Diagnosis Summary and Coding of Obstetric Conditions in the Government Hospitals in Pattalung Province, The Effects of Audit and Feedback

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Objective: *Assess the effects of audit and feedback through a seminar on the obstetric summary and coding system with respect to the International Classification of Diseases, Tenth Revision (ICD-10) and to determine factors associated with the error of summary and coding audit.*
Material and Method: *The medical records of 1,629 and 1,337 women with obstetric conditions admitted to one provincial and nine district hospitals in Pattalung Province, Southern Thailand, were evaluated before and after a seminar, respectively.*
Result: *The error of coding audit among cases with normal conditions and those with abnormal conditions after the seminar was reduced significantly from 40.7 to 13.0% and from 81.8% to 61.2%, respectively ($p < 0.001$). A seminar was a significant factor to reduce the errors of summary and coding. In contrast, the incorrect diagnosis summary, abnormal obstetric conditions and the district hospital were significantly associated with the increase of the coding errors.*
Conclusion: *The audit and feedback was moderately effective on summary and coding audit but the clinical significance of error reduction in abnormal obstetric conditions was marginal, thus intensive intervention, evaluation, and monitoring are necessary.*

Keywords: *Summary audit, Coding audit, ICD-10, Obstetric, Audit and feedback, Southern Thailand*

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The International Classification of Diseases, Tenth Revision (ICD-10) has been used in Thailand since 1994 and modified into the Thai system in 2001 by the Bureau of Policy and Strategy Office of the Permanent Secretary, Ministry of Public Health, Thailand under the support of the World Health Organization. The guidelines for reporting the diagnosis summary include the principal diagnosis, comorbidity, complication, and other diagnosis[1]. Women suffering from conditions related to pregnancy, childbirth and puerperium are commonly admitted to hospital. The 2005 report of maternal health in Pattalung, a province in southern Thailand, by the Health Center 12 Yala noted 3 maternal deaths (maternal mortality ratio 53.5/100,000 live births), perinatal mortality rate of 7.8/1,000 total births, 7.6% of low birth weight and 32.3% of birth asphyxia[2]. According to this information, maternal mortality and morbidity are not uncommon. A correct summary of diagnosis and coding for obstetric conditions is essential to the hospital reporting system because it helps to identify the accurate magnitude of obstetric problems and to improve the quality of health services, health planning and policies, health care finances and research.

The coding audit was modified from the Australian Coding Benchmark and has been applied in Thailand since 1999[3]. It is one of the medical audits used for to improve the accuracy of coding and is divided into summary audits and coding audits. The summary audit is a method for evaluating the accuracy of diagnosis in the discharge summary by reviewing the contents of medical records. The coding audit is a

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method for evaluating the accuracy of diagnosis coding[4]. Reporting the diagnosis summary and coding accurately is a real challenge. Unintentional and intentional errors in such medical reports were identified[5]. Previous studies in Thailand showed problems in both the diagnosis summary and the coding system[6-10]. However, both summary and coding audits for obstetric conditions have not been studied and published.

A Cochrane review has systematically searched the randomized controlled trials regarding the effects of audit and feedback to the practices of health professionals. It has been concluded that the effectiveness of audit and feedback varied from mild to moderate for improving professional practices. The effects of audit and feedback are larger when the baseline error is high. The audit and feedback is defined as "any summary of clinical performance of health care over a specified period of time", given in a written, electronic or verbal format[11]. Therefore, the present study applied the concepts of audit and feedback to the coding audit. The aims of the present study were to assess the effects of audit and feedback on the obstetric summary and coding with reference to the International Classi-fication of Diseases, Tenth Revision (ICD-10), Thai Modifications, and to determine the factors associated with errors in the summary and coding audits.

Material and Method

The proposal of the present study was approved by the Institute Ethics Committee of Faculty of Medicine, Prince of Songkla University and then submitted to the Chief Medical Officer of Pattalung Provincial Health Office and the 10 Hospital Directors for permission. The audit and feedback through a seminar was a key tool in this experimental study comparing the results before and after seminar. The present study settings were all 10 government hospitals including nine district and a provincial hospitals in Pattalung province. The number of evaluated medical records of women admitted with obstetric conditions was stratified by the level of hospitals as provincial and district. The sample of medical records was calculated upon the proportion of baseline coding error in the preliminary analysis of 65%, the confidence level of 95%, the power of 80%, at least 20% of difference for improving coding error, and 35% of abnormal obstetric conditions of women admitted. Therefore, 523 medical records of all obstetric women admitted in the nine district hospitals and in a provincial hospital before and after the seminar were needed.

