Development and Evaluation of a Computer-Based Program for Assessing Quality of Family Medicine Teams Based on Accreditation Standards

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SUMMARY

Introduction: Agency for healthcare quality and accreditation in Federation of Bosnia and Herzegovina (AKAZ) is authorized body in the field of healthcare quality and safety improvement and accreditation of healthcare institutions. Beside accreditation standards for hospitals and primary health care centers, AKAZ has also developed accreditation standards for family medicine teams. **Methods:** Software development was primarily based on Accreditation Standards for Family Medicine Teams. Seven chapters / topics: (1. Physical factors; 2. Equipment; 3. Organization and Management; 4. Health promotion and illness prevention; 5. Clinical services; 6. Patient survey; and 7. Patient's rights and obligations) contain 35 standards describing expected level of family medicine team's quality. Based on accreditation standards structure and needs of different potential users, it was concluded that software backbone should be a database containing all accreditation standards, self assessment and external assessment details. In this article we will present the development of standardized software for self and external evaluation of quality of service in family medicine, as well as plans for the future development of this software package. **Conclusion:** Electronic data gathering and storing enhances the management, access and overall use of information. During this project we came to conclusion that software for self assessment and external assessment is ideal for accreditation standards distribution, their overview by the family medicine team members, their self assessment and external assessment.

Key words: family medicine, accreditation, healthcare quality, software development

1. INTRODUCTION

Agency for healthcare quality and accreditation in Federation of Bosnia and Herzegovina (AKAZ) is authorized body in the field of healthcare quality and safety improvement and accreditation of healthcare institutions (1). Besides accreditation standards for hospitals (2) and primary health care centers (3), AKAZ has also developed accreditation standards for family medicine teams (4, 5). These standards have hierarchical structure comprising of 7 chapters or topics with 35 standards, their 161 criteria and number of sub criteria. In order to speed up and simplify the self assessment and external assessment process, provide better overview and access to accreditation standards and better assessment documents archiving, AKAZ has developed self assessment and external assessment software for family medicine teams.

2. METHODS OF DEVELOPMENT

2.1. Needs Assessment

Software development was primarily based on Accreditation Standards for Family Medicine Teams. Seven chapters / topics: (1. Physical factors; 2. Equipment; 3. Organization and Management; 4. Health promotion and illness prevention; 5. Clinical services; 6. Patient survey; and 7. Patient's rights and obligations) contain 35 standards describing expected level of family medicine team's quality (5). Each standard contains criteria describing standard's key components. There are 161 criteria in total, and some of them are quantitative and some qualitative (indicators). Criteria are divided into three groups: basic, advanced and terminal. Similarly, the accreditation status family medicine team can achieve, can be basic, advanced and terminal accreditation. Beside mentioned, each criterion has its own measure components – sub criteria (quantitative or qualitative), thus accreditation standards structure being hierarchical with four levels: 1. Chapter (or topic); 2. Standard; 3. Criterion; 4. Sub criterion/ Indicator. Criteria carry certain amount of points which is shared among its sub criteria/indicators. Sub criteria/indicators can be independent or interconnected for the purpose of assessment, and also can

carry bonus points. If, for example, an interconnected criterion is not met, none of the other sub criteria interconnected with it, nevertheless they are fulfilled, will contribute to criterion's points. .

Family medicine team members (doctors and nurses), accreditation process facilitators, external assessors, accreditation board members and AKAZ personnel were all been identified as potential users. Information needs of each group as well as methods of entering, viewing, using, sharing and storing of those information were also taken into consideration. Family medicine teams need to easily review all information on accreditation standards, criteria and sub criteria/indicators, to enter their self assessment for each sub criteria/indicator, to have neat preview of their progress and points achieved by fulfilling criteria. Facilitators have the same needs. Besides of reviewing standards, criteria and sub criteria/indicators, entering external assessment for each sub criterion/indicator and points previewing, the external assessors need the ability to see the team's self assessment results for every level of standard, as well as to generate and print specific external assessment reports for submission to AKAZ and Accreditation board. On the other hand, AKAZ needs the ability to easily store the self assessment and external assessment data from various family medicine teams, and later on to statistically analyze the data for the purpose of getting insight of overall fulfillment of standards among various teams and consideration of needs for standards revising.

