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Evaluation of Certifying Examination of Healthcare Information Technologists

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Abstract and objective

To improve the healthcare literacy in both of healthcare providers and system vendors, the Japan Association of Medical Informatics started the task force to foster the Healthcare Information Technologists (HIT) in 2001. After two years of preparation, the annual certifying exam for the primary HIT has started. The purpose of this paper is to report the evaluation of this exam by using four year of experiences. It was found that the exam will be sensitive to select persons who have good knowledge about hospital management, having ethical mind, and conduct well at the time of emergency.

Keywords:

healthcare information technologist, certifying examination, education

Introduction

As is stated by Prof. Evelyn J.S. Hovenga, the chair of MEDINFO2007, improvement of health literacy and development of a sound e-health environment that enables us to improve health conditions of individuals by active and effective use of health information among health care team and the individuals will be the keys to reduce the national medical expenditure. To create such the e-health environment, however, the computer system should meet the demands both of users and of the society, i.e., it should support the care process substantially to realize better patient care, it should be cost effective, and all information should be treated in secure and authorized ways. However, the computer systems used in healthcare sectors now in Japan are far behind of these demands. We have not yet succeeded even to prove the value of the computer systems. Moreover, the introduced systems sometimes mismatch the practical patient care, since few computer technologists working at system vendors know the practical health care process. All of these will come from the deficiency of persons who knows both of the health care processes and the computer technology. To solve this problem, the Japan Association of Medical Informatics has launched a project to foster Healthcare Information Technologists (HIT). To grasp the real requirements for HIT and to decide what to certify, 40 specialists gathered in the year 2001. In that assembly we made the general instructional objectives (GIO) and the specific behavioral objectives (SBO) to foster HIT. According to GIO/SBO, we published a series of textbooks. These textbooks have been widely used in schools and companies, and become the first standard textbooks in this area.

From the year 2003, the annual certifying exam for the primary HIT has started. The certifying exam consists of three tests about information technology, health care, and health information system, comprising 40, 40, and 60 questions, respectively. We have created these questions every year in accordance to SBO to measure abilities that HIT should have.

Until 2006, exemption rule existed for the tests of information technology and health care. Applicants having other specified licenses exempted from the test assigned to each license.

From the start of exam, unexpectedly large number of persons applied. Indeed, about 3800 persons have applied the exam each year. By the year 2006, it reaches 15435 persons in total, and 5129 persons have been qualified as the primary HIT.

The persons from system vendors are continuously increasing from 38% to 61% in these 4 years, and the percentages of them who passed the exam improved from 29% to reach 38%. Though the exam is rather difficult for students and for nurses who have little chances either to use healthcare information systems or to see computer programs, the percentage that pass the exam has remarkably improved from 7 to 15% for students, and 7 to 26% for nurses during these 4 years.

There remains a question, however, what characteristics the exam certifies. This paper devotes to answer this question.

Materials and method

In these 4 years, 4037 persons applied the exam more than twice. The percentage to pass the exam after applying it more than twice is 44.1 %, while it is 29.4% to pass the exam at their first challenge. This somewhat large difference may indicate that it will be better to use only the data at the first challenge of each applicant. In this paper, we used the data of the first challenge of the 11398 applicants.

As each question always treats one theme, we can categorize the objectives of each question. As the typical requirements for HIT, we chose seven categories and selected questions in accordance with these categories. The seven categories are: (1) Ability to follow logic. The questions about flowchart, binary mathematics, etc., are in this category. (2) Computer

literacy. Questions of the level of terminology are here. (3) Medical knowledge. Here, the common sense about clinical medicine was asked. (4) Knowledge about hospital management. Questions about formulas used in hospital management, insurance system, etc., are in this category. (5) Ethical mind. Questions about the code of ethics at practical settings are in this category. (6) Behavior at the time of emergency. The questions asking best choice or priorities in the time of troubles are in this category. (7) Ability to evaluate clinical data. Any questions to ask understanding figures or tables describing some clinical status, or introductory knowledge about medical statistics are in this category.

