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Anamnesis via the Internet - Prospects and Pilot Results

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Abstract

A comprehensive computerized questionnaire was developed to obtain the anamnesis of patients seeking contact with a physician for any type of new problem. The purpose of this pilot study was to investigate if a structured questionnaire filled out by the patient and complementing an interview at the physician's office would contribute to a better quality of the total anamnesis and/or lead to savings in time at the visit. The results encourage further developments in this direction. The potential uses proposed are, in addition to being used to improve a visit, the correct assessment of the history for prioritization and scheduling of visits and in some situations, the anamnesis obtained over the net may be the basis for medical advice without a visit. This study emphasizes the great improvement of information captured by this type of questionnaire based on medical knowledge about associated symptoms and relevant questions depending on the problem presented compared to the results obtained by a simple open question used in many e-health services today.

Keywords:

Anamnesis, Patient-driven, Questionnaire, Internet

Introduction

The word anamnesis is originally Greek, constructed of the prefix ana = re and mnemis = mind. Anamnesis is often the most important part of the medical examination providing information from the patient on current symptoms and the reason(s) for the contact but also on previous health conditions, treatments, heredity, social situation and personal relationships. Depending on the patient's health problem, the amount of information needed in these categories vary and many aspects are often totally omitted, partly because of time constraints. The available time for taking an interview and for the whole visit is often very limited, in primary care often around 10 minutes. Almost 80% of visiting time can be consumed during the anamnesis part. Naturally, any tool or technique that could rationalize or/and make the process more efficient would be valuable.

In many cases, the patient is an unknown person to the physician. The patient needs to trust the physician and be relatively relaxed in order to adequately describe the anamnesis. Because of the stressful situation it is clear that despite willingness to do their best from both parties the results of a typical interview has important limitations. This is especially true for revealing facts that are not obviously the core of the problem but which may be quite important. Patients may also choose to hide some information in a typical interview. Effectiveness in primary care is totally dependent on the degree of physician's learning about patients' problems and patient's learning about aspects of their condition and care.

A complete anamnesis can usually not be accomplished, despite its importance for diagnosis and management of care. The purpose of this study was to investigate if a computerized system operated by the patients could improve the efficiency of the anamnesis taking.

There has been a number of studies where questionnaires, sometimes in computerized form have been provided to patients for a particular disease or related group of problems. The aim has usually been to combine the anamnesis gathering with a decision support which gives a candidate diagnosis based on the answers. In some of these limited situations with large and well evaluated questions the results have been quite good. However, we have not found any previous study where the aim has been to provide structured questions for a general purpose consultation to a primary care physician for all possible problem areas.

The aim of this study has been to investigate the feasibility and usefulness of a computer-assisted questionnaire with such a broad scope. The study further focuses solely on obtaining anamnestic information, the decision making process is totally left to the health professional. One reason for this is to avoid some of the criticisms that has been accompanying decision making systems but also the view that the direct encounter between a physician and the patient will usually be needed to grasp some aspects where a questionnaire is not optimal for several reasons. The scope was thus only to obtain a partial anamnesis to be complemented by an interview.

The criteria for evaluation of the pilot study were:

- Anamnesis quality. Defined as the recollection of significant information that constitutes the basis for choosing accurate medical measure(s).

- Anamnesis quantity. Defined as the recollection of information regardless diagnostic value for the physician.
- Physician-patient communication. Defined as the transfer of information concerning physical and also non-physical correlates of the illness from physician to patient.
- Examination time consumption.

Materials and Methods

Type of Study

This investigation was a pilot study in collaboration with the Segeltorps Vårdcentral - SVC (primary care centre) in Southwest Stockholm aiming to guide further research and future deployment of a routine system. The system development and full evaluation report was also the basis for a Masters Thesis by the first author at the Department of Computer Science at the Stockholm University [1].