2.2. Data Gathering and Processing

Based on accreditation standards structure and needs of different potential users, it was concluded that software backbone should be a database containing all accreditation standards, self assessment and external assessment details.

2.3. Normalization

No matter how valuable, data is not useful unless stored in a manner that is easy to manipulate. Normalized data is information prepared so that it can be uniquely identified and retrieved. We parsed all accreditation and assessment data into ordered table's fields such as chapter's number, chapter's name, standard's number, standard's name, standard's statement, criterion's number, criterion's name, criterion's statement, possible points, etc. To fully normalize a database, a unique identifier must be associated with each record. In such ordered table we have provided the identifier that uniquely identifies each sub criterion/indicator.

2.4. Relational Architecture

A single table could include all the data desired for self assessment and external assessment of each sub criterion/indicator for each family medicine team. On the other hand, that would cause unnecessary multiplication of all data about higher levels in accreditation standards hierarchical structure, i.e. great redundancy. Relational databases link tables sharing information about common subjects. Thus,

we split the principal table into four linked tables reflecting the hierarchical structure of accreditation standards. We placed data about chapters (topics) in the first table, data about each standard in the second, basic data about each criterion in the third, and the fourth table contained the data about individual sub criteria/indicators as well as data about self assessment and external assessment. Unique identifier (primary key) was designated for every table. For table Chapters it was chapter's number, for table Standards – standard's number, for table Criteria – criterion's number, and for table Sub criteria primary key was automatically generated number. In addition, in tables Standards, Criteria and Sub criteria, foreign keys (fields linked to primary keys of hierarchically higher tables) were designated.

2.5. Client Software Development

Because this was the first version of database, for simple design mechanism and straightforward user interface, we decided to utilize Microsoft® Access 2000.

We crated three MS Access files: one containing tables with data and relations (relational database), and the other two containing forms, queries and links on tables from the first file. The other two files acted as user interface, one for family medicine team's self assessment, and the other for external assessment. It was planned to provide family medicine teams with a two files – database and

FIGURE 1. Database relationships

self assessment user interface. After the self assessment and before the external assessment, family medicine team would submit the database to AKAZ. Then, the database would be forwarded to the external assessor along with the external assessment user interface. It would enable external assessor to have insight into the self assessment results and to enter

FIGURE 2. First form of self assessment user interface

the external assessment findings. After the external assessment is done, automatically generated reports are printed and submitted to AKAZ along with the database.

2.6. Database

Database contained following tables with corresponding fields and relations (Figure 1):

- tblPoglavlja (Chapters)
- tblStandardi (Standards)
- tblKriteriji (Criteria)
- tblPotkriteriji (Sub criteria/Indicators)

2.7. Self Assessment User Interface

Self assessment user interface is linked to database and contains several SQL queries for accreditation points summing by different levels and criteria, as well as several forms and sub forms for viewing and navigation through chapters, standards, criteria, sub criteria/indicators, and entering self assessment data.

The first form (Figure 2) provides users with

FIGURE 3. Second form of self assessment user interface

simple navigation through chapters and standards by selecting ones in list boxes on the left. Basic information about chosen standard is shown in the central upper section. List of standard's criteria with

preview of each criterion self assessment points and button for opening form for self assessment of criteria is shown in the central section of the form. Summary of accreditation points for the given standard along with appropriate motivating message is shown at the bottom of the form. The motivating message depends on percentage of self assessment points related to totally possible points. In the lower left section of the form summary of self assessment points, totally possible points and percentage of self assessment points related to the totally possible points for every level of criteria (basic, advanced and terminal) is shown. All

above described is achieved by using form controls, VBA code and sub forms.