As this is the exam for primary HIT, a few questions are categorized into 5, 6 or 7. To avoid distortions caused by the different number of questions we selected at most 3 questions to each category in each test. The selection of these 3 questions is done by the difficulty measure, i.e., the average score of each question normalized to the allotted score.

After selected the questions, we calculated the averages of the scores of percent correct of questions in each category of each applicant, and performed a logistic regression analysis to know what category contributes most to the certification of HIT. Since some categories, e.g., categories 1 and 2, are taken only from the test results of information technology, values of these categories are missed for such applicants who does not take the information technology test. The number of complete cases was 6028, in which no missing values exist.

Results

To grasp the sensitibity of each category to certification, we first show the distribution of scores in table 1. In this table, percentages of the number of applicants who passed or failed the exam are listed in the "Passed" or "Failed" cell. These percentages were taken to the total number of applicants with the same range of average score.

1: Ability to follow Logic			
Score	Cases	Passed (%)	Failed (%)
0.00-0.25	3396	14.22	85.78
0.25-0.75	5816	30.38	69.62
0.75-1.00	557	52.06	47.94
2: Computer Literacy			
0.00-0.25	2298	7.57	92.43
0.25-0.75	6135	26.21	73.79
0.75-1.00	1336	56.74	43.26
3: Medical Knowledge			
0.00-0.25	1578	16.60	83.40
0.25-0.75	5102	29.18	70.82
0.75-1.00	814	46.93	53.07
4: Knowledge about Hospital Management			
0.00-0.25	2080	14.57	85.43
0.25-0.75	6672	27.01	72.99
0.75-1.00	2612	47.47	52.53
5: Ethical Mind			
0.00-0.25	142	4.23	95.77
0.25-0.75	5122	19.37	80.63
0.75-1.00	6100	38.48	61.52
6: Behavior at the time of emergency			
0.00-0.25	34	0.00	100.00
0.25-0.75	4381	16.91	83.09
0.75-1.00	6935	37.55	62.45
7: Ability to evaluate/understand clinical data			
Score	Cases	Passed (%)	Failed (%)
0.00-0.25	852	10.33	89.67
0.25-0.75	8745	27.11	72.89
0.75-1.00	1767	50.14	49.96

Table 1 - Distribution of Scores

Table 2 shows the simple statistics of each category.

Table 2 - Simple statistics of 7 categories

Category	Average	Median	Mode
1	0.32	0.33	0.33
2	0.45	0.39	0.33
3	0.44	0.39	0.33
4	0.55	0.56	0.50
5	0.76	0.80	1.00
6	0.79	0.83	1.00
7	0.58	0.58	0.75

Table 3 shows the result of logistic regression analysis. The dependent variable is a dichotomous status of the exam.

Cate-gory	Coef.B ±SE	Wald statistic	estimated odds ratio		
			exp(B)	95% conf. interval	
1	1.48±0.143	107.6	4.40	3.32	5.82
2	2.44±0.148	272.4	11.47	8.58	15.32
3	1.54±0.150	105.5	4.69	3.49	6.30
4	4.58±0.212	465.2	97.75	64.46	148.24
5	3.96±0.261	230.8	52.57	31.53	87.65
6	3.46±0.250	191.4	31.78	19.47	51.87
7	2.59±0.218	141.6	13.36	8.72	20.47

Table 3 - Result of the logistic regression analysis

Discussions and concluding remarks

From tables 1 and 2 some characteristics of the exam can be seen. For example, making appropriate decision at the time of emergency is easy for many applicants, but, it is very difficult to pass the exam if one fails to make such decision. The result of logistic regresion analysis would mean that the certifying exam will be very sensitive to select persons who have a good knowledge about hospital management, having ethical mind, and conduct well at the time of emergency. But the knowledge about clinical medicine may not be so important. All of these characteristics are those which we have expected to primary HIT, and this will prove the adequacy of the exam.

To improve the quality of exam, the performance of each question has been evaluated each year, based on the item response theory. GIO/SBO and the textbooks are updated so as to cope with the rapidly changing environment. Training schools are also held annually. Through these activities of JHIFT, HIT has accepted in Japanese society, and the workplaces for HIT have been gradually spreading.