The medical records of women admitted due to obstetric conditions in the study hospitals between October and December 2004 were assessed for diagnosis summary and coding with regard to the International Classification of Diseases, Tenth Revision (ICD-10) using the national coding and medical record audit guidelines[4]. The assessment of summary and code audit ranging from code 0 to 9 is depicted in Table 1 and Table 2, respectively. The details of medical records included history, physical examination, laboratory tests, management and treatment, the diagnosis summary in the summary sheet, and the code of diagnosis summary were recorded in the data collection form. The authors of the present study reviewed those details and completed the reviewed diagnosis summaries using the criteria of standard coding guidelines[1]. Then the reviewed diagnosis summaries were coded by a medical coder, a summary and coding auditor in the national team, who worked as the auditor in the present study. The medical records were divided into two groups: one group of individuals with abnormal obstetric conditions and one group with no abnormality. Abnormal obstetric conditions were defined as all admitted pregnant women who did not deliver at admission, except false labor, those who delivered by vacuum extraction, forceps delivery or indicated cesarean section, those having breech presentation and all other complicated conditions. Normal obstetric conditions were false labor, normal delivery without any complications, previous or elective cesarean section without other complications, birth before admission, and vaginal birth after cesarean section without other complications. The reported and reviewed diagnosis summaries and codes were assessed comparatively.

The audit and feedback through a one-day seminar was conducted in September 2005 in order to disseminate and feedback the results of audit assessment. The formal letters from the Chief Medical Officer of Pattalung Provincial Health Office were sent to the Hospital Directors to invite the representatives of the doctors and the medical coders in the 10 studied Hospitals to participate in the seminar of audit and feedback. The contents of the seminar were the explanation of the present study, the results of the summary, the coding audit assessment, the common errors of summary and coding audit, the methods for reporting the diagnosis summary and coding, and the case exercises for the summary of diagnosis and coding. The representatives would then share the contents and concepts of this seminar with other doctors and the

Table 1. Guidelines for summary audit

Codes	Definition
0	No disagreement (the diagnosis in summary discharge is similar to the auditor assessment)
1	Ambiguous principal diagnosis (PDx) (the principal diagnoses (PDx) are more than one leading to principal diagnosis of doctor and auditor is different)
2	Incorrect PDx
3	Incorrect sequencing (the principal diagnosis is reported as the other diagnosis (SDx))
4	Incorrect additional diagnosis
5	Incorrect operation
6	Unjustified operation summary (surgery is concluded without evidence in the medical records)
7	Unclear terminology/documents
8	Inconsistent documents (information within the medical records is inconsistent or different leading to different auditing of diagnosis and operative report)
9	Other problems (the other problems result in the different diagnosis between doctor and auditor)

Table 2. Guidelines for code audit

Codes	Definition
0	No disagreement (the diagnosis code in summary discharge is similar to the auditor assessment)
1	Incorrect principal diagnosis (PDx) coding
2	Incorrect other diagnosis (SDx) coding
3	Unjustified additional code
4	Missing code
5	Incorrect PDx sequencing (the summary of principal and other diagnoses is correct but the coder makes the sequence incorrectly)
6	Incorrect operative code
7	Code disagreement due to summary disagreement
8	Justified modification of the code, sequence or additional code
9	Other error in coding

coders in their hospitals. The participants evaluated their own understanding of how to report the diagnosis summary, the ability to code, and the confidence of coding, before and after the seminar. They also evaluated the satisfaction and the benefit of this seminar for their future work. All items of evaluation were graded by visual analog scale from 1 (Not at all) to 10 (The most). In addition, the problems and suggestions could be noted freely by open-ended questions.

One month after the audit and feedback seminar, the medical records of women admitted to hospital owing to the obstetric conditions from October to December 2005 were re-evaluated for diagnosis summary and coding using the same methods, criteria of audit and auditor. The audit of diagnosis summary and coding in the group of abnormal and normal obstetric conditions before and after the seminar was grouped as either absence or presence of the error and described as the percentage of error. The scores of understanding on how to report the diagnosis summary, the ability and the confidence on coding before and after the seminar were analyzed by pair-t test. The scores of satisfaction and the benefit of this seminar to their future work were described by mean and standard variation. The effect of audit and feedback through a seminar on the changes of error by summary and coding audit - compared before and after - was analyzed by univariate analysis and adjusted by the factors related to summary and coding audit using multiple logistic regression. The effect on summary audit was adjusted by the obstetric conditions and types of hospital. The effect on coding audit was adjusted by summary audit, obstetric conditions, and types of hospital. The significant level was a p-value of 0.05.

