking questions. The selection list comes from different history collecting data sets’ including patient demographic data, present complains, personal medical history, family history and social history, past medical history, risk factors and disease specific questions [4]. So if we consider these sections to be covered by computer questioning and as per physicians reasoning, patients can be allowed to provide their medical data entry by themselves within the computer systems.

However, medical history taking is a complex process [2] and if the patients are allowed to enter data freely the obtained data might not be too much reliable [3]. In this case, the selection of history taking questions should be done by following evidence based medical consultation guide e.g. Calgary-Cambridge Observation Guide [33] as well as expert physicians recommendations.

In addition, it is important to consider the document reviews. Document reviews shown that the process of data collection and interpretation is an iterative process, which follows a hypothetico deductive approach [4]. Such approach is frequently used for formulating models for designing clinical decision support systems. Furthermore, future research is indicated in this area to explore more issues.
4.2. Limitations,

The study was conducted with in short period of time of four months. The questionnaire might not be the standard one to capture all the relevant information and expert opinion on this topic area. Only 7 samples were collected for this study purpose which is a study limitation. The methodology had some limitations too. The methodology was chosen to explore relevant ideas and opinions at the beginning level in order to solve the research problem.

4.3. Strengths and Weakness of the study

The study adds new findings on how to formalize a model on patients’ history taking considering specific condition i.e. back pain. Now the idea can be replicated for design and development of new models on computer questioning for other disease conditions such as diabetics or stroke. One of the strength of the study is that participants were selected purposively, who had more than 3 years of clinical experience. Weakness of the study is its methodology. A cognitive walkthrough or think aloud method would be more appropriate for this study. However, future research is recommended on this topic with more samples and improved methodology.
5. Conclusion

The study generated a new guideline for formalize a model on the clinical process of history taking for typical patient with back pain. Now the idea can be replicated to develop and design computer systems on patient history taking for other disease condition as well for instance, diabetics or stroke. The study succeeds to combines the expert physicians’ cognitive thinking and reasoning with the development of computer questioning and generated the conceptualization of a model on the process of history taking for patient with back pain. Moreover, the use of logical questioning model showed a guideline for the readers and informatics professionals on how to model questions on the computer systems as per physicians cognitive thinking and reasoning. However, all participating physicians in this study argued that the use of computer based history taking can save clinicians time at the clinical setting and they favored the process. However, they think that the process of computerized history taking might be complicated. Selection of questionnaire for computerized history taking should be staged and sequenced according to medical consultation guide [33] and expert physicians’ reasoning process, they mentioned.
References


Appendix 1: Informed Consent Form

Informed Consent Form

Title: Toward Formalized Models on Patient’s History Taking

Researcher: Md. Shehabul Islam Mazumder
Contact address: md.mazumder@stud.ki.se
Rontgenvagen 1, 141 52, Huddinge, Sweden.

As part of my course on master’s thesis project at Karolinska Institutet and Stockholm University; I am required to collect data for completion of master’s thesis project. Therefore, I request your voluntary participation on this research project.

Background: History taking is a time consuming process which left some physicians to keep incomplete and inadequate histories at the clinical settings that might impact on the quality medical care and clinical research. If the time consuming activities like typing for documenting patient histories by the physician can be reduced, then the actual time span for delivering medical care can be improved. Previous research articles showed that standardized computer programs are effective solution for collecting in depth and complete patient histories compared to physicians collected histories.

Purpose of the research: The main purpose of the study is to formalize a model on patient history taking as well as to identify the process of history taking.

Research Aim: The aim of the study is to formalize a model on patients’ history taking.

Voluntary participation: You are required to participate in face to face interviews or fill an online questionnaire to provide your data for this research study. The researcher may take audio tape recording of your provided data and you might be invited to participate in a formal discussion session afterwards as part of data collection process. It may take maximum 40 minutes for the interview. No financial benefit will be provided for this purpose. You participation is voluntary.

Anonymity and Risk involved: I am assuring that the participation will not harm the participants by any means. The participation is voluntary. You have the right to withdraw and discontinue participation at any time. I am assuring to maintain the confidentiality of the collected information to the highest level. If you have any query regarding the study or findings you have right to ask me any time. I will try to answer your queries to the level best.

Informed consent:
I have read the above information carefully. I am fully informed about the things listed above and give my consent to participate in this research study.

Name of participant (First Name, Last Name)
Signature of participant

Date:
Appendix 2: Research Questionnaire

Research Questionnaire

Title: Toward Formalized Models on Patient’s History Taking

First Name:  
Last Name:  
Age:  
Gender:  
Clinical Speciality:  
Year of Experience:  
Current Organization:  

Q.1 - What is your approach to collect information on the patient?  
*E.g. Make the patient comfortable with the environment or visit*  

Q.2 - How do you usually start the process of history taking?  
*E.g. conveying greetings or asking questions etc.*  

Q.3 - What are the main factors to establish rapport with the patients during history taking?  
*E.g. make the patients comfortable by warm introduction or Following personal strategies etc.*
Q.4 - Which questions do you usually ask the patients for history taking?
E.g. Questions relevant to patients medical and social history

Q.5 - How many questions do you ask for history taking?
e.g. 10/20 questions or even more