Evaluation Criteria

The project started by determining the evaluation criteria mentioned in the Introduction. It was realized that the answers to the questions would only be partial in the limited study and qualitative conclusions would be more important than the quantitative data gathered.

Determining information requirements

A key issue for the success of this type of solution depends on the selection of the information the system should seek to obtain from the patients. The methodology used in this project was to rely on the literature used in the teaching of taking an anamnestic interview with Birke [2] as the main source. This was adapted for the computer application and used as a basis to formulate questions directed to the patients. These questions were evaluated and modified by the medically trained author before presented to the group of collaborating primary care physicians that suggested a few minor changes before the pilot study.

Identifying problems

Literature was searched and a series of meetings were held to discuss the general problems of computerized interview compared to the interactive interview by a physician.

System design

The prototype software was developed in Microsoft Access and was divided in two parts:

"Shell" part included default forms purposed to assist the user to enter "the primary" symptom and manage the overall patient session.

The symptom forms. The user would only fill out forms related to his/her health problem. This part served as the prototype's knowledge base.

The forms for each of the 73 symptoms have a series of questions that were either:

- Multiple choice selections (check-box)
- Pull-down menus
- Free text fields
- In some situations the pure text interactions were complemented by graphics showing e.g. anatomical locations of pain.

It was decided to run the pilot without the complications of actually using the internet connection. Instead a stand-alone PC application was operated by the patients in a special room at the primary care center. The results of the questionnaire was printed on paper and given to the participating physicians prior to seeing the patients.

Verification and implementation

The system verification included the following steps:

A low number of non-patient users that were not health professionals tested the questions with real or simulated health problems with the purpose to detect system errors and questions that were difficult to understand.

Verification by the physicians associated with the project.

Field-study

Three primary care physicians and their patients participated in the field-study. Subjects were patients (older than 16) in two groups:

- Non-scheduled patients visiting the healthcare center who experienced urgent health problems
- Patients with a scheduled appointment for a health problem that was unknown to the physician.

The subjects used the prototype questionnaire system in a separate room. After completion of the computer interview the printed answers were given to the attending physicians, simulating the network communication. The patient's answers to the anamnesis questions were also collected for data analysis of the study.

Immediately after the physician visit, the primary care physicians completed a questionnaire on the value of the computer anamnesis for this case.

The patients were also asked to fill out an evaluation questionnaire to investigate their opinions on the computerized anamnesis system.

In addition to this formal data collection patient reactions were noted during direct observation and personal interviews.

The group of physicians were collected for a general discussion on the results achieved with opportunities for further commenting.

Results

The Anamnesis Questions

The objective was to cover all or at least most of the possible problems a patient may present in the primary care environment. 73 Symptoms were grouped in 14 categories as described in table 1. For each of the symptoms a number of questions where posed to gather relevant information on e.g. onset, duration, severity, localization and associated findings.

Table 1 - Symptom Categories

Symptom Category	No of symptoms
Pain	5
General	5
Circulatory	8
Respiratory	6
Gastrointestinal	5
Hematological	4
Gynaecological	3
Endocrine	8
Urinary tract	4
Dermatological	4
Ophthalmological	5
Ear, Nose and Throat	8
Neurological	6
Psychiatric	2
Total	73

The patients were asked to first select a main symptom in one of the above categories. The relevant form was opened and from 5 to 30 questions relevant for this problem were asked. Some were multiple-choice questions with check boxes or in some cases pull-down menus. Some input was based on free text entry fields. Visual-analog rating scales were used for some quantitative input. Where relevant simple anatomical drawings were used to indicate location of the problem, e.g. pain.

At the end of some input forms, the user was asked if any of a set of frequently related symptoms was present, e.g. nausea or fever associated with stomach pain. The program logic would then open the relevant form until no more symptoms were selected.

The patient could also select other symptoms that were not stated by the system nor by the patient to be associated with the primary symptom.

When all structured input had been completed the patient was given the option to summarize his health condition in general and add any information deemed relevant that had not been asked for explicitly previously.