Results

Before the seminar, the medical records of 1,629 women (893 in a provincial hospital and 736 in

the district hospitals) were assessed for diagnosis summary and coding, using the national guidelines for coding and medical records audits. Among women with normal obstetric conditions (430 in a provincial hospital and 465 in the district hospitals), the errors by the summary audit were 3.7% in the provincial hospital and 1.1% in the district hospitals. The most common cause of error in the provincial hospital was incorrect principal diagnosis due to non-specific principal diagnosis but there was an incorrect additional diagnosis due to not completely reporting of other diagnosis in district hospitals. In contrast, the errors among women with abnormal obstetric conditions (463 in a provincial hospital and 271 in the district hospitals) were 67.8% and 61.6%, respectively. The most common error of diagnosis summary detected was incorrect principal diagnosis due to non-specific principal diagnosis. For coding audits among women with normal obstetric conditions, the errors were 15.4% in the provincial hospital due to incorrect principal diagnosis as the most common error and 64.1% in the district hospitals due to missing code as an incomplete code even if the diagnoses were reported. Among abnormal obstetric conditions, the errors of coding audit were 89.0% and 69.4%, respectively. The most common error was incorrect principal diagnosis.

In the seminar for audit and feedback, 18 participants from nine hospitals including an obstetrician, four general practitioners, and four nurses who worked with the diagnosis summary plus three nurses and six medical coders worked with the diagnosis coding system. All participants, had worked in the study hospitals for at least 1 year (ranged 18-96 months), except for one medical coder who had worked for 6 months. Their previous experience on how to code ICD-10 of diagnosis was self-evaluated and revealed that four of them (doctors) did not know how to undertake it, four knew a little, eight knew some, and two knew it well.

The mean scores of their understanding on how to report the diagnosis summary was 4.8 ± 0.4 before the seminar and 7.6 ± 0.2 after the seminar; the ability to code was 3.9 ± 0.6 before and 6.6 ± 0.5 after the seminar and the confidence of coding was 4.0 ± 0.6 before and 6.6 ± 0.5 after the seminar. Their self-evaluations showed significant positive effect of a seminar ($p < 0.001$). They were satisfied (mean $\pm$ SD = 8.2 ± 1.2) and thought that this seminar was useful to their future work (mean $\pm$ SD = 8.7 ± 1.1). Approximately half of them reported the following problems in the coding procedure such as lack of specification; incomplete and incorrect diagnosis summary; incomplete information in the medical records for coding; use of non-standard abbreviations in the diagnosis summary; inability to find ICD-10 code for diagnosis by doctors and poor handwriting. Half of them suggested that a seminar like this was good and should be performed annually or arranged at the regional or national level. In addition, they noted that all hospitals have to code correctly because of the costs involved, and that the doctors must attend this seminar because the diagnosis is very important to ICD-10 coding. One participant suggested that the length of the seminar should be extended.

After the seminar, the medical records of 1,337 women (584 in a provincial hospital and 753 in 9 district hospitals) were re-assessed. Among women with normal obstetric conditions (265 in a provincial hospital and 427 in 9 district hospitals), the errors by the summary audit were 2.6% in the provincial hospital with incorrect principal diagnosis due to non-specific principal diagnosis as the most common cause and 1.6% in the district hospitals with incorrect principal diagnosis. In contrast, the errors among women with abnormal obstetric conditions (319 in a provincial hospital and 326 in 9 district hospitals) were 71.5% and 40.8%, respectively. The most common error detected in the diagnosis summary was incorrect principal diagnosis due to non-specific principal diagnosis. In the coding audit of women with normal obstetric conditions, the errors were 15.8% in the provincial hospital and 11.2% in the district hospitals. The most common error in the provincial hospital was incorrect principal diagnosis but unjustified additional code of other diagnosis by the coder in the district hospitals. In abnormal obstetric conditions, the errors of coding audit were 71.2% and 51.5%, respectively with incorrect principal diagnosis as the most common cause.

