

Implementation of Electronic Logbook for Trainees of General Surgery in Thailand

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Background: All trainees are required to keep a record of their surgical skill and experiences throughout the training period in a logbook format. Paper-based logbook has several limitations. Therefore, an electronic logbook was introduced to replace the paper-based logbook.

Material and Method: An electronic logbook program was developed in November 2005. This program was designed as web-based application based upon PHP scripts beneath Apache web server and MySQL database implementation. Only simplified and essential data, such as hospital number, diagnosis, surgical procedure, and pathological findings, etc. are recorded. The electronic logbook databases between Academic year 2006 and 2011 were analyzed.

Results: The annual recorded surgical procedures gradually increased from 41,214 procedures in 2006 to 66,643 procedures in 2011. Around one-third of all records were not verified by attending staffs, i.e. 27.59% (2006), 31.69% (2007), 18.06% (2008), 28.42% (2009), 30.18% (2010), and 31.41% (2011). On the Education year 2011, the three most common procedural groups included colon, rectum & anus group, appendix group, and vascular group, respectively.

Conclusion: Advantages of the electronic logbook included more efficient data access, increased ability to monitor trainees and trainers, and analysis of procedural varieties among the training institutes.

Keywords: Electronic logbook, General surgery, Surgical experience

J Med Assoc Thai 2013; 96 (1): 47-51

Full text. e-Journal: <http://jmat.mat.or.th>

Postgraduate training in General Surgery in Thailand follows a 4-year training program. All trainees are required to keep a record of their surgical skill and experiences throughout the training period in a logbook format. A minimum skill of 100 major operations is required to be eligible for board examination. The record logbook must be submitted to the Training and Examination Subcommittee for evaluation and approval.

During the first few years after implementation, trainees who were not willing to use this program, could record their operative experiences via paper logbook. At the same time, the electronic logbook was improving to meet the proper interface and database. The current version is 1.3.2 and has been active since April 8, 2012. All trainees are obliged to record their experiences only via electronic logbook since the Academic year 2009. The Training and Examination Subcommittee accepts only reports generated from the electronic logbook as official archive for board examination.

Teachers and supervisors in the training institutes can systematically review a trainee's progress of learning and experiences through assessment of the recorded data in the logbook. However, paper-based logbooks have several limitations, especially in data retrieval⁽¹⁾. Verification and analysis of data maintained in the paper form are tedious and time-consuming, and thus, the usefulness and value of the paper logbook become less satisfactory^(2,3).

The authors herein report the development and implementation of the first electronic logbook for trainees of General Surgery in Thailand. The electronic logbook avoids many pitfalls related to paper logbooks⁽⁴⁾. It is easy to back up, print for hardcopy archives, search for keywords, and generate reports in different aspects of data⁽⁵⁻⁷⁾.

Material and Method

An electronic logbook program was developed in November 2005 and its beta version was tested in March 2006 at Srinagarind Hospital, Khon Kaen University. This program was designed as web-based application based upon PHP scripts beneath Apache web server and MySQL database implementation. The final version (1.0) was started in June 2006, under the

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official website of Royal College of Surgeons of Thailand. All trainees were introduced to begin recording their operative experiences and academic activities via this program. Although some trainees continued to record their experiences in the paper-based logbook, they had to summarize and present the archive in the same report format as generated from electronic logbook program.

This program can be accessed easily via any web browser, such as Mozilla Firefox, Microsoft Internet Explorer, Google Chrome, and Opera to ensure that this program is accessible all around the country. Neither Java script nor Java is required to avoid slow online response. Most training institutes and affiliated hospitals are located in Bangkok and big cities where high-speed internet (around 1-10 MB/s) is available. However, some centers in the rural areas have to rely upon telephone line modem (56 KB/s). Only simplified and essential data, such as hospital number, diagnosis, surgical procedure, and pathological findings, etc. are recorded.

Users are divided into six categories: trainee, trainer, medical secretary, program director, subcommittee member, and hospital administrator. Trainee can fully access to create and edit his own data. However, each record has a set time limit; for example, trainee has to create new operative record within 90 days from the operative date, or trainee's record is locked to read only after trainer verified that record. Trainer has the privilege to fully access only the trainees' records that are his responsibility. However, he can view all records in his institute. Medical secretaries are allowed to read all records, and make reports for the program director. Program director has full privilege to manage all trainees' accounts in his own program site, and in certain cases to verify all trainees' records on behalf of the responsible trainers. Subcommittee member has the privilege to view the reports of data from every site. Administrator is authorized to manage all program functions except the database of each institution. User's right and privilege are controlled via submenu, which enables different functions among the six categories. In some specific conditions, program director can limit some users' accessibility to read only or any action involving the creating new record, editing, and deleting functions.

