CHAPTER 4

RESULTS AND DISCUSSION

DSM is the set of practices aimed at ensuring the timely availability and appropriate use of safe, effective, quality drugs, and services in all health care settings. DSM practicing is essential to be assessed at the community hospitals to present the DSM performance. Selection of the QIs which related to 10 key issues of DSM was attempted to present the performance of DSM. From the literature reviews, many studies presented various QIs for using in the current time but, unfortunately, they did not cover 10 key issues of DSM. Thus, there is clear need for researching in selection of QIs related on the 10 key issues. This is a preliminary research which is relevant to the DSM at the community hospitals.

In this chapter, the finding about QIs following DSM from international organizations and organizations in Thailand by using direct search were explored and reported in part 1. The potential of QIs for assessing the DSM performance were analyzed and presented in part 2. A set of potential QIs was tested in community hospitals and was reported in part 3.

Part 1: Gathering of QIs related to 10 key issues of DSM

A systemic review was used to identify QIs following ten key issues of DSM. Study period for searching the QIs related on DSM was from January 2010 to August 2011. This review was explored in three steps. Our search of QIs based on the functions of DSM. The purposes of each key issue essentially present the DSM operation, therefore, the QIs could measured the most important activities in each key issue that represent the DSM performance. Therefore, the purposes of each key issue were defined from the functions of DSM operation to make sure that the collected QIs will match the key issues. The purposes of ten key issues were presented in Table 4.1.

Table 4.1 The purposes of 10 key issues related to DSM

10 Key issues	Purposes
Policy and regulation	To effectively measure the guideline of policies and regulations related to DSM.
Financing and budgeting	To measure the participation in allocating of the financing and budgeting with equity, accountability, cost effectiveness, and self-reliance and to measure the appropriateness and worthiness of drug expenditure.
Knowledge management	To measure the development and support of knowledge to the medical professions in the same direction and consistency with the current situation
Human resource	To measure the role of pharmacy and therapeutic committees (PTCs) in management of the drug system at the community hospitals continuously.
Drug selection	To measure the use of drug items according to patterns of drug use and standard treatment guidelines.
Drug procurement	To measure the procurement of drugs which good quality and sufficient supplying for saving of drug expenditure.
Drug storage and distribution	To measure the administration on quality and quantity of drugs distributed in drug system, and drugs should be safe from robbery and not cause any public hazard.
Drug use	To measure the use of generic name, promotion of rational use of drugs, and development of drug surveillance system for patients safety.
Accessibility of drugs	To measure the equity of drug accessibility of population in health insurance system following universal coverage scheme, social security scheme, and civil servant medical benefit scheme.
Rational use of drugs (RUDs)	To measure the results of the RUD patterns with a focus on drug knowledge of patients and patient safety.

A systemically review was conducted and QIs were gathered from literatures and websites. QIs were directly gathered according to ten key issues from various datasources. (1) International organizations: WHO and partnerships, i.e. MSH, EU-Med-Stat, OECD, INRUD, PAHO, PING (UK), NHS (UK), HCFA (USA), Qualidigm (USA), Department of Health and Age Care (Australia), the NSW TAG, NPS (Australia), CIHI (Canada) and Health Canada. (2) Organizations in Thailand: MOPH, DMSIC, Bureau of Inspection & Evaluation, The Healthcare Accreditation Institute (HA), NHSO, PSyRIC, and Thai Drug Watch.

From direct search, the key issues which had QIs purposed by various organizations were as follows: 10 key issues from WHO, 7 key issues from MSH and PAHO, 3 key issues from INRUD, 2 key issues from EU-Med-Stat, and OECD, 1 key issue from PING and NHS, 2 key issues from HCFA, 2 key issues from Qualidigm, 2 key issues from Department of Health Age Care, 2 key issues from the NSW TAG, 1 key issues from NPH, 1 key issues from CIHI, 2 key issues from Health Canada, 6 key issues from MOPH of Thailand, 5 key issues from DMSIC and Bureau of Inspection and Evaluation, 2 key issues from HA institution, NHSO, PSyRIC, and 2 key issues from Thai Drug Watch. From the data, it was found that most of organizations interested in the drug use issue and only WHO had all QIs covering of the ten key issues. (Table 4.2)

All QIs recommended from various organizations were gathered and categorized by the researcher following the ten key issues of DSM. As the results, a total of 253 QIs were collected including 18 QIs of policy and regulation (7.1%), 14 QIs of financing and budgeting (5.5%), 16 QIs of knowledge management (6.3%), 20 QIs of human resource (7.9%), 21 QIs of drug selection (8.3%), 40 QIs of drug procurement (15.8%), 33 QIs of drug storage and distribution (13.0%), 83 QIs of drug use (32.8%), 4 QIs of accessibility of drugs (1.6%), and 4 QIs of RUDs (1.6%) (Table 4.3).

The collected QIs, then, were verified by three reviewers to examine the appropriateness and correctness of each QI according to the purposes of 10 key issues. The repeated or similar QIs were also identified and subsequently, excluded. As the results, 52 QIs were excluded and the remained 201 QIs were explored and concluded covering 10 key issues of DSM as follows: 15 QIs of policy and regulation (7.5%),

Table 4.2 Key issues and datasources of QIs

Organizations / **Key issues**	**Policy & regulation**	**Financing & budgeting**	**Knowledge management**	**Human resource**	**Drug selection**	**Drug procurement**	**Drug storage & distribution**	**Drug use**	**Accessibility of drugs**	**RUDs**
International organizations										
WHO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MSH	✓	✓	✓	-	✓	✓	✓	✓	-	-
PAHO	✓	✓	✓	-	✓	✓	✓	✓	-	-
INRUD	-	-	-	-	-	-	-	✓	✓	✓
EU-MED-STAT	-	✓	-	-	-	-	-	✓	-	-
OECD	-	-	-	-	-	-	-	✓	-	-
PING (UK)	-	-	-	-	-	-	-	✓	-	-
HCFA (USA)	-	-	-	-	✓	-	-	✓	-	-
Qualidigm (USA)	-	-	✓	-	-	-	-	✓	-	-
Department of Health and Age Care (Australia)	-	✓	-	-	-	-	-	✓	-	-
The NSW TAG (Australia)	-	-	-	✓	-	-	-	✓	-	-
NPS (Australia)	-	-	-	-	-	-	-	✓	-	-
CIHI (Canada)	-	-	-	-	-	-	-	✓	-	-
Health canada	-	-	✓	-	-	-	-	✓	-	-
Organization in Thailand										
MOPH	✓	-	-	✓	✓	✓	✓	✓	-	-
DMSIC	✓	-	-	✓	✓	✓	✓	-	-	-
Bureau of Inspection & Evaluation	✓	-	-	✓	✓	✓	✓	-	-	-
HA	-	-	-	-	-	-	-	✓	-	✓
NHSO	-	-	-	-	-	-	-	✓	-	✓
PSyRIC	-	-	-	-	-	-	-	✓	-	✓
Thai Drug Watch	-	-	-	-	-	-	-	-	✓	✓

9 QIs of budgeting and financing (4.5%), 14 QIs of knowledge management (7.0%), 19 QIs of human resource (9.5%), 15 QIs of drug selection (7.5%), 25 QIs of drug procurement (12.4%), 24 QIs of drug storage and distribution (11.9%), 75 QIs of drug use (37.3%), 3 QIs of accessibility of drugs (1.5%), and 2 QIs of RUDs (1.0%) (Table 4.3). The detail of each QI is presented in Table 4.4.

Table 4.3 Number and percentage of QIs classified following 10 key issues of DSM

10 Key issues of DSM	Gathered QIs		Repeated QIs		Selected QIs	
	No. of QIs	%	No. of QIs	%	No. of QIs	%
Policy and regulation	18	7.1	3	5.8	15	7.5
Financing and budgeting	14	5.5	5	9.6	9	4.5
Knowledge management	16	6.3	2	3.8	14	7.0
Human resource	20	7.9	1	1.9	19	9.5
Drug selection	21	8.3	6	11.5	15	7.5
Drug procurement	40	15.8	15	28.8	25	12.4
Drug storage and distribution	33	13.0	9	17.3	24	11.9
Drug use	83	32.8	8	15.4	75	37.3
Accessibility	4	1.6	1	1.9	3	1.5
Rational use of drugs	4	1.6	2	3.8	2	1.0
Total	**253**	**100**	**52**	**100**	**201**	**100**

All selected QIs were verified following the Logic model. The data was shown in Table 4.5. (1) Resource component (qualitative) consisted of 4 key issues: 15 QIs of policy and regulation, 9 QIs of budgeting and financing, 14 QIs of knowledge management, and 19 QIs of human resource. (2) Activity component (qualitative) consisted of 4 key issues: 11 QIs of drug selection, 18 QIs of drug procurement, 18 QIs of drug storage and distribution, and 12 of QIs drug use. (3) Output component (quantitative) consisted of 4 key issues: 4 QIs of drug selection, 7 QIs of drug procurement, 6 QIs of drug storage and distribution, and 63 QIs of drug use. (4) Output component (quantitative) consisted of 2 key issues: 3 QIs of accessibility of drugs and 2 QIs of RUDs. 201 QIs were presented following ten key issues of DSM and four components of Logic model to develop and create the first questionnaire.

Table 4.4 201 QIs related to the 10 key issues of DSM

Code	QIs of resource component	References
	Policy and regulation (15 QIs)	
RE1	Is there any implementation of the national drug policy 2011 in developing of the DSM at the community hospitals?	(PAHO, 1995)
RE2	Is there any implementation of the drug safety policy in developing of the DSM at the community hospitals?	(HA Institute, 2011)
RE3	Is there any implementation of the patient drug safety policy 2007-2008 in developing the DSM at the community hospitals?	(HA Institute, 2011)
RE4	Is there any implementation of the criterion for quality use of drugs in developing of the DSM at the community hospitals?	(NHSO, 2011)
RE5	Is there any implementation of the ASU policy in developing of the DSM at the community hospitals?	(NHSO, 2011)
RE6	Is the hospital formulary updated every year?	(MSH, 1994; 2012; Office of the Permanent Secretary, 1999; HCFA, 2001)
RE7	Do the health personnel practice following the regulation of DSM?	(PAHO, 1995)
RE8	Are drugs purchased by generic name according to NLED criteria?	(WHO, 1994; 2012; Office of the Permanent Secretary, 1999)
RE9	Are drugs produced by GPO purchased at the price not more than 3% of the median drug price?	(Office of the Permanent Secretary, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of resource component	References
RE10	For drugs which were not produced by GPO but GPO have them for sale, are they purchased, by offering price or bidding price or price bargaining or special method, at the price not more than the median drug price?	(Office of the Permanent Secretary, 1999)
RE11	Are the NLED and the median drug price circulated or distributed throughout the hospitals?	(Office of the Permanent Secretary, 1999)
RE12	Are drugs in the NLED, produced by GPO or GPO have them for sale, circulated or distributed throughout the hospitals?	(Office of the Permanent Secretary, 1999)
RE13	Are PTCs stipulated formally?	(MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999; TAG,1998)
RE14	Is a drug purchasing plan provided annually?	(Office of the Permanent Secretary,1999)
RE15	Is the quality of purchased drugs verified by using certificate of analysis (COA) from agencies approved by MOPH?	(Office of the Permanent Secretary,1999)
	Financing and budgeting (9 QIs)	
RE16	Is there an increasing trend of drug budget?	(MSH 1994; 2012; PAHO, 1995; WHO, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of resource component	References
RE17	Is the budget allocated adequately compared with the drug expenditure per capita per year?	(MSH 1994; 2012; WHO, 1999)
RE18	In the last three years, is the budget per capita allocated by NHSO increased?	(MSH 1994; 2012; WHO, 1999)
RE19	Are there other financing systems in addition to the public drug budget?	(MSH 1994; 2012; WHO, 1999)
RE20	Is there a system for monitoring drug prices?	(MSH 1994; 2012; WHO, 1999)
RE21	Do the community hospitals have medical treatment compensation system?	(PAHO, 1995)
RE22	Is there any participation in allocating budget received from NHSO at the provincial level?	(Office of the Permanent Secretary, 1999)
RE23	Does the current ratio of hospital have a good liquidity?	(Bureau of Inspection and Evaluation, 2010)
RE24	Does the quick ratio of hospital have a good liquidity?	(Bureau of Inspection and Evaluation, 2010)
	Knowledge management (14 QIs)	
RE25	Is there a drug information center (DIC)?	(MSH 1994; 2012; WHO, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of resource component	References
RE26	Does the DIC regularly provide information on drugs to prescribers and dispensers?	(MSH 1994, 2012; WHO, 1999)
RE27	Does the DIC inform unbias and update information for administrators, providers, and people?	(PAHO,1995; Health Canada, 2000)
RE28	Are the DSM information of hospitals reported to the DMSIC of MOPH every three months?	(Office of the Permanent Secretary,1999)
RE29	Are the pharmaceutical data collected electronically?	(Qualidigm, 2000)
RE30	Are the data collected regularly?	(Qualidigm, 2000)
RE31	Is the pharmaceutical database retrieved for beneficial aspects together with other databases?	(Qualidigm, 2000)
RE32	Are the patient data collected electronically?	(Qualidigm, 2000)
RE33	Are the drug prescribed data of each patient collected as electronic databases?	(Qualidigm, 2000; Health Canada, 2000)
RE34	Are there data of physicians and prescribers collected in the database?	(Qualidigm, 2000; Health Canada, 2000)
RE35	Are there data of prescribing time of physicians collected in the databases?	(Qualidigm, 2000; Health Canada, 2000)
RE36	Are there data of patient compliance collected in the databases?	(Qualidigm, 2000)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of resource component	References
	Human resource (19 QIs)	
RE37	Is there satisfaction assessment of pharmaceutical services?	(Qualidigm, 2000; Health Canada, 2000)
RE38	Is the result of satisfaction assessment of pharmaceutical services more than 80 percents?	(Qualidigm, 2000)
RE39	Do the PTCs operate following its mission stated in operation plan?	(TAG,1998)
RE40	Do the PTCs have authority to make decision on the availability and use of drugs in the hospital?	(TAG,1998)
RE41	Are there at least 3 times per year of PTCs meeting?	(TAG,1998; MOPH, 1999)
RE42	Does the number of PTC members attend each meeting more than 50 percent?	(TAG,1998)
RE43	Is there budget for supporting of PTCs operation?	(TAG,1998)
RE44	Are there any representatives from PTCs participate as consultants for helping in decision making?	(TAG,1998)
RE45	Are the PTCs decisions evaluated by peer review?	(TAG,1998)
RE46	Do the PTCs have a formal compliant-receiving system?	(TAG,1998)
RE47	Are there data of academic evidence for using in PTC operation such as drug selection and drug procurement, which were undoubtedly exposed to relevant personnels?	(TAG,1998)
RE48	Is there any system for consideration of requests of using NED?	(TAG,1998)
RE49	Is there any monitoring process of relevant effects of biased forced-prescribing?	(TAG,1998)
RE50	Is there drug policy endorsed and promulgated by the PTC?	(TAG,1998)
RE51	Is there control policy for drug promotion of medical representatives of the pharmaceutical companies?	(TAG,1998)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of resource component	References
RE52	Do the PTCs encourage and monitor policy of patient discharging with continuous treatment?	(TAG,1998)
RE53	Is there any control of drug used in treatment with unregistered indications?	(TAG,1998)
RE54	Do the PTCs have an annual plan for educational activities?	(TAG,1998)
RE55	Do the PTCs support or participate in education activities together with giving information or data of investigation of drug use?	(TAG,1998)
RE56	Do the PTCs receive feedback from media or consumer groups?	(TAG,1998)
RE57	Do the PTCs receive supports for education and training for developing operation role?	(TAG,1998)
	Drug selection (11 QIs)	
AC1	Is the GN of drugs used in the hospital formulary?	(MSH, 1994; 2012; WHO, 1999)
AC2	Is there an official committee to update the hospital formulary?	(MSH, 1994; 2012; WHO, 1999)
AC3	Is the hospital formulary updated and implemented?	(MSH, 1994; 2012; WHO, 1999; HCFA, 2001)
AC4	Do drugs donated comply with the NLED?	(MSH, 1994; 2012; WHO, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of activity component	References
AC5	Is there the official manual base on the NLED which providing basic drug information to prescribers?	(PAHO, 1995; HCFA, 2001)
AC6	Is there the use of hospital formulary and STGs for basic and in-service training of health personnel?	(MSH, 1994; 2012)
AC7	Does a hospital formulary have basic drug information?	(MSH, 1994; 2012)
AC8	Is a number of drug items in the hospital formulary decreased to not more than 375 items?	(Office of the Permanent Secretary, 1999)
AC9	Is the proportion of essential drugs in the hospital formulary increased?	(Office of the Permanent Secretary, 1999)
AC10	Is the drug items in the hospital formulary controlled?	(Office of the Permanent Secretary, 1999)
AC11	Is the number of drug items with the same GN limited for selecting to use in the hospital?	(Office of the Permanent Secretary, 1999)
	Drug procurement (18 QIs)	
AC12	Is there a supplier investigation system?	(WHO,1999)
AC13	Is the drug purchasing in the hospital limited to drugs on the NLED?	(MSH, 1994; 2012; PAHO, 1995; WHO, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of activity component	References
AC14	Is GN used in drug purchasing?	(MSH, 1994; 2012)
AC15	Is the information available to use for analysing ABC, VEN?	(MSH, 1994; 2012)
AC16	Is there a formal system for reporting compliants of product quality?	(MSH, 1994; 2012)
AC17	Are there recorded test results of drug products to be used for drug assessment of the next drug procurement?	(MSH, 1994; 2012)
AC18	Are relevant personnels in drug procurement trained about drug assurance?	(MSH, 1994; 2012)
AC19	Is there group purchasing or co-bargain of drugs at provincial level?	(Office of the Permanent Secretary, 1999)
AC20	Is there group purchasing of drug at regional level?	(Office of the Permanent Secretary, 1999)
AC21	Is the selection criteria of quality drugs stipulated appropriately and cleary for each drug item?	(Office of the Permanent Secretary, 1999)
AC22	Is there a formal plan to verify quantity of drugs for annual drug procurement?	(MSH, 1994; 2012; Office of the Permanent Secretary, 1999)
AC23	Is the drug procurement data recorded by manually or collected electronically?	(MSH, 1994; 2012)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of activity component	References
AC24	Are there data of procurement and drug cost comparing within each year to be as information for the next procurement?	(MSH, 1994; 2012)
AC25	Is there a NLED or hospital drug formulary used for verifying quantity of drugs for drug procurement?	(MSH, 1994; 2012)
AC26	Are there drug procurement data for asking of approval?	(MSH, 1994; 2012; Office of the Permanent Secretary,1999)
AC27	Are there the suitable software and hardware for collecting database of drug procurement?	(MSH, 1994; 2012)
AC28	Are personnel trained to use the program?	(MSH, 1994; 2012)
AC29	Is there a reliable database system for confidently using of data for drug procurement?	(MSH, 1994; 2012)
	Drug storage and distribution (18 QIs)	
AC30	Is the good storage practice used for drug inventory?	(MSH, 1994; 2012)
AC31	Are amount of drug storage and remaining drugs in wards decreased?	(Office of the Permanent Secretary,1999)
AC32	Is the amount of drugs recorded in stock card equal to the actual amount in the stock?	(MSH, 1994; 2012)
AC33	Are there expired drugs in stock/inventory?	(MSH, 1994; 2012; WHO, 1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of activity component	References
AC34	Is there investigation of ordered drugs before storage?	(MSH, 1994; 2012; WHO, 1999)
AC35	Are there drug items on NLED in drug inventory?	(MSH, 1994; 2012; WHO, 1999)
AC36	Is the staff responsible for ordering, storing, or distribution of drugs trained to manage drug inventory?	(MSH, 1994; 2012)
AC37	Is there a manual for inventory management?	(MSH, 1994; 2012)
AC38	Are emergency drugs available at patient care units?	(MSH, 1994; 2012)
AC39	Is there the drug dispensing system when pharmacy is closed?	(MSH, 1994; 2012)
AC40	Is there the managing system when drugs are returned?	(MSH, 1994; 2012)
AC41	Is temperature at the drug inventory room controlled?	(MSH, 1994; 2012)
AC42	Is drug storage area suitable?	(MSH, 1994; 2012)
AC43	Is temperature controlled in drug inventory?	(MSH, 1994; 2012)
AC44	Are drugs reserved systemically?	(MSH, 1994; 2012)
AC45	Is there no evidence of animals or insects at drug inventory?	(MSH, 1994; 2012)
AC46	Are drugs distributed to PCU/ health facilities?	(MSH, 1994; 2012)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of activity component	References
AC47	Is the current distribution system based on data collection of disbursement and referral system?	(MSH, 1994; 2012)
	Drug use (12 QIs)	
AC48	Are the pharmacists legally entitled to substitute generic drugs for brand name products?	(MSH, 1994; 2012; PAHO, 1995; WHO, 1999)
AC49	Are there regulations to control management of drug system for relevant personnels?	(PAHO,1995)
AC50	Is there any unbias publication documents which are updated in the last 5 years?	(MSH, 1994; 2012; WHO, 1999)
AC51	Are drugs used following standard treatment guidelines (STGs)?	(MSH, 1994; 2012; WHO, 1999; Qualidigm, 2000)
AC52	Is the concept of NLED part of training curricula for health personnel?	(MSH, 1994; 2012; WHO, 1999)
AC53	Is there a mechanism for providing patients with written information about their treatments since starting drug administration until post discharge?	(TAG, 1998)
AC54	Is there a meeting for consideration of treatment process for individual patients?	(TAG, 1998)
AC55	Is there a training program for hospital personnels regarding policies involving drug safety together with drug prescription and administration?	(TAG, 1998)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	References
AC56	Is there a pharmacovigilance assessment system for drug safety regarding ADR?	(HA Institute, 2011)
AC57	Is there an assessment of HAD activities?	(HA Institute, 2011; NPS, 2006)
AC58	Is there an assessment of DUE/DUR activities?	(HA, 2009)
AC59	Is there an assessment of Antibiotic Smart Use (ASU) activities?	(HA, 2009; NPS, 2006)
	Drug selection (4 QIs)	
OP1	Percentage of a number of drugs on the NLED in hospital formulary	(MSH, 1994; 2012; Office of the Permanent Secretary,1999)
OP2	Percentage of a number of ED per a number of NLED in the hospital formulary	(Office of the Permanent Secretary,1999)
OP3	Number of drug items on the hospital formulary	(Office of the Permanent Secretary,1999)
OP4	Rate of increase of a number drug items on the hospital formulary	(Office of the Permanent Secretary,1999)
	Drug procurement (7 QIs)	
OP5	Percentage of value of drugs purchased by group purchasing at provincial level	(MSH, 1994; 2012; PAHO, 1995; Office of the Permanent Secretary,1999)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	References
OP6	Percentage of value of drugs purchased by group purchasing at regional level	(MSH, 1994; 2012; PAHO, 1995; Office of the Permanent Secretary,1999)
OP7	Percentage of value of procurement for drugs on the NLED	(MSH, 1994; 2012; PAHO, 1995; Office of the Permanent Secretary,1999)
OP8	Percentage of value of drugs purchased from local manufacturers	(MSH, 1994; 2012; WHO, 1999)
OP9	Percentage of value of drugs purchased from GPO	(Office of the Permanent Secretary,1999)
OP10	Percentage of a number of drugs executed quality control	(MSH, 1994; 2012; WHO, 1999)
OP11	Percentage of drugs that failed to quality control testing	(MSH, 1994; 2012; WHO, 1999)
	Drug storage and distribution (6 QIs)	
OP12	Number of stocking months for drugs in inventory	(Office of the Permanent Secretary,1999) (PSyRIC,2007; DMSIC,

