

Improved Paper-based OPD cards for Community Hospitals*

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Background : *Medical records were important for every aspect of the medical care process. Traditional Paper-based Medical Records (PMR) for the out-patient department (OPD) have several problems including important data lost, poor recording and incorrect data. Electronic Medical Records (EMR) have been proposed to solve those problems, but this is still not suitable for community hospitals, mainly because of budget and the knowledge of the medical personnel.*

Objective : *To study the problems from using old PMR and to compare it with new PMR by means of communication and documentation time.*

Setting : *Nong Yai Hospital (30-bed community hospital), Nong Yai District, Cholburi*

Subjects : *Eight hundred and seventy patients visiting the hospital during February, 2000 were prospectively studied.*

Design : *Prospective, Descriptive and Analytical Study*

Methods : *Old OPD cards were analyzed for useful information. This was then recorded in new corresponding forms. Documentation and communication time were recorded for the first visit, in which old OPD cards were used, and for the 3 following visits in which new OPD cards were used.*

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Results : *Of 80 problems (37 cases), data missing was found to be the most common (52.50%) while poor recording and incorrect data were 25.00% and 22.50%, respectively. Evenif more time was spent on documentation during the transition period, with new OPD cards, time spent on each patient was reduced while communication time was statistically increased in proportion.*

Conclusion : *Our new PMR was a simple and cost-effective way to improve the medical record system, especially for community hospital in Thailand.*

Key words : *Medical record.*

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**กฤษณ์ พงศ์พิรุฬห์. การบันทึกเวชระเบียนผู้ป่วยด้วย OPD Card สำหรับโรงพยาบาลชุมชน.
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- ปัญหา** : การบันทึกเวชระเบียนผู้ป่วยด้วย OPD Card แบบเดิมทำให้เกิดปัญหาหลายประการ เช่น ข้อมูลสำคัญถูกละเลย การจัดเก็บและเรียกค้นข้อมูลบกพร่องตลอดจนความผิดพลาดของข้อมูล แม้ในปัจจุบันเริ่มมีการใช้คอมพิวเตอร์เข้ามาช่วยแก้ปัญหาดังกล่าว แต่ก็ต้องใช้เงินลงทุนเป็นจำนวนมาก ซึ่งไม่คุ้มค่าสำหรับโรงพยาบาลชุมชนขนาดเล็กที่มีงบประมาณน้อย และเจ้าหน้าที่ยังไม่มีความรู้เพียงพอ
- วัตถุประสงค์** : 1. เพื่อศึกษาข้อบกพร่องจากการใช้ OPD Card แบบเก่า
2. เพื่อเปรียบเทียบเวลาที่แพทย์ใช้พูดคุยกับผู้ป่วยแต่ละคน และเวลาที่ใช้ในการเขียนเอกสาร
- สถานที่** : โรงพยาบาลหนองใหญ่ (โรงพยาบาลชุมชนขนาด 30 เตียง) อ.หนองใหญ่ จ.ชลบุรี
- กลุ่มตัวอย่าง** : ผู้ป่วย 870 รายที่มารับการตรวจรักษาในแผนกผู้ป่วยนอกในเดือนกุมภาพันธ์ 2543
- รูปแบบการวิจัย** : การศึกษาไปข้างหน้า เชิงพรรณนาและวิเคราะห์
- วิธีการศึกษา** : ได้ทำการศึกษาข้อมูลที่บ้านทึกใน OPD Card แบบเก่าแล้วนำมาสรุปไว้ใน OPD Card ที่ออกแบบขึ้นใหม่ โดยบันทึกข้อมูลบางอย่างที่สำคัญต่อผู้ป่วยแต่ละรายเอาไว้ นอกจากนี้ยังได้บันทึกเวลาที่แพทย์พูดคุยกับผู้ป่วย และเวลาที่แพทย์ใช้ในการจดบันทึก ในแต่ละครั้งที่ผู้ป่วยที่ศึกษามารับการตรวจรักษา ตั้งแต่เมื่อมีการใช้ OPD Card แบบเก่า และเมื่อมีการใช้ OPD Card แบบใหม่แล้วอีก 3 ครั้งต่อมา
- ผลการศึกษา** : จากผู้ป่วยจำนวน 827 รายที่มีข้อมูลครบถ้วน พบข้อมูลมีปัญหาทั้งหมด 80 แห่ง จากผู้ป่วย 37 ราย ซึ่งเกิดจากการที่ข้อมูลสำคัญถูกละเลยถึง 52.50 % ในขณะที่มีการจัดเก็บและเรียกค้นข้อมูลบกพร่อง 25.00 % และข้อมูลไม่ถูกต้อง 22.50 % นอกจากนี้ยังพบว่า OPD Card แบบใหม่ ช่วยลดเวลาที่ใช้ต่อผู้ป่วยแต่ละรายลง โดยที่สัดส่วนของเวลาที่ใช้ในการพูดคุยกับผู้ป่วยเพิ่มมากขึ้น อย่างมีนัยสำคัญทางสถิติ
- วิจารณ์และสรุป** : OPD Card แบบใหม่นี้ สามารถช่วยแก้ปัญหาที่เกิดขึ้นกับ OPD Card แบบเก่าได้ในระดับหนึ่ง อีกทั้งยังสามารถทำได้ง่าย และใช้งบประมาณไม่มาก ซึ่งเหมาะสมสำหรับโรงพยาบาลชุมชนขนาดเล็กในประเทศไทย
- คำสำคัญ** : เวชระเบียน