Then followed the input of the patient's expectations for the visit which could be selected from a predefined set or optionally added as a free text field.

Patient characteristics

72% of the patients meeting the inclusion criteria agreed to participate in the trial. Table 2 shows the distribution of sex and type of visit. The average age was 40,5 years.

Table 2 - Participants

Type of Visit	Participants	
	Men	Women
Non-scheduled	10	12
Scheduled	4	9
Sum	14	21
	35	

Primary symptoms tested

The distribution of the cases on primary symptoms is shown in table 3.

Table 3 - Primary symptoms tested

Primary Symptom	Number of cases
Chest- neck- and shoulder pain	5
Pain in the back	2
Pain in the ears	2
Pain in upper and lower extremities and the joints	3
Sore throat	4
Headache	1
Nasal obstruction	4
Nasal discharge	2
Cough	4
Hoarseness	1
Edema	1
Small/or absent urine quantity	1
Skin change and discoloration	1
Heartburn and acid indigestion	1
Sensory disturbances	1
Red eye	1
Urinary difficulties	1

Information captured

The physicians estimated that our prototype, as it was designed, managed to get in average 65% of the information patients normally provide. The information provided was 10% at the minimum (2 cases) and 90% at the maximum (7 cases).

Ten cases did not end with a diagnosis. The average consultation time for the casualty visits and for scheduled visits was 9 and 29 minutes respectively.

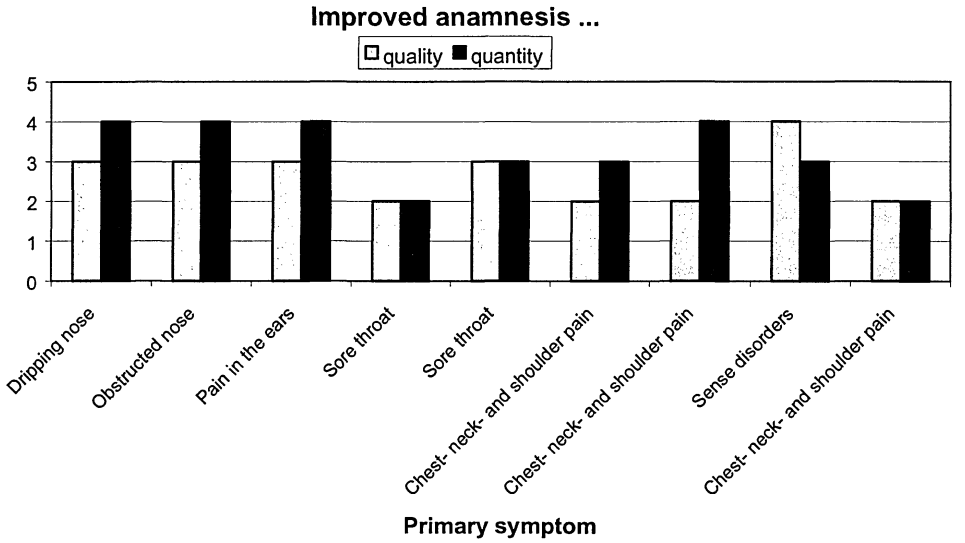

Figure 1 - Physician no 2 estimate of Quantity and Quality changes

Anamnesis quality and quantity

The three physicians at SVC were requested to estimate if the use of the system led to improved anamnesis both in quality and quantity. The answers were given in a 5-graded scale from "agree completely"=5 to "do not agree at all"=1. In the summary done here only 4-5 are considered positive. From the data the physicians estimated that anamnesis quality was improved in five cases and quantity improvement was achieved in eight cases. This corresponds to 14% and 24% of quality and quantity improvement respectively.

In three cases both quality and quantity improvement was reported. All these three cases were under the observation of the less experienced physician. The most experienced physician did not record any significant improvement in quality or quality. However, generally quantity improvements are noticed even for an experienced physician.