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	References
		2011; HA Institute, 2011)
OP13	Number of drug lost	(PSyRIC, 2007)
OP14	Average of drug released time of drug lost	(PSyRIC, 2007)
OP15	Number of vital drugs lost in inventory	(PSyRIC, 2007)
OP16	Percentage of accuracy of drug inventory	(PAHO, 1995)
OP17	Value of drug lost	(PSyRIC, 2007)
	Drug use (63 QIs)	(WHO, 1993;
OP18	Average waiting time for out-patient	Health Canada, 2002)
OP19	Coverage percentage of drug use evaluation	(WHO, 1993)
OP20	Percentage of prescribed drugs in consistent with standard treatment guideline (STG)	(WHO, 1993)
OP21	Value of prescribed drugs in consistent with standard treatment guideline (STG)	(WHO, 1993; OECD, 2000)
OP22	Medication error percentage of high alert drugs (HAD)	(WHO, 1993)
OP23	Medication error percentage of prescribed drugs for out-patients by random investigation	(WHO, 1993)
OP24	Medication error rate (OPD-Prescribing error)	(PSyRIC, 2007)
OP25	Medication error rate (OPD-Transcribing error)	(PSyRIC, 2007)
OP26	Medication error rate (OPD-Pre-dispensing error)	(PSyRIC, 2007)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	Reference
OP27	Medication error rate (OPD-Dispensing error)	(PSyRIC, 2007)
OP28	Medication error rate (OPD-Pre-administration error rate)	(PSyRIC, 2007)
OP29	Medication error rate (OPD-Administration error rate)	(PSyRIC, 2007)
OP30	Medication error rate (IPD-Prescribing error)	(PSyRIC, 2007)
OP31	Medication error rate (IPD- Transcribing error)	(PSyRIC, 2007)
OP32	Medication error rate (IPD-Pre-dispensing error)	(PSyRIC, 2007)
OP33	Medication error rate (IPD-Dispensing error)	(PSyRIC, 2007)
OP34	Medication error rate (IPD-Pre administration error rate)	(PSyRIC, 2007)
OP35	Medication error rate (IPD-Administration error rate)	(PSyRIC, 2007)
OP36	Percentage of out-patients found with ADR	(HCFA, 2001; CIHI, 2002; NHSO, 2011)
OP37	Percentage of out-patients found with serious ADR	(NHSO, 2011)
OP38	Rate of qualified reports	(HCFA, 2001; NHSO, 2011)
OP39	Average time to send the report	(HCFA, 2001; NHSO, 2011)
OP40	Percentage of out-patients diagnosed as common cold and were prescribed of antibiotics	(WHO, 1993; PAHO, 1995)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	Reference
OP41	Percentage of out-patients diagnosed as acute diarrhea and were prescribed antibiotics	(PSyRIC, 2007; MSH, 1994; 2012)
OP42	Percentage of out-patients with clean wound that were not prescribed of antibiotics	(PSyRIC, 2007; MSH, 1994; 2012)
OP43	Average number of drug items per prescription	(WHO, 1993; 1999; HCFA, 2001)
OP44	Average number of drugs prescribed by generic name per prescription	(WHO, 1993; HCFA, 2001)
OP45	Percentage of drugs prescribed by antibiotic drugs	(WHO, 1993; NPS, 2006)
OP46	Percentage of drug prescribed with drug injection at least 1 item	(WHO, 1993; 1999)
OP47	Percentage of drugs on NLED prescribed according to hospital formulary	(WHO, 1993)
OP48	Percentage of a number of children under five years with diarrhoea receiving antidiarrhoeal drugs	(WHO, 1999)
OP49	Average consultation time of physicians	(WHO, 1993)
OP50	Percentage of drugs with correct labels	(WHO, 1993)
OP51	Percentage of patients receiving treatment without medicine	(WHO, 1993)
OP52	Proportion of patients with coronary heart disease (CHD), with a recorded use of an antiplatelet drug within the last 12 months	(PING, 2002)
OP53	Proportion of patients with coronary heart disease (CHD) prescribed a statin within the last 12 months	(PING, 2002)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	Reference
OP54	Proportion of patients prescribed a lipid lowering drug, within the last 2 years who have had documented monitoring of cholesterol levels within the last 2 years	(PING, 2002)
OP55	Proportion of patients with a diagnosis of hypertension, who have a recorded BP check within the last 15 months	(PING, 2002)
OP56	Proportion of patients prescribed an ACE inhibitor or an angiotensin-II receptor antagonist within the last 12 months and have a recorded U+E check within the last 15 months	(PING, 2002; NPS, 2006)
OP57	Proportion of diabetic patients with microalbuminuria prescribed an ACE inhibitor in the last 12 months	(PING, 2002)
OP58	Proportion of patients with a diagnosis of diabetes who have a HbA1 / HbA1C/ fructosamine test within the last 15 months	(PING, 2002)
OP59	Proportion of patients prescribed a thyroid hormone within the last 2 years who have a documented thyroid monitoring test within the last 2 years	(PING, 2002)
OP60	Proportion of patients with a diagnosis of asthma and prescribed short acting β_2 agonists within the last 12 months, who also have been prescribed inhaled corticosteroids within the last 12 months	(PING, 2002)
OP61	Proportion of patients prescribed an inhaled long acting β_2 agonist within the last 12 months, who also have been prescribed an inhaled corticosteroids within the last 12 months	(PING, 2002)
OP62	Proportion of patients who have a history of duodenal ulcer and have been prescribed ulcer healing drugs within the last 12 months with either eradication therapy or investigation for helicobacter pylori	(PING, 2002)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	Reference
OP63	Proportion of patients aged over 65 years who received of influenza vaccination	(PING, 2002; Health Canada, 2000)
OP64	Proportion of patients with a diagnosis of heart failure prescribed an ACE inhibitor within the last 12 months	(PING, 2002; NPS, 2006)
OP65	Utilization in Daily Defined Doses (DDDs)	(EURO-MED-STAT, 2004)
OP66	A number of DDD per 1000 residents per day	(EURO-MED-STAT, 2004)
OP67	Percentage of cephalosporins utilization per overall (systemic) use of antibacterials	(EURO-MED-STAT, 2004)
OP68	Percentage of quinolone antibacterial utilization per overall (systemic) use of antibacterials	(EURO-MED-STAT, 2004)
OP69	Percentage of beta-lactam antibacterials i.e penicillins utilization per overall (systemic) use of antibacterials	(EURO-MED-STAT, 2004)
OP70	Percentage of utilization amoxicillin per amoxicillin with enzyme inhibitor	(EURO-MED-STAT, 2004)
OP71	Percentage of utilization ACE inhibitors per angiotensin II receptor antagonists and ACE inhibitors	(EURO-MED-STAT, 2004)
OP72	Ninety percent of all drugs utilized in DDD (DU 90%)	(EURO-MED-STAT, 2004)
OP73	Percentage of patients receiving benzodiazepines on discharge but on admission	(TAG, 1998)
OP74	Percentage of patients receiving benzodiazepine during hospitalization and one month post discharge	(TAG, 1998)
OP75	Percentage of eligible patients admitted with myocardial infarction who are discharged home on aspirin	(TAG, 1998)

Table 4.4 201 QIs related to the 10 key issues of DSM (Cont.)

Code	QIs of output component	Reference
OP76	Total drug expenditure as a percentage of health care spending	(CIHI, 2002; EURO-MED-STAT, 2004)
OP77	Drug expenditure per capita	(CIHI, 2002; EURO-MED-STAT, 2004; OECD, 2006)
OP78	Proportion of generic drug expenditure on total drug expenditure	(EURO-MED-STAT, 2004)
OP79	Expenditure per capita of drug prescription classified by drug group	(CIHI, 2002; OECD, 2006)
OP80	Percentage of drug expenditure of universal coverage insurance, social security insurance, civil servant insurance per drug prescription	(CIHI, 2002)
	Accessibility of drugs (3 QIs)	
OC1	Percentage of health care setting providing places with drug availability	(WHO, 1993; 1999)
OC2	Proportion of patients receiving single-source statins per 100 population in health insurance system	(Thai drug watch, 2009)
OC3	Proportion of patients receiving clopidogrel per 100 population in health insurance system	(Thai drug watch, 2009)
	RUDs (2 QIs)	
OC4	Percentage of population who know how to take drugs correctly	(WHO, 1993; 1999)
OC5	Percentage of population safe from drug utilization without re-ADR	(PSyRIC, 2007)

Table 4.5 Number of QIs following 10 key issues of DSM and 4 components of Logic model

Key issues of DSM	Components of Logic model	Number of QIs
Policy and regulation	Resource	15 QIs
Financing and budgeting	Resource	9 QIs
Knowledge management	Resource	14 QIs
Human resource	Resource	19 QIs
Drug selection	Activity	11 QIs
	Output	4 QIs
Drug procurement	Activity	18 QIs
	Output	7 QIs
Drug storage and distribution	Activity	18 QIs
	Output	6 QIs
Drug use	Activity	12 QIs
	Output	63 QIs
Accessibility of drugs	Outcome	3 QIs
Rational use of drugs	Outcome	2 QIs
Total		201 QIs

Discussion

From various datasources, QIs were grouped in 10 key issues related in DSM. Most of organizations from international organization: WHO, MSH, INRUD, PAHO, etc are well known organizations which are created and developed QIs or manuals for monitoring and evaluation of drug system in many countries. These organizations developed QIs covering 10 key issues more than other organizations in developed countries and Thailand. For QIs developed from other countries (1) UK: PING and NHS co-operated to develop quality prescribing related indicators. The prescribing indicators were used to measure rational prescribing in general practice at hospital level (PING, 2002), (2) USA: HCFA developed QIs involving drug selection and drug use process for measuring drug system at health facility (HCFA, 2001) and

Qualidigm is a private organization which developed pharmacy information system indicators related the performance of pharmacists who collected database in data information center and practiced drug use process at hospitals (Qualidigm, 2000), (3) Australia: in 2005 the Department of Health and Age Care created drug budget indicators and drug use indicators for assessing drug system in hospitals, the NSW TAG developed manual of indicators for drug use in Australian hospitals. These indicators, an invaluable resource for clinicians, medical managers, health care funders and consumers; separated in structure-process-outcome components (TAG, 1998), and NPS created a manual for users involved the drug use process which relating the indicators of quality prescribing in Australian general practice (NPS, 2006), (4) Canada: CIHI is an institution which developed the drug use indicators: a feasibility study using existing aggregated administrative databases. The indicators can implement and use in hospitals for evaluating the performance of drug use (CIHI, 2002). Health Canada (2000) created QIs relating the knowledge management and drug use issues for measuring the pharmacist practice at hospitals and health facilities. In Thailand, (1) the MOPH set up and published the Improving Efficiency on DSM in 1998 and the Measure of Efficiency on DSM in 1999. The measure implemented the QIs of 5 key issues to the hospitals under MOPH. (2) DMSIC is an organization under MOPH to monitor the performance of DSM related the 5 key issues (policy and regulation, human resource, drug selection, drug procurement, drug storage and distribution, and drug use) from hospitals affiliated in MOPH. (3) Bureau of Inspection and Evaluation of MOPH is an organization which monitored and evaluated the DSM similar to the DMSIC but only drug use issue did not be monitored and evaluated. (4) The HA institution is an organization which developed QIs from JACHO to measure aspects of drug system at the hospitals and focused on the patient safety goal for accreditation of the hospital. These QIs related to the drug use and RUDs process. QIs were focused on the drug safety for patient safety about ADR/ADE, HAD, DUR/DUE, ASU, and medication error similar to the (5) NHSO which developed QIs for assessing drug safety at the hospitals but with exception of the medication error. (6) PSyRIC is a research center which developed and assessed the QIs involving the drug use and RUD issues for the hospitals. And (7) Thai drug watch developed and evaluated QIs related to availability of drug.

From systematic review, the total of 201 QIs were selected. These QIs were classified according to the 10 key issues of DSM and the Logic model. The results showed the coverage of the 201 QIs on all key issues of DSM and all components of the Logic model.

The total of 15 QIs were classified as policy and regulation key issue. These QIs were mostly followed the concept of NDP. The strategies of NDP in Thailand are defined to guarantee the availability of drugs, rational use of drugs, self-reliance on drugs, and safety of drugs for the population and to ensure that drugs are properly used. Therefore, QIs were developed in many institutions relating to activities of NDP (PAHO, 1995; TAG, 1998; WHO, 1994). A drug policy should be followed by the enactment of appropriate regulations to provide a legal basis for the policy and make it enforcable. QIs which are relevant to many regulations developed or created according to important policy as follows. (1) NLEM (MSH, 1994; 2012; PAHO, 1995; WHO, 1999; Office of the Permanent Secretary, 1999), (2) patient safety goal (HA, 2011), (3) drug safety goal (Bureau of Health Administration, 2011), (4) quality of drug use (NHSO, 2011), (5) ASU (NHSO, 2011; HA Institute, 2011), (6) hospital formulary (MSH, 1994; 2012; Office of the Permanent Secretary, 1999), (7) promoting to use GN (MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999), (8) the regulation of MOPH composed of PTC (MSH, 1994; 2012; TAG, 1998; WHO, 1999; Office of the Permanent Secretary, 1999), drug quality assurance (MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999), and drug procurement (Office of the Permanent Secretary, 1999). These QIs will be reflected the related policies and regulations for evaluating the effectiveness of NDP and other regulations of the authorities established by policy-makers. They will be beneficial for self-assessment to identify weakness.