Besides operative experiences and academic activities, trainee is also informed his own examination results via this program, including MCQ, Radiological, and Pathological examinations. Trainer and program

director monitor each trainee's progression or operative experiences each month or rotation. Subcommittee members monitor each site activities, especially trainers' responsibility to monitor their own trainees.

Results

The authors analyzed the electronic logbook databases between Academic year 2006 and 2011 (June 1, 2006 to May 31, 2012). Trainees, who started on Academic year 2006, ended their training program in the Academic year 2009.

The annual recorded surgical procedures gradually increased from 41,214 procedures on 2006 to 66,643 procedures on 2011. These surgical procedures were recorded by 304 active trainees from 18 training institutes within the Academic year 2011. However, around one-third of all records were not verified by attending staffs, i.e. 27.59% (2006), 31.69% (2007), 18.06% (2008), 28.42% (2009), 30.18% (2010), and 31.41% (2011). Subcommittee of training and examination monitored the verification ratio of each institute monthly, e.g. verification ratios ranged from 15.74% to 100% at the ninth month of Education year 2011 (Fig. 1), or 13.88% to 100% at the tenth month of Education year 2011 (Fig. 2).

All surgical procedures were categorized into 16 groups, the appendix group had been the most common procedural group since the Education year 2006. However, the colon, rectum & anus group has been the most common procedural group since the Education year 2009. On the Education year 2011, the three most common procedural groups included colon,

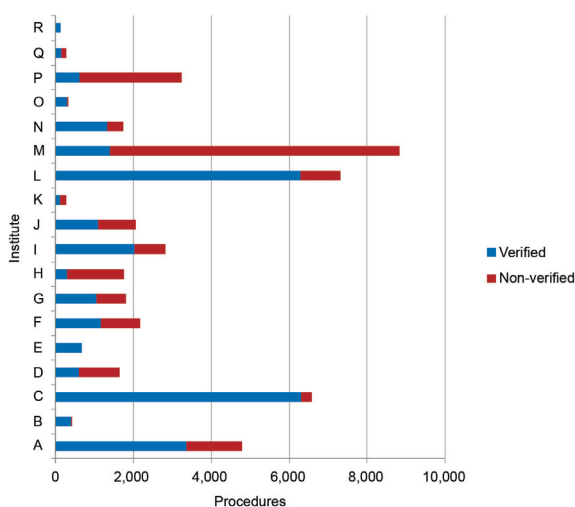


Fig. 1 Verified and non-verified records of each institute at the 9th month of education year 2010.

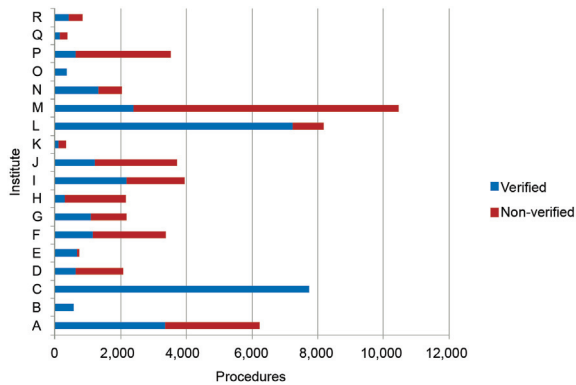


Fig. 2 Verified and non-verified records of each institute at the 10th month of education year 2010.

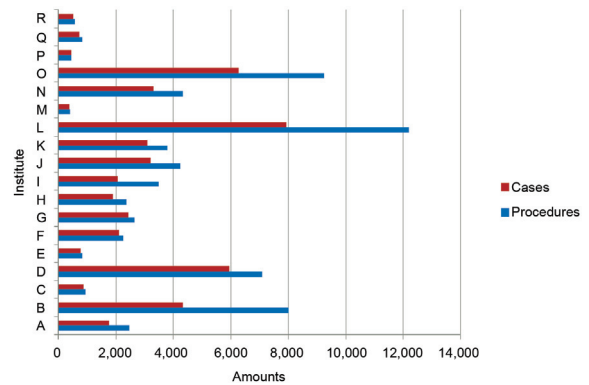


Fig. 4 Case VS Procedures in each institute of education year 2011.