The second form (Figure 3) displays detail about

FIGURE 4. Third form of self assessment user interface

FIGURE 5. The switchboard form of external assessment user interface

chosen criterion, list of sub criteria/indicators with self assessment points, as well as summary points for the given criterion. Beside every sub criterion/in-

AKREDITACIJSKI STANDARDE ZA TIMOVE POROČIOŠNE / OBŠTELJSKE MEDICINE

POGLAVLJA

1. Fizički faktori
2. Oprema tima
3. Organizacija i menadžment
4. Promocija zdravlja i prevencija bolesti
5. Kliničke usluge
6. Anketiranje pacijenata
7. Prava i obaveze pacijenata

Standardi u poglavlju

- 3.1. Osnovni podaci
- 3.2. Informacija i komunikacija
- 3.3. Medicinsko-evidencija i registri
- 3.4. Edukacija i obuka
- 3.5. Strategije i priručnici menadžment
- 3.6. Uputnice i upućivanja
- 3.7. Upravljanje lijekovima

P.U.I.

Vanjska ocjena: 687,00
Mogući poeni: 695
Postotak ispunjenja: 98,85%

Ukupno: 463,50
Mogući poeni: 564
Postotak ispunjenja: 82,18%

Ukupno: 503,50
Mogući poeni: 741
Postotak ispunjenja: 67,81%

POGLAVLJE 3.2 Informacije i komunikacije

Tim otvoreno komunicira s pacijentima i osigurava im dovoljno informacija da bi mogli donijeti odluke o svom zdravlju i liječenju.

KRITERIJI STANDARDA:

Br.	Izjava kriterija standarda	Mogući poeni	Samocjena	Vanjska ocjena	Postotak
P.01	Informativni listi i brošure nude se pacijentima a o čemu se informiraju	3,00	3,00	3,00	100%
P.15	Vrijeme komunikacije s liječnikom dovoljno je dugo da omogućiti	3,00	3,00	3,00	100%
T.06	Tim poročišne / obiteljske medicine raspolaže ažurnim inform	1,00	0,00	0,00	0%
U.01	Liječnici upoznaju pacijente sa svim, značajem, dobom i riz	2,00	2,00	2,00	100%

Od mogućih 9 poena, Tim se samocijenio sa 8 poena, što čini 88,89%
a vanjskom ocjenom je dobio: 8 poena, što čini 88,89%
PREKO 75% ISPUJENOSTI STANDARDA!

FIGURE 6. Main form of external assesment user interface

Izvještaj vanjskog ocjenjivača o ispunjenosti kriterija standarda po nivoima kriterija (PUT)

TOM

	Mogući poeni	Samocjena poeni	%	Vanjska ocjena poeni	%
Kriteriji P:	695,0	687,0	98,40%	687,0	98,86%
Kriteriji U:	864,0	463,5	53,65%	463,5	53,65%
Kriteriji T:	741,0	503,5	67,95%	503,5	67,95%
UKUPNO:	2000,0	1654,0	82,70%	1654,0	82,70%

Prijedlog po osnovu ispunjenosti kriterija standarda prema njihovom nivou (PUT): **Postepena akreditacija**

1. izdanje 2008. AKAZ "VANJSKA OCJENA TOM" 2008. 2. izdanje © AKAZ 2008. Ali sva prava zadržana.

FIGURE 7. The first report with a summary of accreditation points by levels of criteria

indicator there is a button for displaying sub criteria/indicators assessment form.

Izvještaj vanjskog ocjenjivača o ispunjenosti kriterija standarda TOM Slavinović (dr Selmanović)

Poglavlje 1 Fizički faktori

Kriterij	Mogući poeni	Samocjena	Vanjska ocjena
P.01	3 poeni	3 poeni	3 poeni
Ocjena standarda	3 poeni	3 poeni	3 poeni

Poglavlje 2 Oprema tima

Kriterij	Mogući poeni	Samocjena	Vanjska ocjena
P.02	3 poeni	3 poeni	3 poeni
P.03	3 poeni	3 poeni	3 poeni
P.04	3 poeni	3 poeni	3 poeni
P.05	3 poeni	3 poeni	3 poeni
P.06	3 poeni	3 poeni	3 poeni
P.07	3 poeni	3 poeni	3 poeni
P.08	3 poeni	3 poeni	3 poeni
P.09	3 poeni	3 poeni	3 poeni
Ocjena standarda	24 poeni	24 poeni	24 poeni

Poglavlje 3 Organizacija i menadžment

Kriterij	Mogući poeni	Samocjena	Vanjska ocjena
P.10	3 poeni	3 poeni	3 poeni
Ocjena standarda	3 poeni	3 poeni	3 poeni

Izvještaj vanjskog ocjenjivača o ispunjenosti potkriterija sa navođenim dokazima o pridržavanju TOM Slavinović (dr Selmanović)

Poglavlje 1 Fizički faktori

Kriterij P.01

Standard: P.01 Informativni listi i brošure nude se pacijentima a o čemu se informiraju

Podkriterij 1 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 2 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Odnosi u ambulanci postoje u skladu s potrebama pacijenata za hitnu pomoć i pregled sa izvanjskim posjetama.