For the budgeting and financing key issue, 9 QIs were classified. These QIs were concerned of the financial sustainability. Both of public and private hospitals, especially in community hospitals, receive their budgets from NHSO, other health security schemes, and patient out-of-pocket expense, etc. These hospitals have been being realized to balance the resources and a basic quality of care (MSH, 1994; 2012). The main points of QIs represented the operation and verification of the usage of budgeting and financing as follows. (1) Drug budget and drug expenditure (MSH,

1994; 2012; PAHO, 1995; WHO, 1999; Office of the Permanent Secretary, 1999), (2) financing system (MSH, 1994; 2012; WHO, 1999), (3) monitoring of drug price (MSH, 1994; 2012; WHO, 1999), (4) financial ratios: quick ratio and current ratio (Office of the Permanent Secretary, 1999). In this key issue, QIs are needed for measuring the capacity of managing budget and finance for improving efficiency, reducing demand, increasing financial resources, and accepting a decline in quality of care (MSH, 1994; 2012).

For knowledge management key issue, 14 QIs were classified. This key issue is organized to develop and support knowledge for the providers, receivers, and patients or population. All QIs are grouped in three main points as follows. (1) DIC and pharmacy information (MSH, 1994; 2012; PAHO, 1995; WHO, 1999), (2) reporting (Office of the Permanent Secretary, 1999), (3) collecting and using information database (Qualidigm, 2000). The QIs have been applied to access the operations of reporting formats, data entry screens, and feedback reports. Sufficient training for health personnels are needed in the knowledge management, which may include design and development of data collection, computerized data, processing, and use of data (MSH 1994; 2012).

For the human resource key issue, 19 QIs were included. These QIs were measured the role of PTCs in management of the DSM at the community hospitals (TAG, 1998; Office of the Permanent Secretary, 1999). The key issue is an important and challenging task for PTCs. In Thailand, PTCs are responsible for developing of drug policies at national, provincial, and community levels, evaluating and selecting drugs for the hospital formulary, assessing drug use to identify problems, conducting interventions to improve drug use, informing all health personnels which involving drug use issues and policies, etc (MSH, 1994; 2012). All QIs ensure that the effectiveness of the performance of PTCs and patients are provided with the best possible cost-effective and quality of care.

Drug selection process is focused on: (1) NLEM is concerned to promote the use of GN and to select a limited number of ED. ED can lead to better supply, more rational use, and lower cost. (2) STG is needed for practitioners and prescribers who are responsible in drug prescribing and dispensing following RUDs to ensure that patients received safety drugs. (3) Hospital formulary is an important tool for the

hospitals to guide drug items for common health problems in community. The hospital formulary is used for representing therapeutic effective and economic efficient prescribing. Consequently, 15 QIs of drug selection issue in this study are focused on (1) NLEM (MSH, 1994; 2012; PAHO, 1995; WHO, 1999), (2) STG (MSH, 1994; 2012), and (3) hospital formulary (MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999).

Drug procurement process is a major determination of drug availability and total health costs. For the community hospitals in Thailand, procurement of drugs is sustained as the largest health expenditure from NHSO. For the process effectiveness, it should procure the right drugs in the right quantities; set the purchasing plan for ordering quantities to achieve the lowest cost; and ensure that all procured drug met the recognized standard quality. Therefore, 25 QIs are classified to assess the operation which related on quantified drug requirement and drug quality assurance (MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999). This key issue ensures the availability of drugs, reasonable drug prices, and recognized standard of drug quality.

Drug storage and distribution process is a significant issue of DSM and particularly influenc of saving health budget even if the process is very complex and difficulty. Drugs are stored in a specially designed secure area; drug distribution is concerned before drugs were dispensed to the patients and/or other health service units. The other aspect of drug distribution is the return of overstocked and nearly-expired drugs which should inform the person who is responsible for drug inventory and local manufacturer or detailer (MSH; 1994; 2012). In this key issue, 24 QIs are classified: 18 QIs of activity component and 6 QIs of output component. Selected QIs can be classified in two main points as follows (1) drug inventory (MSH, 1994; 2012; PAHO, 1995; WHO, 1999; Office of the Permanent Secretary, 1999; DMSIC, 2009; PSyRIC, 2007; HA Institute, 2011) and (2) distribution process (MSH, 1994; 2012; WHO, 1999; Office of the Permanent Secretary, 1999). All QIs represent the assessment of the operation of drug storage and distribution. Maintaining of drug supply, keeping of drugs in good condition, minimizing of drug losses caused of drug spoilage and expiry, and maintaining of inventory records are the operations for target achieving of the issue.

Drug use issue includes correct drug; appropriate indication; appropriate drug for efficacy and safety consideration for the patient; appropriate dosage, administration, and duration of treatment; appropriate patient, correct dispensing include appropriate information for patients about the drug prescribed; and patient adherence to treatment (MSH, 1994; 2012, WHO, 2004a). All 75 QIs are gathered and classified in 8 main points as follows. (1) Measurement of drug use (MSH, 1994; 2012; PAHO, 1995; TAG, 1998; WHO, 1999; Office of the Permanent Secretary, 1999; Qualidigm, 2000), (2) monitoring on drug use (HA Institute, 2011), (3) prescribing (WHO, 1993; PING, 2002; WHO, 2009), (4) patient care (WHO, 1993), (5) health facility (WHO, 1993), (6) drug utilization (TAG, 1998; EURO-MED-STAT, 2004; CIHI, 2002), (7) drug expenditure of drug use (CIHI, 2002; EURO-MED-STAT, 2004; PSyRIC, 2007), and (8) medication error (PSyRIC, 2007). These QIs present their capacities in investigation of this process for achieving the promotion-rational prescribing, ensuring good dispensing practice, encourage appropriate drug use, etc.

The outcome of DSM is presented as the results of effectiveness of DSM which considered of accessibility of drugs and RUDs. Accessibility of drugs related to the population in health insurance system following universal coverage scheme, social security scheme, and civil servant medical benefit scheme should be available with equity (WHO, 1993; WHO, 1999; Thai drug watch, 2009). RUDs is focused on patient knowledge and patient safety (WHO, 1993; WHO, 1999; PSyRIC, 2007). Both of the key issues are benefit for representing the operation of DSM on patient safety from drug use in provider perspective.

However, this part of the study is limited on the QIs searched from published papers because QIs from some studies may be suitable only for some specific area. Many countries or many settings have their own situations which are different from each other. Therefore, 201 discovered QIs in this study are only searched from the international organizations and organizations in Thailand which created or developed QIs for general basis. The selected QIs involved 10 key issues of DSM and further selection will be performed for the potential QIs for assessing the DSM at the community hospitals.

Part II. Selecting the potential QIs

Study period was from March 1, 2012 to June 15, 2012 for selecting the potential QIs by using two rounds of Delphi technique. This technique was used to select the QIs and their criterion which have potential to represent the success of DSM performance. Twenty experts were participated in QI testing with two rounds of Delphi technique. The results of this study are presented as follows.

For the first Delphi round, the selected QIs (201 QIs from part 1) were presented to twenty experts and were analyzed for importance and validity. The experts were the ones who had experience in DSM and/or relevant to assess the DSM at the community hospitals. The importance and validity of the first Delphi round were analyzed and reported. The cutoff score for selecting of QIs was more than 4.00 for the importance (Kerlinger, 1973; AHRQ, 2011) and be equal or more than 0.7 for validity (IOC). However, the preliminary principle of Delphi technique focused on the importance of QIs as a major priority. Therefore, in the case of the importance was more than 4.00 but IOC (validity) was less than 0.7, the QIs were still recruited for reconsidering in the second round. The QIs were presented following four components of Logic model as shown in Table 4.6- 4.9.

For resource component, 57 QIs were rated for the importance and validity and were classified in 4 key issues as follows (Table 4.6). 15 QIs were classified in policy and regulation issue. In these 15 QIs, 9 QIs were rated as very important and were selected. From 9 selected QIs, the specialists focused on implementing of the NDP and the drug safety policy, stipulating of PTCs, practicing follows the regulation of DSM under MOPH, updating the hospital formulary, providing for the drug purchasing plan, verifying of drugs by the COA, implementing of the ASU policy, and implementing of the criterion for quality use of drugs. The specialist suggested to gather RE3 into RE2 because of the operation of RE3 is similar to the RE2.

For 5 excluded QIs involved the purchasing of drugs by using GN, circulating or distributing of the NLED with median price and drugs produced by GPO, pricing of drugs which GPO purchased not more than 3% of the median drug price, and purchasing of drugs GPO produced by offering price or bidding price or price bargaining or special method. Theses QIs related the rule and regulation of DSM

under MOPH which all hospitals must be practiced follow the rules and regulation. Therefore 5 excluded QIs were not needed and were not presented the different of the DSM performance in this key issue.

Financing and budgeting issue consisted of 9 QIs. All of 9 QIs were excluded. Theses QIs related to the drug budget, drug expenditure, budget per capita which allocated by NHSO, monitoring of drug price, medical treatment compensation system, participating of allocated budget at the provincial level, and evaluating the current and quick ratio. All specialists gave low priority to the financing and budgeting issue because of most of hospitals cannot be collected and evaluated the situation of drug budgeting. In addition, all QIs not only related to the hospital budgeting but also the promotion, prevention, treatment, and rehabilitation which are difficult to be evaluated.

Knowledge management issue composed of 14 QIs and only 7 QIs were selected. The experts gave precedence to the selected QIs involved both manual and electronic databases of the patient data and pharmaceutical data together with unbias and update information from DIC which benefit for the administrators, providers, people and patients. For 7 excluded QIs, the experts expressed their opinion that (1) most of community hospitals have no DIC but only found the drug information services from pharmacy department for providers and receivers as its routine work. (2) All hospitals must send the report of DSM information to the DMSIC. (3) Some hospitals can be collected and assessed for the satisfaction of pharmaceutical services. Most hospitals routinely collected and assessed the out-patient hospital service following the quality criterion of hospitals.

Human resource issue composed of 19 QIs and 7 QIs were selected. The pharmacists gave high priority to the operation of PTCs and the empirical evidence for decision or the data of quality of drugs and drug safety. For 12 excluded QIs, the experts gave low priority to the number of PTC members attended PTCs meeting, supporting budget to the PTCs operation, operating of PTCs such as drug selection and drug procurement, supporting for education and training operation role of PTCs, and selling promotion of drugs. These operations of PTCs were routine works and rules of PTC function except for the selling promotion of drugs.

Table 4.6 Importance and validity 57 QIs of resource component

Code of 57 QIs	Mean	IOC	Selected or removed QI
Policy and regulation (15 QIs)			
RE1	4.45	0.90	Selected
RE2	4.75	0.95	Selected
RE3	4.50	0.85	Selected
RE4	4.00	0.65	Selected
RE5	4.20	0.45	Selected
RE6	4.40	0.85	Selected
RE7	4.42	0.70	Selected
RE8	3.85	0.35	Removed
RE9	2.83	0.11	Removed
RE10	2.83	0.11	Removed
RE11	3.20	0.20	Removed
RE12	3.15	0.25	Removed
RE13	4.45	0.80	Selected
RE14	4.30	0.70	Selected
RE15	4.26	0.60	Selected
Budgeting and financing (9 QIs)			
RE16	2.94	0.13	Removed
RE17	3.94	0.12	Removed
RE18	3.31	0.00	Removed
RE19	3.88	0.19	Removed
RE20	3.94	0.50	Removed
RE21	2.94	0.19	Removed
RE22	2.80	0.20	Removed
RE23	3.63	0.25	Removed
RE24	3.63	0.25	Removed
Knowledge management (14 QIs)			
RE25	4.00	0.39	Selected
RE26	3.06	0.44	Removed
RE27	4.00	0.22	Selected
RE28	3.65	0.41	Removed
RE29	4.33	0.59	Selected
RE30	3.06	0.50	Removed
RE31	4.06	0.61	Selected
RE32	4.67	0.65	Selected
RE33	3.61	0.72	Removed
RE34	4.44	0.65	Selected
RE35	3.72	0.41	Removed
RE36	4.11	0.59	Selected
RE37	3.22	0.59	Removed
RE38	3.17	0.78	Removed

Table 4.6 Importance and validity 57 QIs of resource component (Cont.)

Code of 57 QIs	Mean	IOC	Selected or removed QI
Human resource (19 QIs)			
RE39	4.00	0.67	Selected
RE40	4.41	0.61	Selected
RE41	4.22	0.61	Selected
RE42	3.94	0.33	Removed
RE43	3.56	0.17	Removed
RE44	3.39	0.50	Removed
RE45	3.89	0.56	Removed
RE46	3.53	0.29	Removed
RE47	4.33	0.83	Selected
RE48	4.22	0.78	Selected
RE49	3.94	0.47	Removed
RE50	4.67	0.89	Selected
RE51	3.78	0.39	Removed
RE52	3.78	0.50	Removed
RE53	4.11	0.78	Selected
RE54	3.72	0.56	Removed
RE55	3.83	0.61	Removed
RE56	3.44	0.44	Removed
RE57	3.78	0.39	Removed

For activity component, 59 QIs were rated for the importance and validity as shown in Table 4.7. QIs of 4 key issues were classified as follows. 2 QIs of 11 QIs of drug selection issues were rated as very important and were selected. Both of QIs related to the generic drugs used in the hospital formulary and this formulary updated by official committee which the specialist emphasized. For 9 excluded QIs, the specialists gave low priority to the providing the hospital formulary and drug information follows the NLED, and other details of the formulary.

Drug procurement issues composed of 18 QIs and 10 QIs were selected. The selected QIs were gave high precedence to the drug purchasing because of the personnel can be easily practiced and monitored. For 8 excluded QIs were rated on the low precedence to the limiting the drug purchasing on the NLED, using GN for drug purchasing, recording the results of drug test, training of the drug quality assurance, purchasing of drugs at regional level, and proving quantitative data for the drug purchasing plan. For this reason, all excluded QIs are difficult to be operated.

Table 4.7 Importance and validity of 59 QIs of activity component

Code of 59 QIs	Mean	IOC	Selected or removed QI
Drug selection (11 QIs)			
AC1	4.44	0.67	Selected
AC2	4.06	0.65	Selected
AC3	3.63	0.61	Removed
AC4	2.89	0.22	Removed
AC5	3.89	0.67	Removed
AC6	3.71	0.53	Removed
AC7	3.78	0.56	Removed
AC8	3.26	0.17	Removed
AC9	3.67	0.47	Removed
AC10	3.89	0.50	Removed
AC11	3.83	0.39	Removed
Drug procurement (18 QIs)			
AC12	4.17	0.67	Selected
AC13	3.35	0.47	Removed
AC14	3.72	0.72	Removed
AC15	4.11	0.56	Selected
AC16	4.44	0.83	Selected
AC17	3.71	0.47	Removed
AC18	3.33	0.39	Removed
AC19	4.28	0.61	Selected
AC20	3.83	0.53	Removed
AC21	4.67	0.72	Selected
AC22	3.44	0.53	Removed
AC23	4.22	0.72	Selected
AC24	4.11	0.78	Selected
AC25	3.78	0.44	Removed
AC26	3.28	0.53	Removed
AC27	4.39	0.72	Selected
AC28	4.00	0.61	Selected
AC29	4.44	0.72	Selected
Drug storage and distribution (18 QIs)			
AC30	4.61	0.78	Selected
AC31	4.44	0.67	Selected
AC32	4.50	0.67	Selected
AC33	3.67	0.78	Removed
AC34	4.06	0.67	Selected
AC35	3.13	0.25	Removed
AC36	4.12	0.59	Selected
AC37	4.12	0.65	Selected
AC38	4.65	0.88	Selected

Table 4.7 Importance and validity of 59 QIs of activity component (Cont.)

Code of 59 QIs	Mean	IOC	Selected or removed QI
AC39	4.61	0.89	Selected
AC40	3.94	0.67	Removed
AC41	4.72	0.78	Selected
AC42	3.50	0.59	Removed
AC43	3.59	0.68	Removed
AC44	4.06	0.72	Selected
AC45	3.89	0.50	Removed
AC46	4.56	0.56	Selected
AC47	3.44	0.44	Removed
Drug use (12 QIs)			
AC48	4.33	0.56	Selected
AC49	3.00	0.53	Removed
AC50	3.94	0.44	Removed
AC51	4.74	0.74	Selected
AC52	4.17	0.56	Selected
AC53	4.16	0.63	Selected
AC54	3.95	0.68	Removed
AC55	4.67	0.56	Selected
AC56	4.89	0.74	Selected
AC57	4.58	0.63	Selected
AC58	4.37	0.63	Selected
AC59	4.47	0.74	Selected

Drug storage and distribution issue composed of 18 QIs and 11 QIs were selected. The experts gave high priority to practice follow the storage and distribution process, control the temperature in drug inventory, investigate the ordered drug, provide a manual for inventory management, available of the emergency drugs to the patient care unit, and distribute the drugs to PCU/ health facilities. 7 excluded QIs were gave low priority to the expired drugs, returned drugs, evidence of animals or insects at drug inventory, data collection of disbursement and referral system. These operations are routine works and the limitation of perssonel should be concerned. These operations represent the low performance and cannot inclusively operate these processes.

Drug use issue composed of 12 QIs and 9 QIs were selected. The experts gave high priority to the using of generic drugs for substitution of brand name products; using of drugs following the STGs, training of the NLED concept, drug

safety, drug prescription, and drug administration for health personnel; assessment of the HAD activities, DUE/DUR activities, and ASU activities. For 3 excluded QIs involved the regulation to control management of drug system, any unbias publication documents, and a meeting for consideration of treatment process. These QIs were gave low priority because of the operation related the regulation which hospital must be implemented and some QIs involved the individual personnel such as physician for monitoring of treatment process.