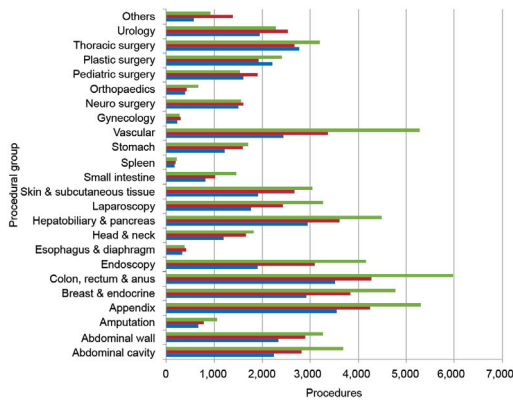


Fig. 3 Amount of 16 procedural groups on the education year 2006, 2008 and 2011.

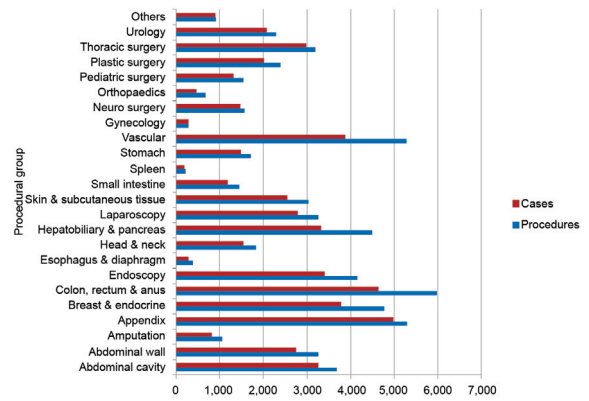


Fig. 5 Cases vs. procedures in each procedural group of education year 2011.

rectum & anus group, appendix group, and vascular group, respectively (Fig. 3).

Besides procedure-view, case-view also showed in different figure. Some institutes were higher ranks in procedure-view, but lower ranks in case-view (Fig. 4). Because of more trainees involving one sophisticated surgical procedure, the real cases of sophisticated surgical procedure may be less than the simple surgical procedure (Fig. 5).

Each institute had different distribution of procedural groups, e.g. Institute O had the largest amount of hepatobiliary & pancreas group while the amount of breast & endocrine group was only half of Institute L (Fig. 6).

Discussion

Advantages of the electronic logbook included more efficient data access, increased ability to monitor trainees and trainers, and analysis of

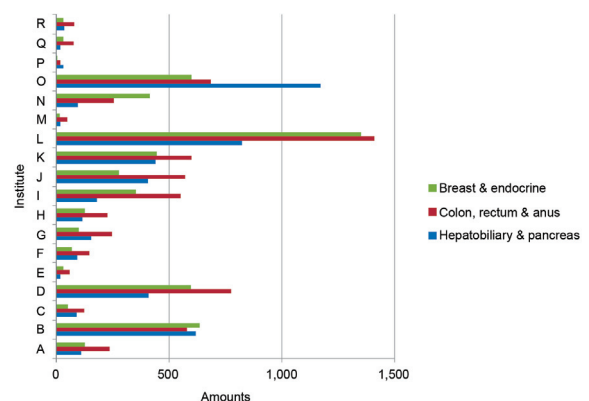


Fig. 6 Records of 3 major procedural groups among all institutes in the Academic year 2011.

procedural varieties among the training institutes⁽⁴⁾. Monthly monitoring by subcommittee showed that verification ratio of each institute varied. However,

some institutes maintained low verification ratio for several months, they would get the warning message from subcommittee. One of the responsibilities of each program director was facilitating his own staffs to verify their trainees' records, not only to ensure the completeness of records, but also to monitor each trainee's experiences. Although around one-third of all records were not verified during each year period, all missing records were finally verified prior to the beginning of the new Academic year. During oral examination, all trainees' experienced surgical procedures were reviewed, and then examiners would ask some questions about their experiences.

Some institutes had more than 4,000 procedures per year (large sized), 2,000 to 4,000 procedures per year (medium sized), and less than 2,000 procedures per year (small sized). In large sized institutes, the amount of trainers and trainees had more than the smaller institutes. The location of each institute was another factor affecting the trainee's experience; Bangkok-located institutes had narrower difference between the amount of surgical procedures and cases, which meant only one or two trainees, could join the surgical team in performing the sophisticated surgical procedure. The out-Bangkok-located institutes had fewer trainers, so their trainees had more chance to join the surgical team in performing the sophisticated surgical procedure, or performing the surgical procedures by themselves.