more on communication than on documentation to improve the quality of care.

Advanced technology like computers, have been introduced as a solution, known as Electronic Medical Records (EMR); but these are still not suitable for community hospitals, mostly because of budget and the knowledge of the medical personnel. In addition, there have been many technology-related problems.⁽³⁻⁵⁾

For those reasons, we developed new PMR (as a shown in Figure 1-4) to solve these problems using only a small amount of resources. After using the new PMR for a period of time, we found that

important information was retrieved during the transition period. Considerable time had to be spent analysing old OPD cards before transferring the data into the new system, although this had to be done only once for each patient.

This study was conducted to demonstrate the benefits of this new method, and is divided into a descriptive and an analytic study. For the descriptive part, problems on important information concerning data lost, poor recording and incorrectness were listed. Time spent on each patient for documentation and communication in each visit was also analyzed.

FOLLOW-UP	<input type="radio"/> FP	<input type="radio"/> DM	<input type="radio"/> HT*	<input type="radio"/> TB	<input type="radio"/>	<input type="radio"/> HN
	<input type="radio"/> ANC	<input type="radio"/> COPD	<input type="radio"/> Asthma	<input type="radio"/> Thyroid	<input type="radio"/>	<input type="radio"/>
			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Name					Sheet
Date						
SBP						
DBP						
BW (kg)						
More?						
NOTE						

Figure 2. FOLLOW-UP Card

Every "recurrent" information can be recorded. Not only data already printed on the top, but also something like information of studied cases for research. The area of the first column under "BW (kg)" can be used for repeated data such as blood glucose level for diabetic cases, pulse rate for thyroid cases, drug names for some diseases, breast examination for post-menopausal cases or some data for antenatal care. Boxes next to the "More?" row can be used to inform that there is additional information which will be written on another old-style OPD card such as additional complaints and medications given.

Methods

This study was conducted at Nong Yai Hospital, a 30-bed community hospital located in Cholburi province, Thailand. Subjects were selected from the first 30 OPD patients of every working day during February, 2000. They were prospectively observed for 3 or more visits with only one physician who was not an author. Patients with less than 3 visits were excluded.

Time spent on each patient before intervention and 3 visits after intervention were prospectively recorded and divided into documentation time and communication time (seconds). Two clocks were individually used by two assistants for time recording. Documentation time started when doctor write any

information on OPD cards, including any drug prescription. Communication time was recorded as the time spent in conversation between the doctor and patient, any writing time during communication period was excluded.

Old OPD cards were analysed for data problems, page by page. Problems on "important" data (Table 1) were listed in 3 groups; data missing, poor recording and incorrect data. The first group consisted of data which was correct and properly recorded but left unmentioned during the following visits regardless of any reason. Poor recording concentrated on technical problems such as handwriting or blurred ink. For the last group of data problem, any data recorded with inadequate evidence was included.

Table 1. Definition of data concerned as "Important".

Type of Data	Definition
Disease	<ul style="list-style-type: none"> ● Chronic, congenital, life - long diseases including cancer ● Diseases that can cause sequelae
Investigation	<ul style="list-style-type: none"> ● Investigations which have strong impact on patient concerning management, diagnosis, patient care, etc. ● Investigations which are needed for monitoring disease progression, major decision
Operation	<ul style="list-style-type: none"> ● Operations which could cause complications such as explore laparotomy, appendectomy, etc. ● Operations which are needed to know for later patient care such as tubal resection, cesarean section, etc.
Others	<ul style="list-style-type: none"> ● Any information which is necessary for patient's life such as severe allergy, steroids use, suicidal attempts, etc. ● History of major accidents ● Family history of cancer

Harrison's Principle of Internal Medicine, 14th edition, was used for references on definition, criteria for diagnosis and judgement of data correctness.

The summarized data were then recorded in new corresponding OPD cards as in Figure 1-4. Old OPD cards were scanned into a computer for future reference. Time spent during the transferring process was recorded as the documentation time of the first follow-up visit.