The changes of summary and coding audit in relation to the obstetric conditions and the seminar are shown in Fig. 1 and 2. There was no significant change of summary audits after the seminar among normal obstetric conditions, but there was a significant change among abnormal obstetric conditions ($p < 0.001$). The error in coding audits in both normal and abnormal obstetric conditions was reduced significantly ($p < 0.001$). Table 3 shows the factors associated with the errors of summary and coding audits by multiple logistic regression. The effect of audit and feedback on the change of summary audit was not found by univariate analysis ($p = 0.1$) but it showed a significance ($p = 0.008$) after being adjusted by the obstetric conditions and types of hospital as in Table 3. Abnor-

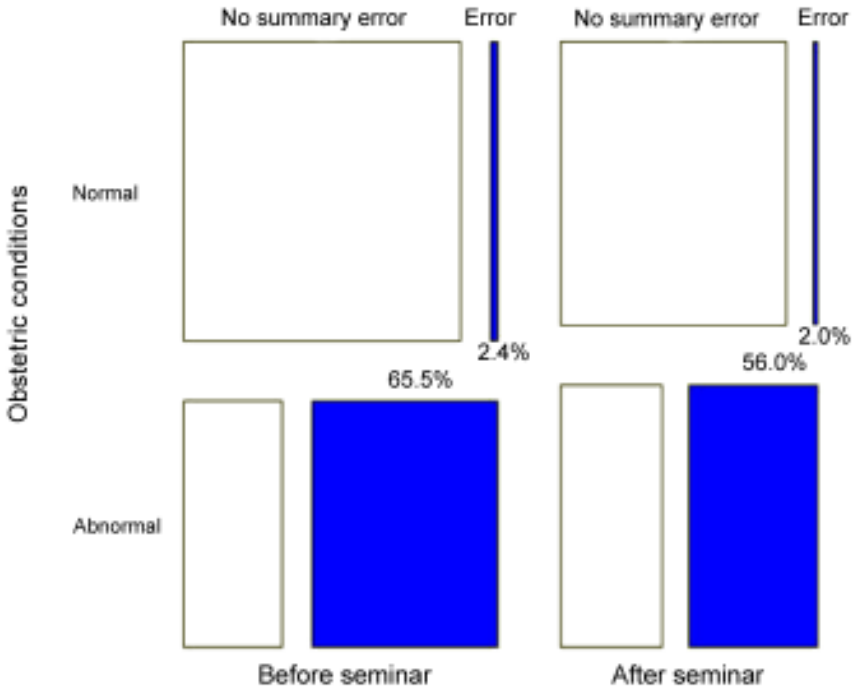

Fig. 1 Summary audit based on the obstetric conditions and seminar

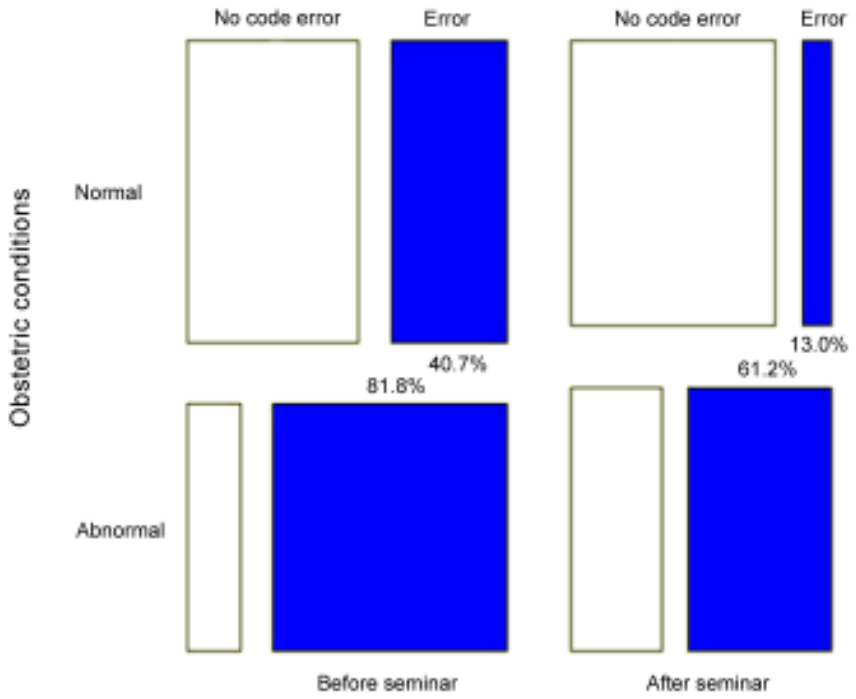

Fig. 2 Coding audit based on the obstetric conditions and seminar

Table 3. Factors associated with the errors of summary and coding audit by multiple logistic regression