The score of importance and validity of 80 QIs of output component were shown in Table 4.8. All 4 QIs of drug selection issue were rated as rather important and excluded. These QIs involved the number of NLED and ED in hospital formulary and drug items on hospital formulary. All QIs are gave low priority by experts because of QIs related to the regulation of drug selection under MOPH which all hospitals must be operated.

From 7 QIs of drug procurement issue, it was found that only 1 QIs was selected. OP7, value of procurement for drugs on the NLED, was rated as very important and was chosen in the first round. Other 6 excluded QIs related to purchasing of drugs by group purchasing method at all levels, purchasing of drugs from local manufacturers, purchasing of drugs from GPO, and executing of the drug quality control. Many levels of hospitals can operate with diferrent capacity of resource, so, the results of some QIs can be assessed only in some hospitals level. Other reason is that drug quality control is regularly process by the hospitals under MOPH.

For 6 QIs of drug storage and distribution issue, it was found that 4 QIs were rated as very important and were chosen. The experts gave high priority to stock drug inventory, lose of drug inventory both of volume and value, and calculation of the accuracy of drug inventory. For 2 excluded QIs, the experts gave low priority to the released time of drug lost and vital drug lost in inventory. Most of hospitals concerned the drug lost in inventory involving the volume and value to monitor of drug inventory for quality and safety of drugs.

For 63 QIs of drug use issue, it was found that 21 QIs were chosen. The selected QIs involved the medication error and drug safety. The experts gave low priority to 42 excluded QIs related to the QIs which were developed in developed

countries. These QIs cannot be collected in Thailand because of the limitation of resources.

Table 4.8 Importance and validity 80 QIs of output component

Code of 80 QIs	Mean	IOC	Selected or removed QI
Drug selection (4 QIs)			
OP1	3.94	0.63	Removed
OP2	3.81	0.56	Removed
OP3	3.67	0.50	Removed
OP4	3.50	0.44	Removed
Drug procurement (7 QIs)			
OP5	3.83	0.61	Removed
OP6	3.33	0.44	Removed
OP7	4.00	0.78	Selected
OP8	3.11	0.28	Removed
OP9	3.50	0.61	Removed
OP10	3.33	0.44	Removed
OP11	3.58	0.26	Removed
Drug storage and distribution (6 QIs)			
OP12	4.63	1.00	Selected
OP13	4.63	0.84	Selected
OP14	3.74	0.37	Removed
OP15	3.74	0.39	Removed
OP16	4.26	0.84	Selected
OP17	4.26	0.68	Selected
OP18	4.17	0.78	Selected
OP19	4.25	0.76	Selected
OP20	4.25	0.75	Selected
OP21	3.63	0.56	Removed
OP22	4.37	0.81	Selected
OP23	4.31	0.94	Selected
OP24	4.59	0.88	Selected
OP25	4.18	0.82	Selected
OP26	4.29	0.82	Selected
OP27	4.59	0.88	Selected
OP28	4.06	0.71	Selected
OP29	4.50	0.82	Selected
OP30	4.50	0.87	Selected
OP31	4.19	0.81	Selected
OP32	4.19	0.81	Selected
OP33	4.35	0.87	Selected
OP34	4.18	0.81	Selected
OP35	4.53	0.87	Selected
OP36	4.12	0.47	Selected
OP37	4.06	0.47	Selected
OP38	3.83	0.33	Removed

Table 4.8 Importance and validity 80 QIs of output component (Cont.)

Code of 80 QIs	Mean	IOC	Selected or removed QI
OP39	3.28	0.44	Removed
OP40	3.94	0.39	Removed
OP41	3.94	0.50	Removed
OP42	3.89	0.50	Removed
OP43	3.50	0.13	Removed
OP44	3.69	0.38	Removed
OP45	3.19	0.06	Removed
OP46	3.13	0.13	Removed
OP47	3.13	0.00	Removed
OP48	3.63	0.25	Removed
OP49	3.19	0.12	Removed
OP50	4.00	0.50	Selected
OP51	3.00	0.06	Removed
OP52	4.20	0.60	Selected
OP53	3.87	0.47	Removed
OP54	3.67	0.47	Removed
OP55	3.27	0.27	Removed
OP56	3.87	0.47	Removed
OP57	3.93	0.53	Removed
OP58	3.60	0.40	Removed
OP59	2.92	0.46	Removed
OP60	3.60	0.53	Removed
OP61	3.53	0.53	Removed
OP62	3.27	0.40	Removed
OP63	3.47	0.33	Removed
OP64	3.73	0.47	Removed
OP65	2.88	0.25	Removed
OP66	2.56	0.12	Removed
OP67	3.07	0.19	Removed
OP68	3.07	0.19	Removed
OP69	3.27	0.19	Removed
OP70	3.60	0.31	Removed
OP71	3.47	0.31	Removed
OP72	3.40	0.25	Removed
OP73	3.06	0.19	Removed
OP74	3.31	0.31	Removed
OP75	3.75	0.56	Removed
OP76	3.94	0.37	Removed
OP77	3.88	0.50	Removed
OP78	3.25	0.38	Removed
OP79	3.21	0.07	Removed
OP80	3.38	0.38	Removed

For 5 QIs of outcome component were presented in Table 4.9. QIs of 2 key issues were analyzed as follows. Accessibility of drugs issue composed of 3 QIs. It was found that only 1 QI related to the available of drugs to health care setting. The other 2 QIs were excluded and involved the patients receiving single-source statins and clopidogrel in health insurance system. These excluded QIs are related the clinical data which are difficult in data collecting. All 2 QIs of RUDs issue were selected and involved that the population know how to take drugs correctly and population are safe from drug utilization without re-ADR. These QIs can represent the outcome of DSM at the hospitals and most of hospitals can operate.

Table 4.9 Importance and validity 5 QIs of outcome component

Code of 5 QIs	Mean	IOC	Selected or removed QI
Accessibility of drugs (3 QIs)			
OC1	4.33	0.32	Selected
OC2	3.06	0.24	Removed
OC3	2.88	0.12	Removed
RUDs (2 QIs)			
OC4	4.05	0.32	Selected
OC5	4.89	1.00	Selected

All of 201 QIs were recommended following four criterion of quality indicator as follows. There were 46 QIs of criteria 1 (Mean>4, IOC$\geq$0.7), 38 QIs of criteria 2 (Mean>4, IOC<0.7), 4 QIs of criteria 3 (Mean<4, IOC>0.7), and 113 QIs of criteria 4 (Mean<4, IOC<0.7). These QIs of 4 criterions were presented in Table 4.10.

For the first round of Delphi technique, 201 QIs were measured related to the importance and validity by twenty experts. 117 QIs were excluded and 84 QIs were selected. The selected QIs were improved and developed for the second round of Delphi technique. The overall of selected QIs were presented in Table 4.11. The QIs were classified in 10 key issues of DSM and 4 components of Logic model. (1) Resource component composed of 57 QIs which separated in 34 excluded QIs and 23 selected QIs: policy and regulation (6 excluded QIs, 9 selected QIs), budgeting and financing (9 excluded QIs), knowledge management (7 excluded QIs, 7 selected QIs), and human resource (12 excluded QIs, 7 selected QIs). (2) Activity component

composed of 59 QIs which classified in 27 excluded QIs and 32 selected QIs: Drug selection (9 excluded QIs, 2 selected QIs), Drug procurement (8 excluded QIs, 10 selected QIs), Drug storage and distribution (7 excluded QIs, 11 selected QIs), Drug use (3 excluded QIs, 9 selected QIs). (3) Output component consisted of 80 QIs which classified in 54 excluded QIs and 26 selected QIs: Drug selection (4 excluded QIs), Drug procurement (6 excluded QIs, 1 selected QIs), Drug storage and distribution (2 excluded QIs, 4 selected QIs), Drug use (42 excluded QIs, 21 selected QIs). (4) Outcome component consisted of 5 QIs, it was found that 1 of 3 QIs of accessibility of drugs was selected and 2 QIs were excluded; and all 2 QIs of RUDs QIs were selected.

Table 4.10 Number of QIs classified in 4 criterions

4 components and 10 key issues	**No. of Selected QIs**		**No. of Excluded QIs**		**Total No. of QIs**
	Criteria 1: (Mean>4, IOC≥0.7)	**Criteria 2: (Mean>4, IOC<0.7)**	**Criteria 3: (Mean<4, IOC>0.7)**	**Criteria 4: (Mean<4, IOC<0.7)**	
Resource component					
Policy and regulation	6*	3	0	5	15
Financing and budgeting	0	0	0	9	9
Knowledge management	0	7	2	5	14
Human resource	4	3	0	12	19
Activity component					
Drug selection	0	2	0	9	11
Drug procurement	6	4	1	7	18
Drug storage and distribution	5	6	1	6	18
Drug use	3	6	0	3	12
Output component					
Drug selection	0	0	0	4	4
Drug procurement	1	0	0	6	7
Drug storage and distribution	3	1	0	2	6
Drug use	17	4	0	42	63
Outcome component					
Accessibility of drugs	0	1	0	2	3
RUDs	1	1	0	0	2
Summarized QIs	**46**	**38**	**4**	**113**	**201**

* The RE3 is merged to the RE2, therefore, the policy and regulation had 6 QIs

Table 4.11 Number of excluded QIs and selected QIs following 10 key issues of DSM and 4 components of Logic model

Components of Logic model	Key issues of DSM	Number of QIs	Number of excluded QIs	Number of selected QIs
Resource component	**Total**	**57**	**34**	**23**
	Policy and regulation	15	6	9
	Financing and budgeting	9	9	0
	Knowledge management	14	7	7
	Human resource	19	12	7
Activity component	**Total**	**59**	**27**	**32**
	Drug selection	11	9	2
	Drug procurement	18	8	10
	Drug storage and distribution	18	7	11
	Drug use	12	3	9
Output component	**Total**	**80**	**54**	**26**
	Drug selection	4	4	0
	Drug procurement	7	6	1
	Drug storage and distribution	6	2	4
	Drug use	63	42	21
Outcome component	**Total**	**5**	**2**	**3**
	Accessibility of drugs	3	2	1
	RUDs	2	0	2
	Overall QIs	**201**	**117**	**84**

Eighty four QIs were presented in Table 4.12. The code of 84 selected QIs was shown according to key issues of DSM and component of Logic model for creating the questionnaire in second Delphi rounds as follows. (1) 23 QIs are related the resource component including: policy and regulation related on 9 QIs (RE1, RE2, RE4, RE5, RE6, RE7, RE13, RE14, and RE15); knowledge management composed of 7 QIs (RE25, RE27, RE29, RE31, RE32, RE34, and RE36); human resource consisted of 12 QIs (RE39, RE40, RE41, RE47, RE48, RE50, and RE53). (2) 32 QIs were involved with the activity component following: drug selection composed of 2 QIs (AC1 and AC2); drug procurement composed of 10 QIs (AC12, AC15, AC16, AC19, AC21, AC23, AC24, AC27, AC28, and AC29); drug storage and distribution consisted of 11 QIs (AC30, AC31, AC32, AC34, AC36, AC37, AC38, AC39, AC41, AC44, and AC46); and drug use composed of 9 QIs (AC48, AC51, AC52, AC53, AC55, AC56, AC57, AC58, and AC59). (3) 26 QIs were related on the output component as follows: drug procurement were found only 1 QI (OP7); drug storage and distribution consisted of 4 QIs (OP12, OP13, OP16, and OP17); and drug use composed of 21 QIs (OP18, OP19, OP20, OP22, OP23, OP24, OP25, OP26, OP27, OP28, OP29, OP30, OP31, OP32, OP33, OP34, OP35, OP36, OP37, OP39, and OP52). (4) 3 QIs were related on the outcome component as follow: accessibility of drugs was found only 1 QI (OC1) and RUDs was found 2 QIs: (OC4 and OC5).

Table 4.12 84 QIs were selected in the first Delphi round

Components of Logic model	Key issues of DSM	Number of QIs	Code of selected QIs
Resource	Policy and regulation	9	RE1 RE2 RE4 RE5 RE6 RE7 RE13 RE14 RE15
	Budgeting and financing	0	-
	Knowledge management	7	RE25 RE27 RE29 RE31 RE32 RE34 RE36
	Human resource	7	RE39 RE40 RE41 RE47 RE48 RE50 RE53
	Total	**23**	
Activity	Drug selection	2	AC1 AC2
	Drug procurement	10	AC12 AC15 AC16 AC19 AC21 AC23 AC24 AC27 AC28 AC29
	Drug storage and distribution	11	AC30 AC31 AC32 AC34 AC36 C37 AC38 AC39 AC41 AC44 AC46
	Drug use	9	AC48 AC51 AC52 AC53 AC55 AC56 AC57 AC58 AC59
	Total	**32**	
Output	Drug selection	0	-
	Drug procurement	1	OP7
	Drug storage and distribution	4	OP12 OP13 OP16 OP17
	Drug use	21	OP18 OP19 OP20 OP22 OP23 OP24 OP25 OP26 OP27 OP28 OP29 OP30 OP31 OP32 OP33 OP34 OP35 OP36 OP37 OP39 OP52
	Total	**26**	
Outcome	Accessibility of drugs	1	OC1
	RUDs	2	OC4 OC5
	Total	**3**	
	Overall QIs	**84**	

For next step in the first Delphi round, 84 QIs were analyzed for appropriateness, congruence, and feasibility rated by twenty experts. Each of QI was analyzed following two criteria: median (Md. > 3.00) and inter-quartile range (I.R. < 2.00). QIs which passed the two criteria were classified as "consensus" otherwise "dissensus" and were presented in Table 4.13 - 4.16.

23 QIs of the resource component were classified in three components as follows. (1) For 9 QIs of policy and regulation issue, it composed of 4 consensus QIs. They were RE1 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), RE2 (appropriateness: Md. 5.00, I.R. 1.75; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), RE13 (appropriateness: Md. 5.00, I.R. 1.75; congruence, Md. 5.00, I.R. 1.75; feasibility, Md. 5.00, I.R. 1.00), and RE14 (appropriateness: Md. 4.00, I.R. 2.75; congruence, Md. 4.00, I.R. 2.75; feasibility, Md. 4.00, I.R. 2.75). 5 QIs were defined as dissensus as follows. RE4 (appropriateness: Md. 4.00, I.R. 2.75; congruence, Md. 4.00, I.R. 2.75; feasibility, Md. 4.00, I.R. 2.75), RE5 (appropriateness: Md. 3.00, I.R. 2.00; congruence, Md. 3.00, I.R. 2.25; feasibility, Md. 3.00, I.R. 2.00), RE6 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.75), RE7 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), and RE15 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

(2) For total of 7 QIs of knowledge management issue, it composed of 3 consensus QIs including: RE27 (appropriateness: Md. 3.50, I.R. 1.25; congruence, Md. 3.00, I.R. 1.25; feasibility, Md. 4.00, I.R. 1.25), and RE32 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.50; feasibility, Md. 5.00, I.R. 1.25). The remained 5 QIs were dissessus as follows. RE25 (appropriateness: Md. 4.00, I.R. 2.25; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE31 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE34 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE36 (appropriateness: Md. 4.00, I.R. 2.50; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), and RE29 (appropriateness: Md. 4.00, I.R. 1.50; congruence, Md. 4.00, I.R. 2.00; feasibility,

Md. 4.00, I.R. 2.50). The last QI, RE29, passed the appropriateness but it did not pass others two criterions, so, the QI was defined as dissensus.

(3) For the total of 7 QIs of human resource issue, it composed of 2 consensus QIs including: RE50 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00) and RE53 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.50). 5 QIs were defined as dissensus. They were RE39 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE40 (appropriateness: Md. 4.00, I.R. 2.25; congruence, Md. 4.00, I.R. 2.25; feasibility, Md. 4.00, I.R. 2.25), RE41 (appropriateness: Md. 4.00, I.R. 3.00; congruence, Md. 4.00, I.R. 2.25; feasibility, Md. 4.00, I.R. 3.00), RE48 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.25), and RE47 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 5.00, I.R. 1.25; feasibility, Md. 5.00, I.R. 2.00). The last QI, RE47, passed the appropriateness and congruence but it did not pass the feasibility, therefore, the QI was defined as dissensus.

32 QIs of the activity component were classified in four issues as follows (Table 4.13). (1) 2 QIs of drug selection were defined as dissensus. They were AC1 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.25) and AC2 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.50). It was noticed that the QI (AC1) passed the appropriateness but it did not pass the others criterion, therefore, this QI was dissensus.

(2) 10 QIs of drug procurement composed of 2 consensus QIs including: AC16 (appropriateness: Md. 4.50, I.R. 1.25; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.25) and AC27 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.25). For the remained 8 QIs were dissensus. They were AC12 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), AC15 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 3.50, I.R. 2.00), AC19 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.25), AC21 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 5.00, I.R. 1.25; feasibility, Md. 5.00, I.R. 2.00),

Table 4.13 Median and inter-quartile range of appropriateness, congruence, and feasibility of 23 QIs in resource component (the first Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Policy and regulation	RE1	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	RE2	5.00	1.75	5.00	1.00	5.00	1.00	Consensus
	RE4	4.00	2.75	4.00	2.75	4.00	2.75	Dissensus
	RE5	3.00	2.00	3.00	2.25	3.00	2.00	Dissensus
	RE6	4.00	2.00	4.00	2.00	4.00	2.75	Dissensus
	RE7	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE13	5.00	1.75	5.00	1.75	5.00	1.00	Consensus
	RE14	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	RE15	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
Knowledge management	RE25	4.00	2.25	4.00	2.00	4.00	2.25	Dissensus
	RE27	3.50	1.25	3.00	1.25	4.00	1.25	Consensus
	RE29	4.00	1.50	4.00	2.00	4.00	2.50	Dissensus
	RE31	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE32	5.00	1.00	5.00	1.50	5.00	1.25	Consensus
	RE34	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE36	4.00	2.50	5.00	2.00	4.00	2.00	Dissensus
Human resource	RE39	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE40	4.50	2.25	4.50	2.25	4.00	2.25	Dissensus
	RE41	4.00	3.00	4.00	2.25	4.00	3.00	Dissensus
	RE47	5.00	1.25	5.00	1.25	5.00	2.00	Dissensus
	RE48	4.00	2.00	4.00	2.00	4.00	2.25	Dissensus
	RE50	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	RE53	5.00	1.00	5.00	1.00	4.50	1.50	Consensus

AC23 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), AC24 (appropriateness: Md. 4.00, I.R. 1.25; congruence, Md. 4.00, I.R. 1.25; feasibility, Md. 4.00, I.R. 2.00), AC28 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.25; feasibility, Md. 4.00, I.R. 2.00), and AC29 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 4.50, I.R. 2.00). The appropriateness and

congruence of AC21 and AC24 were passed but the feasibility of the 2 QIs did not pass, therefore, both of the QIs were dissensus.