An unpaired t-test was used to compare the mean age between the male and female patient populations. Documentation time, communication time and total time between each visits were compared by using a Paired t-test. The Wilcoxon Signed Ranks Test was used to compare communication time ratios between each visit.

Results

Demographics

A total of 870 patients were included in this study but 43 patients were excluded because of having less than 3 follow-up visits. There were 400 males and 427 females in the remaining 827 patients. The median age of the patients was 55 years. The mean ages of the male and female patients were not significantly different. ($p=0.566$; 95% CI, -1.99 to 3.64)

Descriptive Data

Data missing

In Table 2, the most common problem was data missing (42 events; 52.50%). For example, there were evidences showing correction of drug prescription because the patient received penicillin even if "penicillin allergy" was already noted on the first page of OPD cards of two patients. Information on previous

important operations were recorded in 14 patients. Even if there was no evidence of not using such information, it was definitely useful for following visits. Criminal abortion was already noted in three patients but it was never mentioned during her antenatal care of following pregnancy. There was a patient with previous data about suicidal idea for 6 months before he tried to swallow insecticide. By the way, no preventive management had been done. There was a patient with ovarian cancer who had undergone surgery and radiotherapy for about 4 years before her complaint about constipation but she was treated without any mention on such information. History of previous fracture and dislocation was useful for therapeutic intervention, recurrent shoulder dislocation was an example. There was a patient suffering this problem for 6 times in 2 years. By the way, no surgical management was even proposed.

Table 2. Problems concerning "Important" data (37 cases)

Problems	Events
Data missing ^a	42 (52.50 %)
Poor recording ^b	20 (25.00 %)
Incorrect data ^c	18 (22.50 %)
Total	80 (100.00 %)

a Data was correct and properly recorded but left unmentioned during the following visits.

b The correctness of data couldn't be determined because of technical errors such as poor handwriting style, blurred ink, lost pieces of paper

c Data was recorded with inadequate evidence, unfulfilled criteria

Information on some investigations is also important. For example, previous creatinine levels can be used for differential diagnosis between acute and chronic renal failure. One patient was diagnosed HIV-positive during antenatal care screening without ELISA confirmation. Progression of lung pathology and evidence of myocardial infarction in 2 cases could have been detected using a Chest X-Ray and EKG, respectively.

Poor recording

Poor recording problems were found in 20 events (25%). An example was that a patient had suffered from back pain for about 6 months and undergone myelography at a general hospital. Some degree of spinal cord compression was found but he was still diagnosed only "low back pain" during his following visits because such information was recorded with poor writing style. Chronic renal failure were diagnosed in one patient by only creatinine level 3.0 even if the result of previous 2 months was only 1.2. It was also resulted from poor writing style.

Incorrect data

There were 18 events (22.50%) of incorrect data problem. COPD were diagnosed in two patients by only history of smoking and dyspnea without confirmation by X-Ray or pulmonary function test. Gout was diagnosed in two patients with only hyperuricemia during their annual check-up. Drug allergy was noted in 2 patients without definite evidence but it was believed by the following doctors. One of them was asked about his "allergy" symptoms on the following visit. He thought that "nausea" was one of the symptoms of "allergy". Ten cases were recorded as having ischemic heart disease with only symptom of

chest pain. All of them were carefully examined on the following visits and found that 9 had dyspepsia and only one had real cardiac problem. Some common diseases such as diabetes and hypertension were diagnosed without standard criteria. Fortunately, no evidence of inappropriate treatment was found.

Analytic Data

Before using the new OPD cards, the mean time spent on each case was 92.35 seconds (Table 3, Figure 5). This was used mostly on documentation (writing information and drug prescription). The mean documentation and communication time were 47.54 and 44.81 seconds, respectively.

Time per case was significantly increased from 92.35 to 192.63 seconds ($p < 0.01$; 95% CI, -101.64 to -98.93) for the first OPD visit using new OPD cards. This was mostly due to documentation time which was increased from 47.54 to 134.16 seconds ($p < 0.01$; 95% CI, -87.56 to -85.69). Documentation time then decreased at the second and third visits; 33.61 seconds ($p < 0.01$; 95% CI, 12.95 to 14.90) and 33.92 seconds ($p < 0.01$; 95% CI, 12.72 to 14.52), respectively. The total time was also decreased; 80.67 seconds ($p < 0.01$; 95% CI, 10.33 to 13.03) for the second visit and 77.96 seconds ($p < 0.01$; 95% CI, 13.09 to 15.68) for the third visit. The documentation time between the second and third visits were not statistically different ($p = 0.522$).

Communication time was 48.51% when using the old OPD cards and significantly decreased to 30.23% ($p < 0.01$) for the first visit using the new OPD cards. It then significantly increased to 58.56% and 56.73% ($p < 0.01$) in the second and third visits, respectively.