Factors	OR (95%CI)	p-value
Summary audit		
Obstetric conditions		<0.001
Normal	1	
Abnormal	70.51 (49.44-100.56)	
Type of hospitals		<0.001
Provincial	1	
District	0.46 (0.37-0.57)	
Seminar		0.008
Before	1	
After	0.75 (0.6-0.93)	
Coding audit		
Summary audit		<0.001
No error	1	
Error	8.09 (6.21-10.54)	
Obstetric conditions		<0.001
Normal	1	
Abnormal	3.24 (2.62-4.00)	
Type of hospitals		<0.001
Provincial	1	
District	1.73 (1.44-2.08)	
Seminar		<0.001
Before	1	
After	0.25 (0.20-0.30)	

mal obstetric conditions increased the risk of errors both in summary and coding audit. The error of summary audits was highly associated with the increase of errors in the coding audit. The factor of district hospital increased the risk of coding error compared to provincial hospitals when it was adjusted by obstetric conditions and error of summary audits.

Discussion

The errors of diagnosis summary and coding by the standard coding guidelines and the coding and medical record audit guidelines were significantly improved by audit and feedback through a seminar. However, the rate of errors was still high in cases with abnormal obstetric conditions mostly due to non-specific principal diagnosis of the summary and incorrect coding of principal diagnosis.

The report on the accuracy of summary and coding varied according to the methods of the study, the groups of evaluated diseases and the criteria used. A cross-sectional study using 112 pediatric medical records was conducted in Pattani Hospital, southern Thailand[9]. The criteria of evaluation included the severity of errors which was divided into mild (unjustified or missing code), moderate (incorrect other diagnosis) and severe (incorrect principal diagnosis). The rate of error was 66.1% rating as mild 25%, moderate 36.9%, and severe 38.1%. The coding errors were found in 78.8% in 1999 and 84.6% in 2000. The most common cause of error was code disagreement due to summary disagreement. These high rates of coding errors supported the findings of the present study.

The situation of medical coding practice in Thailand using a questionnaire was surveyed in 2001 and reported that health personnel who work on coding in the hospitals are medical coders or nurses. Eighty-five percent of coding personnel were trained[8]. However, the present study found that only training was not enough because the errors of obstetric summary and coding were high when the audit was evaluated before our seminar. As a result, interventions that more effective are needed to improve the quality of summary and coding.

The audit and feedback was chosen to be a model for intervention in the present study since it proved for improving professional practice[11]. The authors used a seminar, one of audit practices[12], as a method for sharing the results of audit and feedback with health professionals who work in the field of diagnosis summary and coding. Moreover, the interactive educational process including the practice of case exercises and discussion was additionally applied[13]. The present study confirmed that a seminar of audit and feedback significantly reduced the rate of errors both in summary and coding audits in multiple logistic regression. The reduction of the errors in abnormal obstetric conditions was statistically significant but the clinical significance was questionable because it remained high. This might be because the diagnosis summary and coding among the cases with abnormal obstetric conditions is complex thus the organizing seminar for audit and feedback undertaken only once was insufficient to reduce the errors effectively. Due to a high rate of errors of coding among normal obstetric conditions before seminar (64.1%) in the district hospitals, there was also a high change in error reduction (11.2%). This result was supported by a result of systematic review showing that the effects of audit and feedback are larger when the compliance of correct practice is low[11].

As the result of complexity for summary diagnosis and coding in abnormal obstetric conditions, it strongly influenced the error of both summary and coding of diagnosis. The findings of the present study

supported that abnormal obstetric conditions and the accuracy of diagnosis summary were essentially important to the accuracy of coding. Doctors who summarize the diagnosis in the summary discharge in the medical records are very crucial for this audit. The diagnosis of obstetric cases in district hospitals was less complicated than in provincial hospital; therefore, the error of summary audit was also less. In contrast, the error of coding audit after adjustment showed that the medical coders in the district hospital are needed to be better trained with respect to the principle of coding guidelines.

In the present study, the error of diagnosis summary in normal obstetric conditions was low and the most common errors were the non-specified labor status of previous cesarean section at admission, reporting of perineal tear without the evidence in the medical records and false labor after 37 weeks but premature contraction reported. In contrast, the error of diagnosis summary in abnormal obstetric conditions remained greater than half. The common causes of this error were the lack of specification between maternal care or obstructed labor in connection to fetopelvic disproportion or breech presentation, and no reporting on the nature of the complicated conditions of abortion and the non-specified conditions of fetal distress.