(3) 11 QIs of drug storage and distribution composed of 4 consensus QIs including: AC30 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 0.25), AC38 (appropriateness: Md. 5.00, I.R. 1.50; congruence, Md. 5.00, I.R. 1.50; feasibility, Md. 5.00, I.R. 1.00), AC39 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and AC41 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.25). The remained QIs were dissensus including: AC31 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), AC32 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.25), AC34 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 4.50, I.R. 2.00), AC36 (appropriateness: Md. 4.00, I.R. 2.50; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.50, I.R. 2.75), AC37 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.50), AC44 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 4.50, I.R. 2.00), and AC46 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00).

(4) 9 QIs of drug use composed of 4 consensus QIs as follows: AC55 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 5.00, I.R. 1.25; feasibility, Md. 5.00, I.R. 1.00), AC56 (appropriateness: Md. 5.00, I.R. 0.00; congruence, Md. 5.00, I.R. 0.00; feasibility, Md. 5.00, I.R. 0.00), AC57 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and AC58 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00). 5 dissensus QIs were AC48 (appropriateness: Md. 3.50, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.50), AC51 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), AC52 (appropriateness: Md. 4.00, I.R. 2.50; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 3.25), AC53 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), and AC59

(appropriateness: Md. 4.00, I.R. 2.50; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

Table 4.14 Median and inter-quartile range of appropriateness, congruence, and feasibility of 32 QIs in activity component (the first Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Drug selection	AC1	5.00	1.25	4.50	2.00	5.00	2.25	Dissensus
	AC2	4.00	2.00	4.00	2.00	5.00	2.50	Dissensus
Drug selection	AC12	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC15	4.00	2.00	4.00	2.00	3.50	2.00	Dissensus
	AC16	4.50	1.25	4.50	1.00	5.00	1.25	Consensus
	AC19	5.00	2.00	5.00	2.00	5.00	2.25	Dissensus
	AC21	5.00	1.25	5.00	1.25	5.00	2.00	Dissensus
	AC23	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC24	4.00	1.25	4.00	1.25	4.00	2.00	Dissensus
	AC27	4.50	1.00	4.50	1.00	4.50	1.25	Consensus
	AC28	4.00	2.00	4.00	2.25	4.00	2.00	Dissensus
	AC29	4.50	2.00	4.50	2.00	4.50	2.00	Dissensus
Drug storage and distribution	AC30	5.00	1.00	5.00	1.00	5.00	0.25	Consensus
	AC31	4.50	2.00	4.50	2.00	5.00	2.00	Dissensus
	AC32	5.00	2.00	5.00	2.00	5.00	2.25	Dissensus
	AC34	4.50	2.00	4.50	2.00	4.50	2.00	Dissensus
	AC36	4.00	2.50	4.00	2.00	4.00	2.75	Dissensus
	AC37	4.00	2.00	4.00	2.00	4.00	2.50	Dissensus
	AC38	5.00	1.50	5.00	1.50	5.00	1.00	Consensus
	AC39	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC41	5.00	1.00	5.00	1.00	5.00	1.25	Consensus
	AC44	4.50	2.00	4.50	2.00	4.50	2.00	Dissensus
	AC46	4.50	2.00	4.50	2.00	5.00	2.00	Dissensus
Drug use	AC48	3.50	2.00	4.00	2.00	4.00	2.50	Dissensus
	AC51	5.00	2.00	4.00	2.00	5.00	2.00	Dissensus
	AC52	4.00	2.50	4.00	2.00	4.00	3.25	Dissensus
	AC53	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC55	5.00	1.25	5.00	1.25	5.00	1.00	Consensus
	AC56	5.00	0.00	5.00	0.00	5.00	0.00	Consensus
	AC57	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC58	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC59	4.00	2.50	4.00	2.00	4.00	2.00	Dissensus

26 QIs of the output component were classified following these issues as follows: (1) Only 1 QIs was OP7 of drug procurement was dissensus (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

(2) The overall of 4 QIs of drug storage and distribution was consensus. They were OP12 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP13 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP16 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), and OP17 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00).

(3) 13 QIs from the total of 21 QIs of drug use were classified as consensus. They were OP18 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.25), OP22 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), OP24 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP26 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), OP27 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP29 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP30 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP31 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), OP32 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), OP33 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP34 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), OP35 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and OP52 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00).

8 QIs of dissensus were OP19 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), OP20

(appropriateness: Md. 3.50, I.R. 2.00; congruence, Md. 3.50, I.R. 2.00; feasibility, Md. 3.50, I.R. 2.00), OP23 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.50), OP25 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), OP28 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.50), OP36 (appropriateness: Md. 5.00, I.R. 3.00; congruence, Md. 5.00, I.R. 3.00; feasibility, Md. 5.00, I.R. 3.00), OP37 (appropriateness: Md. 4.00, I.R. 2.50; congruence, Md. 4.00, I.R. 3.00; feasibility, Md. 5.00, I.R. 2.00), and OP50 (appropriateness: Md. 4.00, I.R. 3.00; congruence, Md. 4.00, I.R. 2.75; feasibility, Md. 3.00, I.R. 2.75).

3 QIs of the outcome component were analyzed. It was found only one consensus QI (OC5) (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00). For 2 dissensus QIs were OC1 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00) and OC4 (appropriateness: Md. 3.00, I.R. 3.00; congruence, Md. 4.00, I.R. 3.00; feasibility, Md. 4.00, I.R. 3.00). (Table 4.16)

Table 4.15 Median and inter-quartile range of appropriateness, congruence, and feasibility of 26 QIs in output component (the first Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Drug procure-ment	OP7	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
Drug storage and distribution	OP12	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP13	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP16	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	OP17	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
Drug use	OP18	5.00	1.00	5.00	1.00	4.00	1.25	Consensus
	OP19	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	OP20	3.50	2.00	3.50	2.00	3.50	2.00	Dissensus
	OP22	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	OP23	4.00	2.00	4.00	2.00	4.00	2.50	Dissensus
	OP24	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP25	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	OP26	4.00	1.00	5.00	1.00	4.00	1.00	Consensus
	OP27	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP28	4.00	2.00	4.00	2.00	4.00	2.50	Dissensus
	OP29	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP30	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP31	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	OP32	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	OP33	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP34	4.00	1.00	4.00	1.00	4.00	1.00	Consensus
	OP35	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP36	5.00	3.00	5.00	3.00	5.00	3.00	Dissensus
	OP37	4.00	2.50	4.00	3.00	5.00	2.00	Dissensus
	OP50	4.00	3.00	4.00	2.75	3.00	2.75	Dissensus
	OP52	4.00	1.00	4.00	1.00	4.00	1.00	Consensus

Table 4.16 Median and inter-quartile range of appropriateness, congruence, and feasibility of 3 QIs in outcome component (the first Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Accessi-bility	OC1	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
RUDs	OC4	3.00	3.00	4.00	3.00	4.00	3.00	Dissensus
	OC5	5.00	1.00	5.00	1.00	5.00	1.00	Consensus

For the second Delphi round, 84 QIs were re-tested for appropriateness, congruence, and feasibility by the same experts. The results are presented in Table 4.17. Each of QI was analyzed following the three criterions by using median (Md.>3.00) and inter-quartile range (I.R.<2.00). The consensus QIs of the second Delphi round will be selected as potential QIs when the results following the three criterions of each QI in the second Delphi round should be in agreement with the results in the first Delphi round.

For the results of the second Delphi round, 23 QIs of the resource component were classified in three issues as follows. (1) 9 QIs of policy and regulation issue composed of 5 consensus QIs including: RE1 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), RE2 (appropriateness: Md. 5.00, I.R. 0.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 0.75), RE7 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.00, I.R. 1.75; feasibility, Md. 4.00, I.R. 1.75),RE13 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.75; feasibility, Md. 5.00, I.R. 1.00), and RE14 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00). 4 dissensus QIs were RE4 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 4.50, I.R. 1.75; feasibility, Md. 4.50, I.R. 2.00), RE5 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE6 (appropriateness: Md. 4.00, I.R. 1.75; congruence, Md.

4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.75), and RE15 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

(2) 7 QIs of knowledge management issue composed of 3 consensus QIs including: RE25 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.75), RE27 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 3.50, I.R. 1.50; feasibility, Md. 3.00, I.R. 1.00), and RE36 (appropriateness: Md. 4.00, I.R. 1.75; congruence, Md. 4.00, I.R. 1.75; feasibility, Md. 4.00, I.R. 1.00).

4 QIs were dissensus as follows. RE29 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 3.50, I.R. 2.00), RE31 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE34 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE32 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.75), and RE34 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

(3) 7 QIs of human resource issue composed of 3 selected QIs including: RE48 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.75), RE50 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and RE53 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.50).

4 QIs were dissensus as follows. RE39 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.75), RE40 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), RE41 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), and RE47 (appropriateness: Md. 4.00, I.R. 1.75; congruence, Md. 4.50, I.R. 1.75; feasibility, Md. 4.00, I.R. 2.00). The last QI, RE47, passed the appropriateness and congruence but it did not pass the feasibility, therefore, this QI was dissensus.

Table 4.17 Median and inter-quartile range of appropriateness, congruence, and feasibility of 23 QIs in resource component (the second Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Policy and regulation	RE1	4.50	1.00	4.00	1.00	4.00	1.00	Consensus
	RE2	5.00	0.75	5.00	1.00	5.00	0.75	Consensus
	RE4	5.00	1.00	4.50	1.75	4.50	2.00	Dissensus
	RE5	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE6	5.00	1.75	4.50	2.00	4.50	2.00	Dissensus
	RE7	4.50	1.00	4.00	1.75	4.00	1.75	Consensus
	RE13	5.00	1.00	5.00	1.75	5.00	1.00	Consensus
	RE14	5.00	1.00	4.50	1.00	4.50	1.00	Consensus
	RE15	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
Knowledge management	RE25	4.00	1.00	4.00	1.00	4.00	1.75	Consensus
	RE27	4.00	1.00	3.50	1.75	3.00	1.00	Consensus
	RE29	4.00	2.00	4.00	2.00	3.50	2.00	Dissensus
	RE31	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE32	4.00	2.00	4.00	2.00	4.00	2.75	Dissensus
	RE34	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE36	4.00	1.75	4.00	1.75	4.00	1.00	Consensus
Human resource	RE39	4.00	2.00	4.00	2.00	4.00	2.75	Dissensus
	RE40	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE41	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	RE47	4.50	1.75	4.50	1.75	4.00	2.00	Dissensus
	RE48	5.00	1.00	5.00	1.00	5.00	1.75	Consensus
	RE50	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	RE53	5.00	1.00	5.00	1.00	5.00	1.50	Consensus

32 QIs of the activity component were classified in four issues as follows. (1) 2 QIs of drug selection issue were dissensus. They were AC1 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00) and AC2 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00).

(2) 10 QIs of drug procurement issue composed of 4 consensus QIs including: AC16 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.00), AC19 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00), AC21 (appropriateness: Md. 4.50, I.R. 1.25; congruence, Md. 4.50, I.R. 1.25; feasibility, Md. 5.00, I.R. 1.00), and AC27 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.00, I.R. 1.75).

6 QIs were dissensus as follows. AC12 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), AC15 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), AC23 (appropriateness: Md. 4.00, I.R. 3.00; congruence, Md. 4.00, I.R. 3.00; feasibility, Md. 4.00, I.R. 3.00), AC24 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), AC28 (appropriateness: Md. 3.00, I.R. 3.00; congruence, Md. 3.00, I.R. 3.00; feasibility, Md. 3.00, I.R. 3.00), and AC29 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 3.00).

(3) 11 QIs of drug storage and distribution issue composed of 6 QIs were consensus. They were AC30 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), AC31 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), AC34 (appropriateness: Md. 4.50, I.R. 1.25; congruence, Md. 4.50, I.R. 1.25; feasibility, Md. 4.00, I.R. 1.00), AC38 (appropriateness: Md. 5.00, I.R. 0.00; congruence, Md. 5.00, I.R. 0.00; feasibility, Md. 5.00, I.R. 0.00), AC39 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and AC41 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.25).

5 QIs were dissensus. They were AC32 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), AC36 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 3.00), AC37 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 3.00), AC44 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.50), and AC46

(appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 1.00). AC46 was found that the expert disagreed with the congruence, but not the appropriateness and feasibility.

(4) 9 QIs of drug use issue composed of 4 consensus QIs. They were AC55 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), AC56 (appropriateness: Md. 5.00, I.R. 0.25; congruence, Md. 5.00, I.R. 0.25; feasibility, Md. 5.00, I.R. 0.00), AC57 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and AC58 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00).

5 QIs were dissensus. They were AC48 (appropriateness: Md. 4.00, I.R. 3.00; congruence, Md. 4.00, I.R. 3.00; feasibility, Md. 3.50, I.R. 3.25), AC51 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), AC52 (appropriateness: Md. 3.50, I.R. 3.00; congruence, Md. 4.00, I.R. 3.00; feasibility, Md. 3.00, I.R. 3.00), AC53 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00), and AC59 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

26 QIs of the output component were classified in three issues as follows (Table 4.19). (1) Only 1 QIs (OP7, appropriateness: Md. 5.00, I.R. 0.00; congruence, Md. 5.00, I.R. 0.00; feasibility, Md. 5.00, I.R. 0.00) of drug procurement was consensus.

(2) The overall of 4 QIs of drug storage and distribution issue were consensus. They were OP12 (appropriateness: Md. 5.00, I.R. 0.25; congruence, Md. 5.00, I.R. 0.25; feasibility, Md. 5.00, I.R. 0.25), OP13 (appropriateness: Md. 5.00, I.R. 0.00; congruence, Md. 5.00, I.R. 0.00; feasibility, Md. 5.00, I.R. 0.00), OP16 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), and OP17 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.25).

Table 4.18 Median and inter-quartile range of appropriateness, congruence, and feasibility of 32 QIs in activity component (the second Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Drug selection	AC1	4.50	1.00	4.50	1.00	4.50	1.00	Consensus
	AC2	5.00	1.00	5.00	1.00	4.00	1.00	Consensus
Drug procurement	AC12	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC15	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC16	4.50	1.00	4.50	1.00	4.00	1.00	Consensus
	AC19	5.00	1.00	5.00	1.00	4.50	1.00	Consensus
	AC21	4.50	1.25	4.50	1.25	5.00	1.00	Consensus
	AC23	4.00	3.00	4.00	3.00	4.00	3.00	Dissensus
	AC24	4.00	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC27	4.00	1.00	4.00	1.00	4.00	1.75	Consensus
	AC28	3.00	3.00	3.00	3.00	3.00	3.00	Dissensus
	AC29	4.00	2.00	4.00	2.00	4.00	3.00	Dissensus
Drug storage and distribution	AC30	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC31	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC32	5.00	2.00	5.00	2.00	5.00	2.00	Dissensus
	AC34	4.50	1.25	4.50	1.25	4.00	1.00	Consensus
	AC36	4.00	2.00	4.00	2.00	4.00	3.00	Dissensus
	AC37	4.00	2.00	4.00	2.00	4.00	3.00	Dissensus
	AC38	5.00	0.00	5.00	0.00	5.00	0.00	Consensus
	AC39	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC41	5.00	1.00	5.00	1.00	5.00	1.25	Consensus
	AC44	4.00	2.00	4.00	2.00	4.00	2.50	Dissensus
	AC46	4.00	1.00	4.00	2.00	4.00	1.00	Dissensus
Drug use	AC48	4.00	3.00	4.00	3.00	3.50	3.25	Dissensus
	AC51	5.00	2.00	5.00	2.00	5.00	2.00	Dissensus
	AC52	3.50	3.00	4.00	3.00	3.00	3.00	Dissensus
	AC53	4.50	2.00	4.00	2.00	4.00	2.00	Dissensus
	AC55	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC56	5.00	0.25	5.00	0.25	5.00	0.00	Consensus
	AC57	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	AC58	5.00	1.00	5.00	1.00	5.00	0.50	Consensus
	AC59	4.50	2.00	4.00	2.00	4.00	2.00	Dissensus

(3) 21 QIs of drug use issue was classified. 15 QIs were consensus. They were OP18 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00), OP23 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00), OP24 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.25; feasibility, Md. 5.00, I.R. 1.00), OP25 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.00), OP26 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP27 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP28 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP29 (appropriateness: Md. 4.50, I.R. 1.00; congruence, Md. 4.00, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.25), OP30 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP31 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP32 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP33 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP34 (appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00), OP35 (appropriateness: Md. 5.00, I.R. 0.25; congruence, Md. 5.00, I.R. 0.25; feasibility, Md. 5.00, I.R. 1.00), and OP52 (appropriateness: Md. 4.00, I.R. 1.25; congruence, Md. 4.50, I.R. 1.00; feasibility, Md. 4.50, I.R. 1.25).

For 8 QIs were dissensus as follows: OP19 (appropriateness: Md. 4.00, I.R. 1.25; congruence, Md. 4.00, I.R. 1.25; feasibility, Md. 4.00, I.R. 2.00), OP20 (appropriateness: Md. 4.00, I.R. 2.00; congruence, Md. 4.00, I.R. 1.25; feasibility, Md. 4.00, I.R. 2.00), OP22 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 5.00, I.R. 1.25; feasibility, Md. 5.00, I.R. 2.00), OP36 (appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), OP37 (appropriateness: Md. 5.00, I.R. 1.25; congruence, Md. 4.50, I.R. 2.00; feasibility, Md. 5.00, I.R. 2.00), and OP50 (appropriateness: Md. 4.50, I.R. 2.00; congruence, Md. 5.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.25).