These results may suggest that the use of this system may not lead to improvement in anamnesis quality and quantity for very experienced physicians. On the contrary, less experienced physicians are able to achieve improved anamnesis in both quality and quantity.

In one case one of the physician noticed improved anamnesis quality but not improved anamnesis quantity. "Sensory distortion" was the primary symptom of this patient case, which appeared in the field study only once. An explanation behind this result can be a well coverage of the information needed for this symptom.

Figure 1 illustrates the different results achieved for physician 2.

Examination time consumption

All the physicians considered that time efficient decision-making was attained. See table 4. This fact indicates that physicians, regardless of their experience level, can make time efficient decision(s) using this system. The low number of negative responses motivates the strength of the last assumption.

Table 4 - Time efficiency

	Responses		
	Positive	Neutral	Negative
Physician 1	2	8	2
Physician 2	3	6	0
Physician 3	2	11	1
Sum	7	25	3

Discussion

This pilot study has tested the feasibility of anamnesis collection using a computerized structured questionnaire.

To our knowledge this is the first time an attempt has been made to capture the anamnesis of an unsorted population of patients to visit a primary care physician. Despite the limited time available for development of this pilot system a rather rich set of questions for common symptoms could be used. The overall patient reaction was rather positive towards this new method. We think this depends on several factors:

- The system was not intended to replace the meeting with the physician - only to complement it
- The system allowed the patients to take the necessary time to consider a large number of different questions and give their responses without the haste and stress often created in the physician encounter.
- The test population was relatively young and used to computers.

However in Sweden and some other countries more than 50% of the population are using the internet. Even if the use of PCs and the internet is lower at the older ages where a lot of healthcare is needed it is beginning to be a significant and rapidly increasing part also of the older population that is familiar to computers.

The results of the very limited pilot test in terms of achieving the goals of improved quantity and quality of the anamnesis must be interpreted with care. Most of the small group of patients had rather simple problems where an experienced physician rather rapidly can obtain sufficient information in an interview. Despite this, the results indicate that both new information can be obtained and that the quality of information in some cases will be better if a computerized questionnaire of this type will complement the interview.

The data may suggest that very experienced physicians gain less in quality and quantity than a less experienced one but the data is really to small to be certain of this. The patient populations were not large and equal enough for this.

It is likely that future research may find that the computerized partial anamnesis will have great value for some type of symptoms and less value for other. It is also possible that different patients as individuals will give different results even if they have similar problems.

Interestingly the studies of time efficiency as judged by the physicians, and not real time measurements, indicate strongly that previously gathered information from the patient with a computer will save time at the patient encounter. This may lead to decreased costs but can of course also lead to the situation that physician time gained can be used to improve the quality of the total care, if allowed by the financial constraints.

The next steps before this type of system will be a routine utility that will serve some but not all patients are:

Further improvement of the questionnaire in terms of human computer interaction and in terms of medical significance.

The transfer of the tested stand-alone application to an internet server at a primary care center. This is considered a relatively easy step but must be accompanied by appropriate technology to protect patient confidentiality. The integration of such a system with the workflow of a physician's office and the electronic healthcare record system (this center as more than 90 % of primary care physicians in our country has EHCR systems) will be more difficult.

Such anamnesis taking over the net might also be used for other purposes than improving the time efficiency and amount of information gathered at a following visit:

As an initial interface to the patients to gather information used for sorting and scheduling of visits. The difference in information obtained will be very great compared to a short telephone call to a nurse for making an appointment.

Patients may also perceive an improved service and even learn from the questions made.

A well received anamnesis might of course also be used by a health professional to give directed advice over e-mail or web service mail-box without requiring a visit. Such systems are started in some countries while considered questionable from an ethical and legal point of view in others. Our recommendation is clearly that any such service should seek to develop a structured anamnesis rather than allowing only a free text open question.

Conclusion

The pilot study strongly encourages further research and developments to use a structured interview to gather the anamnesis from the patient.

References

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