Table 3. Mean time spent on each case (seconds).

Time (second)	OPD Visit			
	Before	First	Second	Third
Documentation	47.54	134.16	33.61	33.92
Communication	44.81 (48.51 %)	58.47 (30.23 %)	47.06 (58.56 %)	44.05 (56.73 %)
Total	92.35	192.63	80.67	77.96

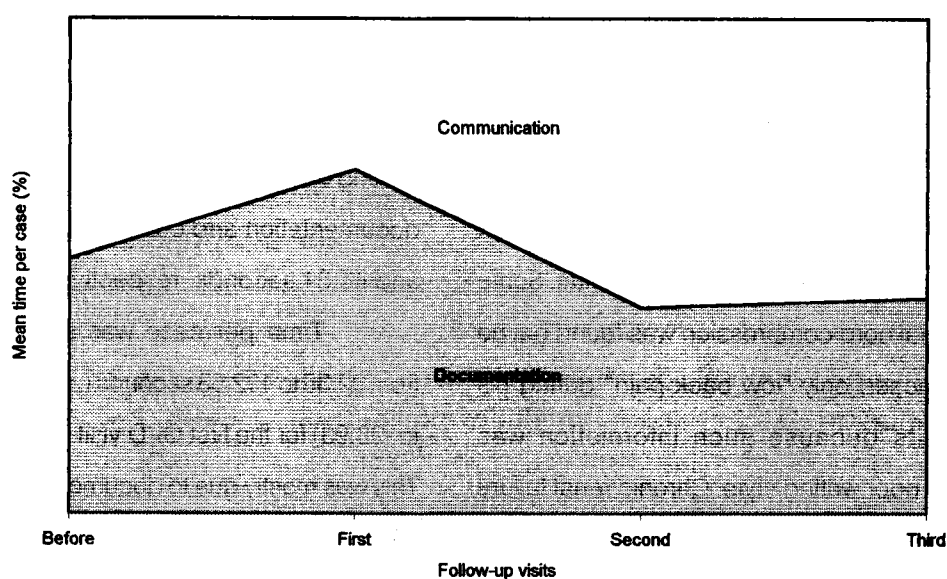


Figure 5. Time spent on each visits

Time spent on analyzing old OPD cards was added to documentation time of first visit, resulted in decreased communication time ratio. But after using new PMR, communication time was proportionally increased during second and third visits.

Discussion

PMR has been used for a long time to help physicians for many purposes; for example recalling patient information, comparing previous data and providing legal evidence. Despite its simplicity, many problems occur as a result of handwriting style, storage place and data integration. In addition, some information is especially important for legal reasons.⁽⁶⁾ As a result, more time is spent on documentation instead of patient communication.

Solomon DH, et al, found that patient satisfaction was more significantly associated with physician communication than documentation.⁽⁷⁾ In our quality improvement project, we had to solve previous data problems and increase patient satisfaction by the use of a small of budget and no additional staff training.

EMR was recently proposed as a tool for medical database management. However, it might not be suitable for some small-sized community hospitals because of both cost-effectiveness and the knowledge

of the medical personnel. There have also been a lot of technology-related problems such as data security^(3,5) and Y2K.⁽⁴⁾ There is also evidence showing the impact of hospital information system failure.⁽⁶⁾ In addition, no product can completely support every intra- and inter-organization system because of a lack of standardization.^(4,9,5,10) When data from each department in the hospital are different in their structure and coding system, this becomes one of the main problems for EMR.⁽¹⁰⁾ Privacy is still unable to be ensured at the present time.⁽¹¹⁾ In spite of these problems, it seems inevitable that EMR will eventually be integrated into the medical care system.

For this reason, we also have to think about the transition to use advanced technology in the future. By using the principle of data integration, we slightly transformed old PMR into the new standardized forms. The only investment made was to print those new OPD forms. Even though considerable time had to be spent during the transformation process, our study showed that this has to be done only once for each patient and documentation time was then significantly reduced in the following visits (Figure 5). Medical personnel easily adopted themselves to use this new form. Patients appreciated the increased communication time, and additional benefits such as the retrieval of missed information and the prevention of incorrect diagnosis were gained.

Conclusion

Many solutions have been proposed to solve data problems which occur in the medical care process. Each of them had different pros and cons for each institution. Our methods to solve problems and to improve the medical record system was

proposed considering the limitation of money which is a main concern for many hospitals in Thailand. The disadvantages were that a lot of time had to be spent during the transition period and doctor cooperation was very important. Nevertheless, our study has shown that many invaluable data could be retrieved and time spent in talking to the patient was proportionally increased. In addition, it will be easier to transform records into EMR in the future when budgets and staff knowledge are not such a concern.

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