Table 4.19 Median and inter-quartile range of appropriateness, congruence, and feasibility of 26 QIs in output component (the second Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Drug procure -ment	OP7	5.00	0.00	5.00	0.25	5.00	0.00	Consensus
Drug storage and distribution	OP12	5.00	0.25	5.00	0.00	5.00	0.25	Consensus
	OP13	5.00	0.00	5.00	1.00	5.00	0.00	Consensus
	OP16	5.00	1.00	4.50	1.00	5.00	1.00	Consensus
	OP17	4.50	1.00	5.00	1.00	4.50	1.25	Consensus
Drug use	OP18	5.00	1.00	4.50	1.25	4.50	1.00	Consensus
	OP19	4.00	1.25	4.00	1.25	4.00	2.00	Dissensus
	OP20	4.00	2.00	5.00	1.25	4.00	2.00	Dissensus
	OP22	5.00	1.25	4.50	1.00	5.00	2.00	Dissensus
	OP23	4.50	1.00	5.00	1.25	4.50	1.00	Consensus
	OP24	5.00	1.00	4.50	1.00	5.00	1.00	Consensus
	OP25	4.50	1.00	5.00	1.00	4.50	1.00	Consensus
	OP26	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP27	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP28	5.00	1.00	4.00	1.00	5.00	1.00	Consensus
	OP29	4.50	1.00	5.00	1.00	4.50	1.25	Consensus
	OP30	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP31	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP32	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP33	5.00	1.00	5.00	1.00	5.00	1.00	Consensus
	OP34	5.00	1.00	5.00	0.25	5.00	1.00	Consensus
	OP35	5.00	0.25	5.00	2.00	5.00	1.00	Consensus
	OP36	5.00	2.00	4.50	2.00	5.00	2.00	Dissensus
	OP37	5.00	1.25	5.00	2.00	5.00	2.00	Dissensus
	OP50	4.50	2.00	4.50	1.00	4.00	2.25	Dissensus
	OP52	4.00	1.25	5.00	0.25	4.50	1.25	Consensus

3 QIs of the outcome component were analyzed as shown in Table 4.20. It was found only one consensus QI (OC5, appropriateness: Md. 5.00, I.R. 1.00; congruence, Md. 5.00, I.R. 1.00; feasibility, Md. 5.00, I.R. 1.00). 2 dissensus QIs were OC1(appropriateness: Md. 5.00, I.R. 2.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.50, I.R. 2.00) and OC4 (appropriateness: Md. 4.00, I.R. 1.00; congruence, Md. 4.00, I.R. 2.00; feasibility, Md. 4.00, I.R. 2.00).

Table 4.20 Median and inter-quartile range of appropriateness, congruence, and feasibility of 3 QIs in outcome component (the second Delphi round)

Key issues	List of QIs	Appropriateness		Congruence		Feasibility		Consensus or Dissensus
		Md.	I.R.	Md.	I.R.	Md.	I.R.	
Accessibility	OC1	5.00	2.00	4.00	2.00	4.50	2.00	Dissensus
RUDs	OC4	4.00	1.00	4.00	2.00	4.50	2.00	Dissensus
	OC5	5.00	1.00	5.00	1.00	5.00	1.00	Consensus

The decision for consensus or dissensus of 84 QIs in the first and second Delphi rounds were concluded in Table 4.21.

Table 4.21 The opinion of twenty experts for consensus or dissensus of 84 QIs of the two rounds of Delphi technique

Component of key issues	List of QIs	First Delphi round	Second Delphi round
Resource component			
Policy and regulation	RE1	Consensus	Consensus
	RE2	Consensus	Consensus
	RE4	Dissensus	Dissensus
	RE5	Dissensus	Dissensus
	RE6	Dissensus	Dissensus
	RE7	Dissensus	Consensus
	RE13	Consensus	Consensus
	RE14	Consensus	Consensus
	RE15	Dissensus	Dissensus
Knowledge management	RE25	Dissensus	Consensus
	RE27	Consensus	Consensus
	RE29	Dissensus	Dissensus
	RE31	Dissensus	Dissensus
	RE32	Consensus	Dissensus
	RE34	Dissensus	Dissensus
	RE36	Dissensus	Consensus
Human resource	RE39	Dissensus	Dissensus
	RE40	Dissensus	Dissensus
	RE41	Dissensus	Dissensus
	RE47	Dissensus	Dissensus
	RE48	Dissensus	Consensus
	RE50	Consensus	Consensus
	RE53	Consensus	Consensus
Activity component			
Drug selection	AC1	Dissensus	Consensus
	AC2	Dissensus	Consensus
Drug procurement	AC12	Dissensus	Dissensus
	AC15	Dissensus	Dissensus
	AC16	Consensus	Consensus
	AC19	Dissensus	Consensus

Table 4.21 The opinion of twenty experts for consensus or dissensus of 84 QIs of the two rounds of Delphi technique (Cont.)

Component of key issues	List of QIs	First Delphi round	Second Delphi round
Drug procurement	AC21	Dissensus	Consensus
	AC23	Dissensus	Dissensus
	AC24	Dissensus	Dissensus
	AC27	Consensus	Consensus
	AC28	Dissensus	Dissensus
	AC29	Dissensus	Dissensus
Drug storage and distribution	AC30	Consensus	Consensus
	AC31	Dissensus	Consensus
	AC32	Dissensus	Dissensus
	AC34	Dissensus	Consensus
	AC36	Dissensus	Dissensus
	AC37	Dissensus	Dissensus
	AC38	Consensus	Consensus
	AC39	Consensus	Consensus
	AC41	Consensus	Consensus
	AC44	Dissensus	Dissensus
	AC46	Dissensus	Dissensus
Drug use	AC48	Dissensus	Dissensus
	AC51	Dissensus	Dissensus
	AC52	Dissensus	Dissensus
	AC53	Dissensus	Dissensus
	AC55	Consensus	Consensus
	AC56	Consensus	Consensus
	AC57	Consensus	Consensus
	AC58	Consensus	Consensus
	AC59	Dissensus	Dissensus
Output component			
Drug procure -ment	OP7	Dissensus	Consensus
Drug storage and distribution	OP12	Consensus	Consensus
	OP13	Consensus	Consensus
	OP16	Consensus	Consensus
	OP17	Consensus	Consensus

Table 4.21 The opinion of twenty experts for consensus or dissensus of 84 QIs of the two rounds of Delphi technique (Cont.)

Component of key issues	List of QIs	First Delphi round	Second Delphi round
Drug use	OP18	Consensus	Consensus
	OP19	Dissensus	Dissensus
	OP20	Dissensus	Dissensus
	OP22	Consensus	Dissensus
	OP23	Dissensus	Consensus
	OP24	Consensus	Consensus
	OP25	Dissensus	Consensus
	OP26	Consensus	Consensus
	OP27	Consensus	Consensus
	OP28	Dissensus	Consensus
	OP29	Consensus	Consensus
	OP30	Consensus	Consensus
	OP31	Consensus	Consensus
	OP32	Consensus	Consensus
	OP33	Consensus	Consensus
	OP34	Consensus	Consensus
	OP35	Consensus	Consensus
	OP36	Dissensus	Dissensus
	OP37	Dissensus	Dissensus
	OP50	Dissensus	Dissensus
	OP52	Consensus	Consensus
Outcome component			
Access -ibility	OC1	Dissensus	Dissensus
RUDs	OC4	Dissensus	Dissensus
	OC5	Consensus	Consensus

84 QIs of the first and second Delphi rounds were concluded in Table 4.21. These QIs were evaluated for inter-rater reliability (IRR) by using Cohen's kappa statistic. It was found that the IRR result showed a good agreement ($k = 0.627$, P-value < 0.01). (Table 4.22)

Table 4.22 Inter-rater reliability of agreement by twenty experts

Measure of Agreement	Inter-rater reliability	Value	Sig.
	Kappa	.627	.000

For the results, total of 47 QIs showed the consensus of twenty experts. Noticeably, most of experts suggested to combine OP27 with OP23 because of similar meaning. The QIs were developed as a set of potential QIs for assessing DSM at the community hospitals. 47 QIs were justified from the agreement of the expert opinion in the second Delphi round as shown in Table 4.23. Resource component composed of 11 potential QIs: 5 potential QIs of policy and regulation, 3 potential QIs of knowledge management, and 3 potential QIs of human resource. Activity component consisted of 16 potential QIs: 2 potential QIs of drug selection, 4 potential QIs of drug procurement, 6 potential QIs of drug storage and distribution, and 4 potential QIs of drug use. Output component composed of 19 potential QIs: 1 potential QIs of drug procurement, 4 potential QIs of drug storage and distribution, and 15 potential QIs of drug use. Outcome component had only 1 potential QIs of RUDs.

Table 4.23 Code of QIs and number of QIs following 10 key issues of DSM

Components of Logic model	**Key issues**	**Code of QIs**	**Total No. of selected QIs**
Resource	Policy and regulation	RE1 RE2 RE7 RE13 RE14	5
	Knowledge management	RE25 RE27 RE36	3
	Human resource	RE48 RE50 RE53	3
Activity	Selection	AC1 AC2	2
	Procurement	AC16 AC19 AC21 AC27	4
	Storage and distribution	AC30 AC31 AC34 AC38 AC39 AC41	6
	Use	AC55 AC56 AC57 AC58	4
Output	Procurement	OP7	1
	Storage and distribution	OP12 OP13 OP16 OP17	4
	Use	OP18 OP23* OP24 OP25 OP26 OP28 OP29 OP30 OP31 OP32 OP33 OP34 OP35 OP52	14
Outcome	RUDs	OC5	1
Total			**47**

* OP23 and OP27 had similar meaning, the experts suggested to combine these two QIs as OP23

Discussion

In the first Delphi round 201 QIs were considered by twenty experts for importance and validity. 84 QIs were selected and were also measured by QI criterion of appropriateness, congruence, and feasibility which were reconsidered again in the second round.

In the second Delphi round 84 QIs were reconsidered by the same expert group and the same criterion of appropriateness, congruence, and feasibility. The results of expert's opinion in the first round and the second round were evaluated for the inter-rater reliability (IRR). Only 48 QIs were consensus according to the appropriateness, congruence, and feasibility following the IRR value. However, the experts suggested that two QIs (OP23 and OP27) had similar meaning, therefore, the two QIs were combine together as OP23. Consequently, total of 47 QIs were consensus. Both of consensus and dissensus QIs are discussed according to four components of Logic model and key issues of DSM.

(1) Resource component consisted of 11 consensus QIs and 12 dissensus QIs: policy and regulation (5 consensus QIs, 4 dissensus QIs), knowledge management (3 consensus QIs, 4 dissensus QIs), and human resource (3 consensus QIs, 4 dissensus QIs) as follows.

The 5 consensus QIs of policy and regulation issue are RE1, RE2, RE7, RE13, and RE14. RE1 involves the implement of the NDP to develop the DSM at the community hospitals. The QI is very important to reflect the operation of NDP implement. In Thailand NDP was updated and approved in 2011. It comprised of four strategies for operation and development of DSM (National Drug Committee, 2011). Developing countries and African countries focused on implement of the NDP roles/functions in the countries. The guideline of NDP are intended to develop and implement a comprehensive NDP which is appropriate to need, priorities, and resources of each country (WHO, 2010).

RE2 relates to the implementation of drug safety policy. The consensus of the experts was shown because it represents the operation of drug safety for patient safety. This finding corresponds to the mission in promotion and protection of the public health of many countries (IOM, 2006; Turner, 2009). In Thailand, the HA

institute developed and implied the National Patient Safety Goals (NPSGs) to the public and private hospitals (HA Institute, 2011).

RE7 involves the health personnel who's practice following the regulation of DSM at community hospitals. In the first round the experts disagreed to the QI because scoring of the QI was not defined clearly and it was difficult to measure. Therefore, RE7 was improved and was selected in the second round. The scoring of QI is defined to assess the regulations for efficiency improvement on DSM (1999). The operation composed of eight activities. Some experts suggested that drug production activity, one of eight activities, should be removed because of most community hospitals have no drug production in the hospitals. The drug production is only found in the regional and general hospitals.

RE13 measures the responsibility of PTCs. All experts agreed with this QI in both Delphi rounds. PTCs are established in hospitals to consider the DSM policy in the hospital and perform the other activities of PTCs (Weekes and Brooks, 1996; Weekes et al, 1998). This QI is similar to indicator of performance measurement of Drug and Therapeutics Committees (DTCs) of the NSW TAG in Australia (CSHSH, 1994; Mannebach et al, 1996; Weekes and Brooks, 1996; Sripiroj, 2006).

RE14 assesses the providing of drug purchasing plan. The experts agreed with this QI in both Delphi rounds. In Thailand, MOPH emphasized the drug purchasing plan following the supply regulation of the office of Prime Minister in 1998 and 1999. In North American and European countries, there was a study on the purchasing and supply management to increase the potential of the activities and procurement process to improve purchasing effectiveness and efficiency, and in addition to improve the overall purchasing capability (Center for Advanced Purchasing Studies, 1999).

For 4 dissensus QIs (RE4, RE5, RE6, and RE15) of policy and regulation, it was found that RE4, involving the implementation of quality of drug use criteria, was disagreed in appropriateness, congruence, and feasibility. In the second round, the experts only agreed with the appropriateness and congruence. For the feasibility, the experts disagreed because some drugs were refered from regional and general hospitals. These drugs could not be assessed by using DUE or DUR process in the community hospitals. This QI is similar to RE2.

RE5 relates the implementation of ASU. The experts dissensus with the QI in both Delphi rounds. Some experts suggested that the QI depends on the diagnosis and treatmemt of each patient.

RE6 assesses the update of the hospital formulary. In the first Delphi round, the experts dissensus. In the second Delphi round, only appropriateness is consensus but not for congruence and feasibility. The experts suggested that the hospital formulary should be improved together with the EDs. This QI related to the AC2. The experts justified AC2 for assessing the hospital formulary in drug selection process. Conversely, MOPH stipulated the regulation to update hospital formulary 1-2 times per year (Office of the Permanent Secretary, 1999)

RE15 involves the qualification of purchased drugs from agencies by MOPH. For both of Delphi rounds, the experts considered as dissensus with the QI, since the QI was not sensitive to the quality of drugs because it was only one activity in drug procurement process. Almost drugs were analyzed in drug purchasing group process at the provincial level by the drug committee of Provincial Public Health Office.

Three consensus QIs of knowledge management issue are as follows. RE25 relates to the pharmacy information service which was improved from DIC. The DIC is set at the central and general hospitals. The experts considered as dissensus with the QI and sugested that the scoring should be clearly identified. When this QI was reconsidered in the second round, the experts considered as consensus with the QI to measure the operation of pharmacy information service. In agreement with previous study, it was reported that medicine information services provided by pharmacists were valuable and useful for the patients (McEntee et al, 2010).

RE27 measures the satisfaction of pharmacy information service. This QI is connected to the RE25. The experts considered as consensus with this QI in both Delphi rounds. The QI corresponds to the study of Wongpoowarak et al (2010) in evaluating the quality of drug information service. It was found that the providers and receivers satisfied above 3 from 5. Oparah and Kikanme studied the consumer satisfaction at community pharmacies. It was found that the consumer rated moderate service satisfaction (Oparah and Kikanme, 2006).

RE36 measures the data of patient compliance collected in database. In the first Delphi round, the experts considered as dissensus in appropriateness,

congruence, and feasibility. They suggested that the QI should be determined the drug compliance of patients in chronic disease. Moreover, the QI is difficult to collect data. Therefore, the QI was improved. The explanation and the scoring were clearly defined. The experts consensus with the QI in the second round.

Four dissensus QIs of knowledge management issue, RE29, RE31, RE32, and RE 34, relate to electronically collection of pharmaceutical data, retrieving other database together with beneficial aspects, collecting the prescribed drug data, collecting the database of physicians and prescribers. In the first Delphi round, the experts only consensus with the appropriateness, but not for congruence and feasibility. The scoring of RE29 did not clear and did not cover. Only the update database could not reflect the operation of pharmaceutical data. The experts also expressed their opinion to RE31 for dissensus. The experts suggested that the collected data should be identified for every day, every week, or every month and the data should be linked between public and private hospitals in area for monitoring and assessing of drug use. Another QI is RE34. The expert consensus in congruence and feasibility but dissensus with the appropriateness because drugs were prescribed not only by the physicians but sometime by others personnel such as pharmacists, nurses etc. For RE32, it was found that the experts consensus with the QI. When reconsidering of QIs in the second round, all QIs were dissensus.

Three QIs of human resource issue include RE48, RE50, and RE53. RE48 relates the system for PTCs consideraion of requests of using non-NLED. The experts considered as dissensus with the QI in the first Delphi round. On the other hand, they express their opinion to agree in second Delphi round. The committee is responsible to select the drugs both of ED and NED to the hospital formulary (Weekes et al, 1998; Anon, 1998; Sripiroj, 2006). RE50 relates the PTCs to endorse and promulgate the drug policy. RE53 relates PTCs controlling of drug use in treatment with unregistered indication. Therefore, the 3 QIs are important to present the operation of PTCs of human resource issue.

On the contrary, 4 QIs of human resource issue were dissensus. RE39 is about the PTCs operation following the mission stated in operation plan. RE40 is about the authority of PTCs to make decision on the availability and use of drugs. RE41 is about the number of PTCs meeting. RE47 is about the using data of academic

evidence in PTCs operation. The experts considered as dissensus with RE39, RE40, and RE41 in both Delphi round because they are insufficient to assess the operation of PTCs. For RE47 in the first Delphi round, the experts consensus with the QI in appropriateness and congruence but not for feasibility. Similar opinion was shown in the second round. They dissensus with the feasibility to collected data in community hospitals.

Activity component consisted of 16 consensus QIs and 20 dissensus QIs including: drug selection (2 consensus QIs), drug procurement (4 consensus QIs, 6 dissensus QIs), drug storage and distribution (6 consensus QIs, 5 dissensus QIs), and drug use (4 consensus QIs, 5 dissensus QIs) as follows.

Two consensus QIs of drug selection were as follows. AC1 is about measuring of the use GN in the hospital formulary. In the first Delphi round, the experts disagreed and suggested that the explanation did not cover. It should be concerned the use of GN for selecting drugs following the MOPH criteria. In the second round, the experts agreed with the QI in appropriateness, congruence, and feasibility. Some studies reported the promotion to use GN to control the drug items in hospital formulary (Lexchin, 2004; Kanavos et al., 2007). AC2 is about updating the hospital formulary by the official committee. For this QI, the experts expressed their opinion similar to the AC1. Previous study reported that the hospital must be set priorities of drug using which should be listed on the hospital formulary and this formulary should be updated (Mucklow, 2003; Martin et al, 2003).