The most common error of coding was incorrect principal diagnosis. For example, the principal diagnosis of previous cesarean section should be coded as maternal care due to uterine scar from previous surgery (O34.2) but it was mistakenly coded as the delivery by elective caesarean section (O82.0) or the delivery by emergency caesarean section (O82.1). For preterm labor, there was no specified code and the medical coder suggested using O47 the same as the false labor code but it was coded as the hypertonic, uncoordinated and prolonged uterine contractions (O62.4) or the other abnormalities of forces of labor (O62.8).

The present study had some limitations. Firstly, the audit and feedback through a seminar was launched only once and conducted at Pattalung Provincial Health Office, not directly at each hospital. Secondly, although the authors invited the representatives from all the studied hospitals, some participants from one district hospital missed the seminar because the doctor and coder were not available on the day of seminar. When the separate analysis of this hospital was explored, the number of medical records from this hospital was approximately 10% of overall samples among district hospitals and there was no effect on the results of associated factors. Finally, the distribution of the results and knowledge from the audit and feedback seminar by the representatives to other related health professionals in each hospital was uncontrolled and not evaluated.

If health professionals are actively involved and have formal responsibilities for implementing change, the effects of audit and feedback would be larger[11]. Therefore, the present study emphasizes the importance of having health professionals working directly on diagnosis summary and coding. They positively evaluated the process of audit and feedback on how to report the diagnosis summary, how to code, the confidence to code, satisfaction and the benefit of this seminar. They also discussed their problems on coding, which supported the authors' results of the present study. In conclusion, the audit and feedback was moderately effective on summary and coding audits but the clinical significance of error reduction in abnormal obstetric conditions was marginal, thus intensive intervention as well as evaluation and monitoring are necessary.

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ผลของการนำเสนอข้อมูลแบบสะท้อนกลับต่อการสรุปการวินิจฉัยและการลงรหัสโรคทางสูติกรรมของโรงพยาบาลรัฐบาลในจังหวัดพัทลุง

วรพิณ วิทยวราวัฒน์, ทิพวรรณ เลียบสื่อตระกูล, สาธนา ทัศศรี

การศึกษาเชิงทดลองนี้มีวัตถุประสงค์เพื่อประเมินผลของการนำเสนอข้อมูลแบบสะท้อนกลับต่อการสรุปการวินิจฉัยและการลงรหัสโรคทางสูติกรรมตามบัญชีจำแนกโรคระหว่างประเทศฉบับที่ 10 โดยใช้เกณฑ์การประเมินสรุปการวินิจฉัยและการลงรหัสโรคของประเทศ และหาปัจจัยที่มีผลต่อความคลาดเคลื่อนของการสรุปการวินิจฉัย และการลงรหัสโรค ซึ่งประเมินจากแฟ้มเวชระเบียนของหญิงจำนวน 1,629 และ 1,337 คนที่เข้ารับการรักษาด้วยภาวะทางสูติกรรมในโรงพยาบาลอำเภอจำนวน 9 โรงพยาบาลและโรงพยาบาลประจำจังหวัดในจังหวัดพัทลุง ภาคใต้ของประเทศไทยโดยเปรียบเทียบก่อนและหลังการนำเสนอข้อมูลสะท้อนกลับผ่านทางการสัมมนา ความคลาดเคลื่อนของการลงรหัสโรคในรายที่ไม่มีความผิดปกติลดลงอย่างมีนัยสำคัญหลังการนำเสนอข้อมูลสะท้อนกลับจากร้อยละ 40.7 เป็นร้อยละ 13.0 ส่วนในรายที่มีความผิดปกติพบลดลงจากร้อยละ 81.8 เป็นร้อยละ 61.2 ($p < 0.001$) การนำเสนอข้อมูลสะท้อนกลับผ่านการสัมมนาเป็นปัจจัยสำคัญทำให้ความคลาดเคลื่อนลดลง และปัจจัยอื่น ๆ ที่ทำให้ความคลาดเคลื่อนในการลงรหัสโรคเพิ่มขึ้น ได้แก่ ความคลาดเคลื่อนในการสรุปผลการวินิจฉัยของแพทย์ รายที่วินิจฉัยว่ามีความผิดปกติทางสูติกรรม และโรงพยาบาลชุมชน