Kriterij P.02

Standard: P.02 Vrijeme komunikacije s liječnikom dovoljno je dugo da omogućiti

Podkriterij 1 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 2 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 3 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 4 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 5 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 6 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 7 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 8 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 9 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 10 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 11 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 12 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 13 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 14 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 15 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

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Podkriterij 25 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

Podkriterij 26 ☒ Realizirano poeni: 3 Samocjena: 3 Vanjska ocjena: 3

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Podkriterij 208

ment along with their summary self assessment and external assessment points.

The third report (Figure 8) provides with detailed insight to fulfillment of every individual sub criteria along with all entered notes and remarks.

3. END USER TESTING

After the development the software was tested during the project of WHO and AKAZ "Quality Improvement and Accreditation Program Based on Accreditation Standards for Family Medicine and Performance Indicators in Two Cantons – Tuzla and Posavina". The database and the self assessment interface were installed on nine family medicine teams' computers. Members of nine teams (doctors and nurses) were provided with software using basic training and support by telephone should there be some unclear issues concerning the use of software. During one month all teams have done self assessment according the accreditation standards using the software and submitted their databases to AKAZ. During that period of time none of the users has reported neither any error in the software functioning nor any major difficulties in using it. On contrary, majority has said that the software has been of great help and had very stimulating effect because they were able to follow their progress during the self assessment in any moment.

After reviewing of self assessments, AKAZ concluded that seven of the nine teams met the conditions for external assessment. Two external assessors were designated to every of the seven teams. External assessors were provided with teams' databases and external assessment user interfaces. External assessment lasted for two days (17th and 18th of November 2008). For the purpose of external assessment external assessors used the software installed on their laptop computers. After completion of assessment they submitted the databases and printed reports to AKAZ. None of the external assessors has reported neither any errors in software functioning nor any difficulties in using it. All fourteen external assessors gave very positive comments on software and stressed the fact that the software has greatly eased their work during the external assessment of family medicine teams.

Data from all gathered databases AKAZ has imported into specially created database for analyzing and archiving. Preliminary results obtained by the analysis suggested that all seven family medicine teams could achieve basic level of accreditation. Rating of family medicine teams based on number of accreditation points was also determined, and all the results were forwarded to the Board which considers assessment reports and gives the final decision on accreditation. Further on, database of all self assessments and external assessments made possible analysis of overall fulfillment of all individual sub criteria/indicators and corresponding remarks given by family medicine teams' members, facilita-

tors and external assessors. Thus, identification of certain difficulties of some sub criteria/indicators fulfillment and need for their revision was made possible.

In meanwhile one limitation of the software was identified – prerequisite that appropriate version of MS Access is installed on user's computer. In some cases that will not be practicable or it will require additional cost for purchase of MS Access application.

4. FUTURE DEVELOPMENT

In order to overcome the identified limitation, AKAZ plans further development utilizing the MS Visual Basic 2008 Express Edition tool for development of user interface linked to existing MS Access database. Software created in this way would eliminate the need for having MS Access installed on user computer. Further on, AKAZ also plans development of web based application which would allow online registration of family medicine teams, their online self assessment, and immediate feedback in the means of benchmarking, i.e. comparison against other family medicine teams. Bringing the spirit of competition into accreditation process, this could, it is assumed, further stimulate teams in their struggle for healthcare quality improvement. On the other hand, AKAZ would have a better and immediate insight in self assessments of teams who entered the accreditation process.

5. CONCLUSION

Electronic data gathering and storing enhances the management, access and overall use of information. During this project we came to conclusion that software for self assessment and external assessment is ideal for accreditation standards distribution, their overview by the family medicine team members, their self assessment and external assessment.

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