Four consensus QIs of drug procurement issue composed of AC16, AC19, AC21, and AC27. AC16 relates the formal system for compliant reporting of drug quality. The experts agreed with this QI in both Delphi rounds. This QI is a key QI of drug procurement process to ensure that drugs safety because drug information system and reporting system should provide unbiased data and current information to stakeholder (Ambre et al, 1997).

AC19 measures group purchasing and co-bargaining of drugs at provincial level. It was found that the experts disagreed with the first Delphi round. When the QI was reconsidered in the second round, the experts agreed with the QI. They suggested that the group purchasing process is an essential regulation for hospital affiliated in MOPH (Office of the Permanent Secretary, 1999). Some studies showed

that the group purchasing process could decrease and save the hospital budget, and increase the efficiency of this process (Aunsanun, 1999; Pitaknitinun et al, 2003)

AC21 relates the selection criteria of quality drugs stipulated appropriately and clearly for each drug item. This QI help to ensure that each drug prescribed to a patient is safe, effective, and has acceptable quality (MSH, 2012).

AC27 involves the suitable software and hardware for database collecting of drug procurement. In both Delphi rounds, the experts expressed their opinion as consensus to the QI. The QI agreed with the other studies that many countries should provide program for collecting of the database and develop a new data information system (Enders et al., 2002; Fraser et al, 2004).

Six dissensus QIs of drug procurement issue consisted of AC12, AC15, AC23, AC24, AC 28, and AC 29. AC12 measures the supplier investigation system. The experts considered as dissensus with the QI because the MOPH has already stipulated the manufacturer to use COA form for quality control assurance. The AC12 is similar to the RE14 which is the QI in resource component and was consensus by the experts.

AC15 is about the ABC or VEN analysis. In both Delphi round, the QI was dissensus and removed. On the other hand, ABC and VEN analysis are beneficial tool for evaluating and classifying the item of drugs together with identifying drug use problems (WHO, 2004; Theptong, 2010).

AC23 assesses the formal plan to verify quantity of drugs for annual drug procurement. The QI was not agreed by the experts in both Delphi rounds. They suggested that the verification of drug quantity should be practiced following the measurement of MOPH (Office of the Permanent Secretary, 1999).

AC24 measures the data of drug procurement and drug cost each year to be information for the next procurement of drugs. In the first Delphi round, the experts considered as consensus in appropriateness and congruence, but not feasibility. When the QI was reconsidered in the second round, this QI was still dissensus for confirming to remove the QI.

AC28 assesses the personnel training of using the database program and AC29 evaluates the reliability of database system related to drug procurement. Both of QIs were dissensus by twenty experts in both Delphi rounds. The experts suggested that this QI could not represent the operation of drug procurement process.

Six consensus QIs of drug storage and distribution composed of AC30, AC31, AC34, AC38, AC39, and AC41. AC30 relates the good storage practice for drug inventory. In both Delphi rounds, the experts consensus with the QI. FEFO or FIFO systems are concerned in this process for protecting of drugs lost, dead stock, and over stock (MSH, 2012). The significant of this QI is focused on the drug lost in drug inventory corresponded to the study of expired drug in supply outlets by using FIFO and FEFO approaches (Nakyanzi et al, 2010).

AC31 involves the amount of drug storage and remaining drugs in ward. In the first Delphi round, the experts considered as dissensus with this QI. The experts suggested to improve the scoring of the QI and the detail of explanation should be defined. So, the QI was revised and was focused on the patient care team (PCT). This team should set the guideline of drug storage process and monitor the process. In the second round, the experts considered as consensus with the QIs. The QI in this study focuses on the PCT priority to operate following the guideline. Some studies showed that the unit dose and daily dose should be concerned (Schommer et al, 1993; Negele, 1994). For the AC31, the unit dose and daily dose is a subset in the process.

AC34 involves the investigation of ordered drugs before storage. In the first Delphi round, the experts considered as dissensus and suggested to modify the QI. In the hospitals, the investigation of ordered drugs is routine work before drugs entry the inventory and store in inventory. Therefore, the QI should be focused on the medication error in drug inventory. Then, the QI was improved and assessed by twenty experts in the second Delphi round. Consensus was resulted. This finding is similar to the study of the way to decrease medication error from the wrong selection of drugs in inventory by the staff for patient safety (McKesson Pharmacy System, 2010).

AC38 relates the available of emergency drugs at patient care unit. The experts considered as consensus with the QI in both Delphi rounds. They suggested that the PTCs should define the emergency drug items and criteria which comprised of drug volume, date of drug expired, and the appropriate of storage condition. This QI is corresponded to the improving of safety at the point of care (AHRQ, 2011)

AC39 relates drug dispensing system when pharmacy is closed. For both Delphi rounds the experts considered as consensus with the QI. This QI is used to

measure the dispensing when it is out of service time. The automated dispensing system has been suggested to effort and improve drug distribution system in the hospitals (Michael et al, 2012).

AC41 involves controlling of the temperature at drug inventory room. For both Delphi rounds, the experts considered as consensus with the QI. The QI is used as a measure of temperature record and humidity measurement. This QI consensus with the study of the proper control storage in terms of temperature, light, humidity, etc (Arshad et al, 2011).

Five dissensus QIs of drug storage and distribution issue composed of AC32, AC36, AC37, AC44, and AC46. AC32 relates to that the amount of drug recorded in stock card should be equal to the current stock. The experts considered as dissensus with the QI in the first Delphi round. Some experts suggested that this QI was similar to another one and the scoring had been verified for the different of drug inventory records between the stockcard and computer. The rational of QI was not sufficient to be consensus.

AC36 involves the staff who was trained to manage drug inventory and responsible for ordering, storing, or distribution of drugs. The experts considered as dissensus with the QI. Some experts responsed that this QI was a role or competency of working position; and it should be practiced following the working role. However, a few organization or institution in Thailand supports knowledge to health personnel but it is not adequate.

AC37 involves availability of a manual of drug inventory in the hospitals. The experts considered as dissensus with the QI in both Delphi rounds. The scoring is also not appropriate for measuring and not essential to reflect the operation of drug inventory. It is a basic work in drug inventory activities.

AC44 relates to systematically reserved drugs. In both Delphi rounds, the experts considered as dissensus with the QI because the same reason as AC37. The drug reserved systematically is a basic work of drug storage process.

AC46 involves distribution of drugs to PCUs/health facilities. The experts considered as dissensus with the QI in both Delphi rounds. The objective of the QI is to assess the availability of drugs to PCUs/ health facilities. The QI is similar to OC1.

The scoring is assessed from drugs lost and missing drugs. In the current situation, the hospital can support drugs to PCUs/ health facilities.

In the activity component 4 consensus QI and 6 dissensus QIs of drug use process were measured. It was found that the results of the first and the second Delphi round were similar.

Four consensus QIs of drug use were as follows. AC55 relates to the training program for health personnels regarding policy involving drug safety, drug prescription, and drug administration. The experts considered as consensus with the QI in both Delphi rounds. The experts suggested that the training program should be operated continuously by using documented, public relations, etc to support knowledge management (MSH, 2012).

The other three QIs composed of AC56 which involves the assessment of ADR, AC57 which relates the assessment of HAD and AC58 which relates the assessment of DUE/DUR. The experts considered as consensus with the QIs in both Delphi rounds. These QIs had been developed by NHSO, therefore, the QIs were important for assessing the drug use processes.

Five dissensus QIs of drug use were as follows. AC48 relates legal substitution of generic drugs for brand name drugs by pharmacists. The experts considered as dissensus with the QI of in both Delphi rounds. This QI influences the physicians to use the generic drugs more than the pharmacists who practiced following the regulation or guideline (MSH, 2012). So, the QI was dissensus.

AC51 involves the use of drugs following STG. The experts considered as dissensus with the QI in both Delphi rounds. They suggested that the STG had been developed for a disease or some situation of disease in each specific area. It is possible to measure but it is difficult to be assessed or compared between hospitals in different areas and different situations. This is a reason to justify for excluding of the QI.

AC52 relates the concept of NLED in part of training curricula for health personnels. In both Delphi round, the expert considered as dissensus with the QI. The experts suggested that the training curricula of NLED should be focused on the physicians as well as other health personnel to promote the beneficially use of NLED.

In contrast, some expert stated that the STG should be studied in academic institutions.

AC53 involves the treatment for patients from starting drug administration to post discharge. In both Delphi round, the expert considered as dissensus with the QI. They recommended that the QI was essential but, in practice, was difficult. Thus, this QI was not represented the results of the process directly. For the AC59, relating the assessment of ASU activity, the expert considered as dissensus with the QI in both Delphi rounds. Most of the community hospitals are just start of ASU implement. The use of antibiotic drugs is difficult to control in community. In Thailand, people can access this drug easily because there are unclearly controlling of antibiotic dispensing at the drug store.

Output component consisted of 19 consensus QIs and 7 dissensus QIs including: drug procurement (1 consensus QIs), drug storage and distribution (4 consensus QIs), and drug use (14 consensus QIs, 7 dissensus QIs) as follows.

In drug procurement, it was found only one QI (OP7) involved the value of procurement for drugs on the NLED. The QI was dissensus in the first Delphi round but consensus in the second Delphi round. In Thailand, MOPH implemented the principle of efficiency improvement on DSM in 1999 which drug procurement was one of the issues. This issue is determined to reduce drug items in the hospital formulary and to increase drug use on NLED. Therefore, the criterion was developed as more than the 90% proportion of drugs on NLED are in the drug list for the community hospitals (Office of the Permanent Secretary, 1999). The QI has been used for monitoring and evaluation by the Bureau of Inspection and Evaluation in 2010; and DMSIC under MOPH in 2009. For the other countries, it was found that most of studies were similar in focusing on the ED of the NLED in drug selection and procurement process (Hogerzeil et al., 2006; WHO, 2009).

Drug storage and distribution issue composed of 4 consensus QIs as follows. OP12 measures the number of month of minimum stock for drug inventory. In both Delphi rounds, the experts considered as consensus with the QI. MOPH has been defined the month of minimum stock drug inventory as not more than 3 months.

OP13 relates the drug lost. In this study, the drugs lost involve the drugs which are unable to be found in inventory. In both Delphi rounds, the experts

considered as consensus with the QI. OP16 relates the error of drug inventory which represents the efficiency of the drug inventory. The experts considered as consensus with the QI in both Delphi rounds. The QI is benefit for prevention of the error from health personnel who managed the drug inventory, even if many factors influence the error (MSH, 2012). This process focuses on the the health personnel whose response in recording of drug inventory. They should have experience in checking of drugs and environment, etc, of drug inventory. OP17 relates to the drug lost value. In both Delphi rounds, the experts considered as consensus with the QI. They recommended that the QIs could assess the efficiency of DSM. The lost value can influence the financial situation of the hospitals. The cost of lost value are related to drug expired, drug loss in drug inventory, etc. (National Community Pharmacists Association, 2008).

In drug use issue, it composed of 14 consensus QIs as follows. OP12 measures the average waiting time of out-patients. In both Delphi rounds, the experts considered as consensus with the QI. They suggested that there were several types of hospitals, i.e different level, different health personnel, different context of place etc, therefore, this QI should be specified the average waiting time following the characteristic of the hospitals together with time in a day to measured such as rush time or on whole day.

Another QIs are involved the medication system. They are OP23, medication error percentage of prescribed drugs for out-patients by random investigation; OP24, OPD prescribing error; OP25 OPD transcribing error; OP26, OPD pre-dispensing error; OP28, OPD pre-administration error; OP29, OPD administration error; OP30, IPD prescribing error; OP31, IPD transcribing error; OP32, IPD pre-dispensing error; OP33, IPD dispensing error; OP34, IPD pre-administration error; and OP35, IPD administration error. All QIs are developed and implemented from PSyRIC and are monitored and evaluated by the HA institute (PSyRIC, 2007; HA Institute, 2011). All hospitals have to be evaluated and reported to the HA institute. The experts suggested that some QIs could be measured only in some the hospitals such as prescribing error and dispensing error because different hospitals have different capacity for doing the activities. All QIs represent the patient safety goal for reducing medication error and increasing patient safety as it was found in some countries for studying of the

prescribing and dispensing error (Christina, 2004; Garnerin et al., 2007; Kiekkas et al, 2011).

OP52 relates the proportion of patients with coronary heart disease (CHD), together with a recorded use of an antiplatelet drug within the last 12 months. In both Delphi rounds, the experts considered as consensus with the QI. This QI represents the performance of drug use process, but some community hospitals could not be assessed because these hospitals did not collect the data for calculation. However, the QI was consensus for assessing the DSM.

For outcome component, only OC5 was consensus. The QI relates to the drug safety. The experts considered as consensus with the QI that represents the RUDs for patient safety. Moreover, they suggested that it should be assessed the re-ADR at severe level of re-ADR at E-I.

The findings found that 47 QIs were consensus in the second Delphi round and could be used as a set of potential QIs for testing of DSM at thirty community hospitals in part 3.

Part III. Testing a set of potential QIs of DSM

Study period was from June 20, 2012 to July 31, 2012. The number of potential QIs in this part was 47 QIs. A retrospective study was used to examine a set of potential QIs. The pharmacists who are responsible for DSM in thirty community hospitals gathered the data of the year 2011 and sent back. The data are analyzed (1) general data of 47 QIs, (2) reliability of potential QIs, and (3) correlation between the results of each QI with the score of drug system standard of Bureau of Health Administration under MOPH.

The analysis of the data of 11 QIs in resource component classified in 3 DSM issues are presented in Table 4.24. They are policy and regulation (5 QIs), knowledge management (3 QIs), and human resource (3QIs).

For policy and regulation issue, 5QIs are included. For the results of RE1 analysis, it was found that scoring 2 was from 16 (53.3%) of 30 community hospitals for the implement of the NDP. Moreover, the policy was disseminated to health personnel for realizing and practicing in the hospital. Whereas, scoring 1, was from 13 (43.3%) hospitals for the implement of the NDP but only about PTCs and administration committee. For 1 hospital (3.3%), the score of 0 was resulted since there was no NDP implement in the hospital.

The results of RE2 measurement showed that all of 30 (100%) community hospitals were rated in scoring 2. It meant that drug safety policy was implemented more than two topics namely HAD, ADR/ADE, DUE/DUR, LASA, and medication error.

For the results of RE7 analyzing, it was found that scoring 2 was from 21 (70.0%) of 30 community hospitals which meant that the hospitals practice on the regulation of DSM covering of eight measures. They are (1) drug management, (2) drug requirement, (3) hospital formulary, (4) drug selection, (5) drug procurement and drug quality assurance, (6) drug production, (7) drug storage and distribution, and (8) drug utilization. While 9 (30.0%) hospitals were rated in scoring 1, which meant that these hospitals practiced only at least five measures.

For the results of RE13 assessing, it was found that 28 (93.3%) hospitals were rated in scoring 2. The QI relates the PTCs responsibility on more than 2 topics

of its roles on DSM and can be operated continuously. The roles of PTCs are (1) managing drug system, (2) drug use review, (3) stipulating criteria of drugs, (4) developing drug system, (5) reviewing and analyzing the cause of medication error, (6) monitoring ADR report, (7) DUE, and (8) others role. For scoring 1 and 2 (6.7%), community hospitals practiced at least 2 topics and can be operated continuously.

The results of RE 14 showed that scoring 2 was from 20 (66.7%) of 30 community hospitals. The hospitals have a drug purchasing plan annually and purchasing of drugs following the plan. For 10 (33.3%) community hospitals were rated on scoring 1. The hospitals had a drug purchasing plan annually but did not purchase drugs following the plan.

For knowledge management issue, 3 QIs are included. For the results of RE25 evaluation, it was found that scoring 2 was from 12 (40.0%) of 30 community hospitals. These hospitals can service more than three activities of the pharmacy information to providers, receivers, and people or patients. Whereas, for scoring 1 (17 hospitals, 56.7%), the pharmacy information was serviced at least two activities and for scoring 0 (1 hospital, 3.3%), NDP was not practiced the pharmacy information at the hospitals.

For the results of RE27 analysis, it was found that scoring 2 was from 10 (33.3%) of 30 community hospitals. The scoring was rated for more than 70% satisfaction of person who received the pharmacy information service. For scoring 1 (2 hospitals, 6.7%) 50-70% was received for the pharmacy information services and 0-50% satisfaction was for scoring 0 (17 hospitals, 56.7%).

For the RE36 evaluation, it was found that scoring 2 was from 1 (3.3%) of 30 community hospitals. It related to that the drug compliance data were collected covering all patients. While, for scoring 1 (25 hospitals, 83.3%), drug compliance data was collected but not covered all patients and for scoring 0, (4 hospitals, 13.3%) drug compliance data was not collected.

For the human resource issues, 3 QIs were included. For the results of RE48 measurement, it was found that scoring 2 was from 15 (50.0%) of 30 community hospitals. It involves the guideline stipulation of the PTCs to consider the requests of using non-NLED and all drugs were operated. For scoring 1 (10 hospitals, 33.3%), PTC stipulated guideline for consideration of requests for using non-NLED

but all drugs was not operated and for scoring 0, (5 hospitals, 16.7%), no PTC guideline was stipulated.

The result of RE50 evaluation, it was found that scoring 2 was from 23 (76.7%) of 30 community hospitals. It regarded to endorsement of hospital drug policy and the policy was promulgated. While for scoring 1, the hospital drug policy was not endorsed and was not promulgated, and for scoring 0, PTCs had no hospital drug policy and they were found from 6 (20.0%) and 1 (3.3%) hospitals, respectively.

For the result of RE53 assessment, it was found that scoring 2 was from 5 (16.7%) of 30 community hospitals. It regarded to PTC stipulation and monitoring of activities on unregistered indication of drugs. For scoring 1, the activity or policy was stipulated but was not monitored of drug used in treatment with unregistered indication by PTCs, and for scoring 0, the activity or policy was not stipulated and was not monitored and they were found from 7 (23.3%) and 14 (46.7%) hospitals, respectively.

The results of analysis of 16 QIs in activity component are presented in Table 4.25. 16 QIs are classified in drug selection (2 QIs), drug procurement (4 QIs), drug storage and distribution (6 QIs), and drug use (4QIs). For drug selection issue, 2 QIs were included. For AC1 analysis, it was found that scoring 2 was from 28 (93.3%) of 30 community hospitals. The scoring 2 was rated for 80 to 100% of the use of generic name in hospital formulary, whereas 51 to 79% for scoring 1 (2 hospitals, 6.7%).