Each institute has different distribution of surgical procedures or case mix, so this database provides information for trainee who wants to gain experience of specific surgical procedure, to choose the appropriate institute during the elective period.

With the availability of the electronic logbook program, the Training and Examination Subcommittee can effectively fulfill the subcommittee's role of (1) monitoring trainee's academic progress, (2) monitoring trainer's supervision and responsibility, (3) evaluating academic activities provided and surgical service case mix available for training at each institute, and (4) summarizing the total experience of each trainee at the completion of the training period.

Conclusion

Electronic logbook has been developed to replace paper logbook for trainee of General Surgery in Thailand since 2005. This program was designed to collect only simplified and essential data. It is working

on Internet and accessible even on low-speed telephone line modem. Advantages of the electronic logbook include more efficient data access, increased ability to monitor trainees and trainers, and analysis of procedural varieties among training institutes.

Acknowledgements

The author would like to thank Dr. Vajarabhongsa Bhudhisawasdi and Dr. Thongdee Sripanich for their initiation of electronic logbook; Dr. Darin Losiriwat, Chairman of Training and Examination Subcommittee and other subcommittee members for their support.

Potential conflicts of interest

None.

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โปรแกรมบันทึกประสบการณ์ของแพทย์ประจำบ้านสาขาศัลยศาสตร์ทั่วไปในประเทศไทย

พจน์ชวิทย์ อภินิเวศ

ภูมิหลัง: ในระหว่างการฝึกอบรม แพทย์ประจำบ้านจำเป็นต้องบันทึกประสบการณ์การผ่าตัดตามเกณฑ์ที่กำหนดไว้ในหลักสูตร ซึ่งแต่เดิมการใช้สมุดบันทึกมีข้อจำกัดหลายประการ จึงมีการพัฒนาโปรแกรมบันทึกประสบการณ์เพื่อทดแทน

วัสดุและวิธีการ: การพัฒนาโปรแกรมบันทึกประสบการณ์เริ่มขึ้นในเดือนพฤศจิกายน พ.ศ. 2548 โดยอาศัยภาษา PHP ร่วมกับโปรแกรมฐานข้อมูล MySQL และใช้งานผ่านโปรแกรมท่องอินเทอร์เน็ต การบันทึกข้อมูลเน้นเฉพาะข้อมูลที่มีความสำคัญจำเป็นเท่านั้น เช่น หมายเลขประจำตัวผู้ป่วย การวินิจฉัย หัตถการผ่าตัด เป็นต้น

ผลการศึกษา: การศึกษานี้ทำการวิเคราะห์ข้อมูลที่บันทึกในช่วงปีการศึกษา พ.ศ. 2549 ถึง 2554 ในแต่ละปีมีจำนวนหัตถการที่ ถูกบันทึกเพิ่มขึ้นเรื่อยๆ จาก 41,214 หัตถการในปี พ.ศ. 2549 เป็น 66,643 หัตถการในปี พ.ศ. 2554 เป็นที่น่าเสียดายว่า ประมาณหนึ่งในสามของข้อมูลทั้งหมด ไม่ได้รับการรับรองความถูกต้องจากอาจารย์ผู้ควบคุมการผ่าตัด ได้แก่ ร้อยละ 27.59 ในปี พ.ศ. 2549 ร้อยละ 31.69 ในปี พ.ศ. 2550 ร้อยละ 18.06 ในปี พ.ศ. 2551 ร้อยละ 28.42 ในปี พ.ศ. 2552 ร้อยละ 30.18 ในปี พ.ศ. 2553 และร้อยละ 31.41 ในปี พ.ศ. 2554 สำหรับกลุ่มหัตถการที่พบบ่อยที่สุดสามอันดับแรกในปี พ.ศ. 2554 ได้แก่ กลุ่มลำไส้ใหญ่และทวารหนัก กลุ่มไส้ติ่ง และกลุ่มหลอดเลือด ตามลำดับ

สรุป: ประโยชน์ของโปรแกรมบันทึกประสบการณ์ที่เหนือกว่าสมุดบันทึกคือ ความสามารถในการตรวจสอบรายละเอียดของข้อมูล เพื่อประเมินพฤติกรรมของแพทย์ประจำบ้านและอาจารย์ รวมทั้งการวิเคราะห์ความหลากหลายของหัตถการที่แพทย์ประจำบ้าน ได้ทำในสถาบันฝึกอบรมแต่ละแห่งด้วย