Q.6 - How much time does it take for history taking?
E.g. 10/20 minutes or even more depending on the patients’ symptoms

Q.7 - What do you think about medical history taken by the patient him/herself (using computer?)
E.g. when patients provide their medical histories on the computer systems by themselves

Q.8 - Which are the main factors that affect a trustful medical history taking by the patient?
E.g. Health literacy, education level, medical knowledge, leading questions etc.
Q.9 - Do you think that time saving could be a good reason for having medical history taken by the patient him/herself by using computer systems?
E.g. *If patient provides their history relevant data on computer systems*

Q.10 - Do you think that the patient should be educated before he/she could take medical history by him/herself at the computer systems?
E.g. *Education on health related terminologies, computer skill, medical knowledge domain etc.*

Q.11 - Whether standardized answers given by the patients themselves at the computer systems can be effective for medical history taking?
E.g. *Answers that are obtained from the patients by pre-programmed history taking questions on the computer*

☐ Yes     ☐ No     ☐ Don’t Know     ☐ Don’t Understand

Q.12 - How do you think the process would differ from the medical history taken by the doctor?
E.g. *when questions are programmed on the computer rather than asked by the physicians*

*Thank You for your Participation*
Research Questionnaire

Title: Toward Formalized Models on Patient’s History Taking

Link for online questionnaire:

https://docs.google.com/forms/d/1ICyMx9UF7Qfudob0xk5FZubc8uea0sB8CehLLx2FPQ/formResponse

Snapshots of the online consent form and research questionnaire:

Research Study

* Required

Informed Consent Form

Title: Toward Formalized Models on Patient’s History Taking

Researcher: Md. Shehabul Islam Mazumder  
Contact address: md.mazumder@stud.ki.se  
Rontgenvagen 1, 141 52, Huddinge, Sweden.

As part of my master degree Programme on Health Informatics at Karolinska Institutet and Stockholm University, I am required to collect data for completion of my master thesis project. Therefore, I request your voluntary participation on this research project.

Background: History taking is a time consuming process which left some physicians to keep incomplete and inadequate histories at the clinical settings that might impact on the quality medical care and clinical research. If the time consuming activities like typing for documenting patient histories by the physician can be reduced, then the actual time span for delivering medical care can be improved. Previous research articles showed that standardized computer programs are effective solution for collecting in depth and complete patient histories compared to physicians collected histories. Standardized questionnaire can be programmed in computer systems as a checklist to capture all the relevant information.

Purpose of the research: The main purpose of the study is to investigate about the definition of epistemological models on patient history taking. The models can be used by the patients for providing their medical histories by themselves.

Research Aim: The aim of the study is to explore, if it is possible to formalize epistemological models on patients’ history taking.

Voluntary participation: You are required to fill an online questionnaire to provide your data for this research study. It may take maximum 40 minutes. No financial benefit will be provided for this purpose. Your participation is voluntary.

Anonymity and Risk involved: I am assuring that the participation will not harm the participants by any means. The participation is voluntary. You have the right to withdraw and discontinue participation at any time. I am assuring to maintain the confidentiality of the collected information to the highest level. If you have any query regarding the study or findings you have right to ask me any time. I will try to answer your queries to the level best.

If you have read, understand and agree to the things listed above please check the box below and continue with the research questionnaire.

First Name: *

Last Name *

Date:

mm/dd/yyyy

Place:

Informed Consent *

I have read the above information carefully. I am fully informed and give my consent to participate in this research study.

☐ I agree to participate in this research study
Research Questionnaire
Title: Toward Formalized Models on Patient's History Taking

Q.1 - What is your approach to collect information on the patient?
E.g. Make the patient comfortable with the environment or visit

Q.2 - How do you usually start the process of history taking?
E.g. Conveying greetings or asking questions etc.
Q.3 - What are the main factors to establish rapport with the patients during history taking?
e.g. Make the patients comfortable by warm introduction or following personal strategies etc.

Q.4 - Which questions do you usually ask the patients for history taking?
e.g. Questions relevant to patients medical and social history

Q.5 - How many questions do you ask for history taking?
e.g. 10/20 questions or even more
Q.6 - How much time does it take for history taking?

Example: 10/20 mins or even more depending on the patient's symptoms.

Q.7 - What do you think about medical history taken by the patient him/herself (using a computer)?

Example: When patients provide their medical histories on the computer systems by themselves.

Q.8 - Which are the main factors that affect a trustful medical history taking by the patient?

Example: Health literacy, education level, medical knowledge, leading questions etc.
Q.9 - Do you think that time saving could be a good reason for having medical history taken by the patient him/herself by using computer systems?

  e.g. If patient provides their history relevant data on computer systems

Q.10 - Do you think that the patient should be educated before he/she could take medical history by him/herself at the computer systems?

  e.g. Education on health related terminologies, computer skill, medical knowledge domain etc.
Q.11 - Whether standardized answers given by the patients themselves at the computer systems can be effective for medical history taking?

E.g., Answers that are obtained from the patients by pre-programmed history taking questions on the computer

- Yes
- No
- Don't Know
- Don't Understand

Q.12 - How do you think the process would differ from the medical history taken by the doctor?

E.g., When questions are programmed on the computer rather than asked by the physicians