For the results of AC2 measurement, it was found that scoring 2 was from 28 (93.3%) of 30 community hospitals. It related to improving of the hospital formulary in the last year and the hospital formulary was updated regarding to disease situation. Whereas for scoring 1 (2 hospitals, 6.7%), the hospital formulary in the last year was improved but was not updated.

4 QIs of drug procurement issue were as follows. For the results of AC16 analysis, it was found that scoring 2 was from 12 (40.0%) of 30 community hospitals. It involved stipulation of the supplier investigation system. For scoring 1 (14 hospitals, 46.7%), supplier investigation system was not set up but the reporting system was improved and for scoring 0 (4 hospitals, 13.3%), PTCs did not set up the supplier investigation system.

Table 4.24 Number and percentage of the results of 11 QIs in resource component

Code	Key issues and QIs	Scoring of QI			Total
		No. (%) Score=0	No. (%) Score=1	No. (%) Score=2	
	Policy and regulation (5 QIs)				
RE1	Is there any implementation of the national drug policy 2011 in developing of the DSM at the community hospital?	1 (3.3)	13 (43.3)	16 (53.5)	30 (100)
RE2	Is there any implementation of the drug safety policy in developing of the DSM at the community hospital?	-	-	30 (100)	30 (100)
RE7	Do the health personnel practice following the regulation of DSM?	-	9 (30.0)	21 (70.0)	30 (100)
RE13	Are PTCs responsible for DSM in the hospital?	-	2 (6.7)	28 (93.3)	30 (100)
RE14	Is a drug purchasing plan provided annually?	-	10 (33.3)	20 (66.7)	30 (100)
	Knowledge management (3 QIs)				
RE25	Is there serviced the pharmacy information?	1 (3.3)	17 (56.7)	12 (40.0)	30 (100)
RE27	Is there an assessment of the satisfaction of receivers from pharmacy information service? Missing = 1 (3.3)	17 (56.7)	2 (6.7)	10 (33.3)	29 (96.7)
RE36	Is there collected drug interaction data on database or OPD card?	4 (13.3)	25 (83.3)	1 (3.3)	30 (100)
	Human resource (3 QIs)				
RE48	Is there any system for consideration of requests for using non-NLED?	5 (16.7)	10 (33.3)	15 (50.0)	30 (100)
RE50	Is there drug policy endorsed and promulgated by the PTC?	1 (3.3)	6 (20.0)	23 (76.7)	30 (100)
RE53	Is the activity or policy stipualted by PTCs for monitoring of drug used in treatment with unregistered indication? Missing = 4 (13.3)	14 (46.7)	7 (23.3)	5 (16.7)	26 (86.7)

The results of AC19 measurement showed that all of 29 (96.7%, missing = 1) community hospitals were rated in scoring 2. It meant that value group purchasing of drugs at provincial level was more than 20%.

The results of AC21 measurement showed that scoring 2 was from 29 (96.7%) of 30 community hospitals. It related to the quality selection criterion of drugs was stipulated appropriately and clearly for each drug item. For scoring 1 (2 hospitals, 6.7%), the quality selection criterion of drugs was stipulated but was not operated.

The results of AC27 assessment showed that scoring 2 was from 23 (76.7%) of 30 community hospitals. It involved that the information system for efficient managing drug procurement was set up and data was utilized more than 2 times in one month. For scoring 1 (7 hospitals, 23.3%), the information system was set up and data was utilized at least 1 times in one month.

For drug storage and distribution issue, 6 QIs were included. The results of AC30 measurement showed that scoring 2 was from 12 (40.0%) of 29 community hospitals (missing = 1). It involved the good storage practice of drug inventory. Expired drugs, dead stock, and over stock were not found. For scoring 1 (11 hospitals, 36.7%), expired drugs were not found but deteriorated drugs, and for scoring 0 (6 hospitals, 20.0%), expired drugs were found.

For AC31 measurement, it was found that scoring 2 was from 20 (66.7%) of 30 community hospitals. It related to that the PCT defined the guideline of drug storage process and decreasion of remaining drugs in ward was resulted of the operation. For scoring 1 (10 hospitals, 33.3%), the guideline was defined but no operation in accordance with the guideline.

For AC34 results, it was found that scoring 2 was from 17 (56.7%) of 30 community hospitals. It involved the random investigation of ordered drugs before storage every time. Whereas scoring 1 (11 hospitals, 36.7%), ordered drugs were randomed some times and scoring 0 (2 hospitals, 6.7%), ordered drugs was not investigated.

The results of AC38 showed that scoring 2 was from 24 (80.0%) of 30 community hospitals. It involved the regular inspection of the emergency drugs available at patient care unit. For scoring 1 (5 hospitals, 16.7%), the emergency drugs

were inspected only for expiry date and, for scoring 0 (1 hospital, 3.3%), the emergency drugs were not inspected.

The results of AC39 showed that scoring 2 was from 16 (53.3%) of 29 community hospitals (missing = 1). It related to that the drug dispensing system was set up and prescribing data were reviewed. For scoring 1(12 hospital, 40.0%), the drug dispensing system was set up but the prescribing data were not reviewed and, for scoring 0 (1 hospital, 3.3%), the drug dispensing system at emergency room was set up when the pharmacy room closed but the drug items in the system were not defined.

For the results of AC41 assessment, it was found that scoring 2 was from 17 (80.0%) of 29 community hospitals (missing = 1). It related to that the temperature at the drug inventory room was recorded 2 times per day and the humidity was also measured. For scoring 1 (7 hospitals, 23.3%), the temperature was recorded but not in control and the humidity was measured and, for scoring 0 (7 hospitals, 20.0%), the temperature was recorded but not in control and the humidity was not measured.

For drug use issue, 4 QIs were as follows. The results of AC55 measurement showed that scoring 2 was from 5 (16.7%) of 30 community hospitals. It involved training of health personnels regarding policy on drug safety together with drug prescription and drug administration more than 2 topics per year. For scoring 1 (24 hospitals, 80.0%), the health personnels was trained 1-2 topics per year and, for scoring 0 (1 hospital, 3.3%), the health personnels was not trained.

The results of AC56 showed that scoring 2 was from 12 (40.0%) of 30 community hospitals. It related to the assessment of pharmacovigilance system and activity for drug safety regarding ADR were operated. They were (1) stipulating list of high alert drug for monitoring intensive APR, (2) managing APRM by PCT, and (3) finding of no ADR recurrence in the last 2 years. Whereas, for scoring 1 (10 hospitals, 33.3%), ADR were operated as follows (1) monitoring spontaneous APR, (2) reporting APR every case, (3) assessing ADR following Naranjo's algorithm of WHO criteria, (4) monitoring patients who was prescribed antihistamine, steroids or tracer agents, and (5) using re-ADR card.

For AC57, it was found that scoring 2 was from 10 (33.3%) of 30 community hospitals. It related to the assessment of HAD activities. The activities were (1) preparing datasource of toxicology as a coordination system for assistance

and referring of patients, (2) limiting the HAD access (3) reviewing HAD system for patients, (4) readily protection of the effect from HAD preparing of antidote, (5) finding of no medication error, and (6) performing patient safety without dead or admitted patients. Whereas, for scoring 1 (20 hospitals, 80.0%), HAD were operated as follows (1) stipulating HAD regulation, (2) preparing of the academic information, (3) preparing guideline and communication for HAD, (4) reducing duplication of strength and dosage form, (5) monitoring system for HAD, (6) transferring system, and (7) storing of these drugs separately from the other drugs.

For AC58, it was found that scoring 2 was from 4 (13.3%) of 30 community hospitals. It related to the assessment of DUE/DUR which was operated as follows (1) reporting the results of DUE/DUR to hospital committee or PTC, (2) managing practice guideline for treatment. For scoring 1 (24 hospitals, 80.0%), DUE/DUR were operated as follows (1) evaluating of drug utilization, (2) cooperating with physicians for managing the criteria of DUE/DUR, (3) evaluating of drug utilization in quality perspective of drugs, and (4) measuring retrospective DUE or concurrent DUE or prospective DUE each year and, for scoring 0 (2 hospitals, 6.7%), DUE/DUR were not operated.

The results of 19 QIs in output component are showed in Table 4.26. 19 QIs are classified in drug procurement (1 QI), drug storage and distribution (4 QIs), and drug use (14 QIs).

One QI of drug procurement issue was OP7. The values of procurement of NLED drugs evaluated from 30 community hospitals were 82% for minimum and 98.52% for maximum with mean value of 92.02 $\pm$ 3.90%.

For drug storage and distribution, 4 QIs were as follows. OP12 was the number of minimum stocking months for drugs in inventory evaluated from 30 community hospitals. The minimum stocking were between 1.39 - 3.60 months with mean value of 2.29 $\pm$ 0.57 months.

The OP13 was assessed the number of drugs out of stock. From 29 community hospitals, the number of drugs out of stock were found to be between 0 - 27 items of the time of assessment and its mean value was of 6.76 $\pm$ 6.77 items.

Table 4.25 Number and percentage of the results of 16 QIs in activity component

Code	Key issues and QIs	Scoring of QI			Total
		No. (%) Score=1	No. (%) Score=2	No. (%) Score=3	
	Drug selection (2 QIs)				
AC1	Is the generic name of drugs used in the hospital formulary?	-	2 (6.7)	28 (93.3)	30 (100.0)
AC2	Is there updated the hospital formulary regarding to disease situation?	-	2 (6.7)	28 (93.3)	30 (100.0)
	Drug procurement (4 QIs)				
AC16	Is there a supplier investigation system?	4 (13.3)	14 (46.7)	12 (40.0)	30 (100.0)
AC19	Is there group purchasing of drugs at provincial level? Missing 1(3.3)	-	-	29 (96.7)	29 (96.7)
AC21	Is the selection criterion of quality drugs stipulated appropriately and cleary for each drug item?	-	1 (3.3)	29 (96.7)	30 (100.0)
AC27	Is there the information system for managing drug procurement efficiency?	-	7 (23.3)	23 (76.7)	30 (100.0)
	Drug storage and distribution (6 QIs)				
AC30	Is the good storage practice used for drug inventory? Missing 1 (3.3)	6 (20.0)	11 (36.7)	12 (40.0)	29 (96.7)
AC31	Is there process of drug storage and remaining drugs in ward decreased	-	10 (33.3)	20 (66.7)	30 (100.0)
AC34	Is there investigation of ordered drugs before storage?	2 (6.7)	11 (36.7)	17 (56.7)	30 (100.0)
AC38	Is there inspection the emergency drugs available at patient care unit?	1 (3.3)	5 (16.7)	24 (80.0)	30 (100.0)
AC39	Is there the drug dispensing system when pharmacy is closed? Missing 1 (3.3)	1 (3.3)	12 (40.0)	16 (53.3)	29 (96.7)
AC41	Is temperature and humidity at the drug inventory room controlled?	6 (20.0)	7 (23.3)	17 (56.7)	29 (96.7)

Table 4.25 Number and percentage of the results of 16 QIs in activity component (Cont.)

Code	Key issues and QIs	Scoring of QI			Total
		No. (%) Score=1	No. (%) Score=2	No. (%) Score=3	
	Drug use (4 QIs)				
AC55	Is there a training program for hospital personnels regarding policy involving drug safety together with drug prescription and drug administration?	1 (3.3)	24 (80.0)	5 (16.7)	30 (100.0)
AC56	Is there an assessment of pharmacovigilance system and activity for drug safety regarding ADR?	-	18 (60.0)	12 (40.0)	30 (100.0)
AC57	Is there an assessment of HAD activity?	-	20 (66.7)	10 (33.3)	30 (100.0)
AC58	Is there an assessment of DUE/DUR activity?	2 (6.7)	24 (80.0)	4 (13.3)	30 (100.0)

The OP16 was assessed the error percentage of the drug inventory. From 19 community hospitals, the error percentage of drug inventory error was found to be between 0 - 16.67% with the mean value of 1.71 $\pm$ 3.85%.

The results of OP17, assessing from 16 community hospitals, showed that the value of drug lost was between 0 - 32,840.09 baht with mean value of 7,042.85 $\pm$ 8,215.43 baht.

Drug use issue composed of 19 QIs as follows. For OP18, the average waiting time of out-patients was measured into two criterions. (1) The average waiting time of out-patients in one day. From 25 community hospitals, average waiting times were between 5.00 - 27.00 minutes with mean value of 10.92 $\pm$ 4.46 minutes. (2) The average waiting time of out-patients on rush time. From 23 community hospitals, it was found to be 5.19 - 37.00 minutes with mean value of 16.51 $\pm$ 7.07 minutes.

The OP23 was measured medication error rate of dispensed drugs of out-patients by random investigation. From 30 community hospitals, the dispensing error rate was 0 - 9.00 times per 1,000 prescriptions with mean value of 0.97 $\pm$ 1.89 times per 1,000 prescriptions.

The OP24 was assessed medication error rate of prescribed drugs of out-patients. From 30 community hospitals, the prescribing error rate was 0.05 - 78.96 times per 1,000 prescriptions with mean value of 5.45 $\pm$ 14.25 times per 1,000 prescriptions.

The OP25 was assessed medication error rate of transcribing drugs of out-patients. From 23 community hospitals, the prescribing error rate was 0 - 11.31 times per 1,000 prescriptions with mean value of 2.20 $\pm$ 3.19 times per 1,000 prescriptions.

The OP26 was evaluated medication error rate of pre-dispensing drugs of out-patients. From 30 community hospitals, the pre-dispensing error rate was 0.30 - 32.71 times per 1,000 prescriptions with mean value of 5.76 $\pm$ 6.39 times per 1,000 prescriptions.

The OP28 was assessed medication error rate of pre-administration of drugs of out-patients. From 10 community hospitals, the pre- administration error rate was 0 - 36.41 times per 1,000 prescriptions with mean value of 5.70 $\pm$ 12.14 times per 1,000 prescriptions.

The OP29 was measured medication error rate of administration of drugs of out-patients. From 21 community hospitals, the administration error rate was 0 - 3.98 times per 1,000 prescriptions with mean value of 0.67 $\pm$ 0.99 times per 1,000 prescriptions.

The OP30 was analyzed medication error rate of prescribing drugs of in-patients. From 25 community hospitals, the prescribing error rate was 0 - 18.14 times per 1,000 prescriptions with mean value of 3.37 $\pm$ 4.91 times per 1,000 prescriptions.

The OP31 was assessed medication error rate of transcribing drugs of in-patients. From 26 community hospitals, the transcribing error rate was 0 - 48.85 times per 1,000 prescriptions with mean value of 6.02 $\pm$ 10.24 times per 1,000 prescriptions.

The OP32 was measured medication error rate of pre-dispensing drugs of in-patients. From 28 community hospitals, the pre-dispensing error rate was 0.03 -

173.02 times per 1,000 prescriptions with mean value of 16.34 ± 32.05 times per 1,000 prescriptions.

The OP33 was measured medication error rate of dispensing drugs of in-patients. From 28 community hospitals, the dispensing error rate was 0.05 - 27.82 times per 1,000 prescriptions with mean value of 5.40 ± 6.04 times per 1,000 prescriptions.

The OP34 was evaluated medication error rate of pre-administration of drugs of in-patients. From 13 community hospitals, the pre-administration error rate was 0 - 26.18 times per 1,000 prescriptions with mean value of 3.98 ± 7.12 times per 1,000 prescriptions.

The OP35 was evaluated medication error rate of administration of drugs of in-patients. From 29 community hospitals, the administration error rate was 0.07 - 101.39 times per 1,000 prescriptions mean value of 8.14 ± 18.74 times per 1,000 prescriptions.

And, the OP52 was assessed the proportion of patients with CHD, together with a recorded use of an antiplatelet drug within the last 12 months. From 4 community hospitals, the proportion of the patients was 0.03 - 280.00 patients per year with mean value of 89.77 ± 132.17 patients per year.

The analysis of the data of only one QI of RUDs issue of outcome component is presented in Table 4.27. The results of OC5 assessment showed that the rate of population safety from drug utilization without recurrent of ADR. From 29 community hospitals were 0 - 8.20 times per 1,000 patients with mean value of 0.59 ± 2.07 times per 1,000 patients.

Table 4.26 Statistic values of 19 QIs in output component

Code	Key issues and QIs	N	Min	Max	Mean	Sd.
	Drug procurement (1 QIs)					
OP7	Percentage of value of procurement for drugs on the NLED	30	82.0	98.52	92.02	3.90
	Drug storage and distribution(4 QIs)					
OP12	Number of minimum stocking months for drugs in inventory	30	1.39	3.60	2.29	0.57
OP13	Number of drugs which are out of stock	29	0	27.00	6.76	6.77
OP16	Percentage of error of drug inventory	19	0	16.67	1.71	3.85
OP17	Value of drug lost	16	0	32,840.09	7,042.85	8,215.43
	Drug use (14 QIs)					
OP18	Average waiting time of out-patient:	25	5.00	27.00	10.92	4.46
	(1) in one day	23	5.19	37.00	16.51	7.07
	(2) on rush time					
OP23	Medication error percentage of prescribed drugs for out-patients by random investigation	29	0	9.00	0.97	1.89
OP24	Medication error rate (OPD-Prescribing error)	30	0.05	78.96	5.45	14.25
OP25	Medication error rate (OPD-Transcribing error)	23	0	11.31	2.20	3.19
OP26	Medication error rate (OPD-Pre dispensing error)	30	0.30	32.71	5.76	6.39

Table 4.26 Statistic values of 19 QIs in output component (Cont.)

Code	Key issues and QIs	N	Min	Max	Mean	Sd.
OP28	Medication error rate (OPD-Pre administration error rate)	10	0	36.41	5.70	12.14
OP29	Medication error rate (OPD-Administration error rate)	21	0	3.98	.67	0.99
OP30	Medication error rate (IPD-Prescribing error)	25	0	18.14	3.37	4.91
OP31	Medication error rate (IPD-Transcribing error)	26	0	48.85	6.02	10.24
OP32	Medication error rate (IPD-Pre dispensing error)	28	0.03	173.02	16.34	32.05
OP33	Medication error rate (IPD-Dispensing error)	28	0.05	27.82	5.40	6.04
OP34	Medication error rate (IPD-Pre administration error rate)	13	0	26.18	3.98	7.12
OP35	Medication error rate (IPD-Administration error rate)	29	0.07	101.39	8.14	18.74
OP52	Proportion of patients with coronary heart disease (CHD), together with a recorded use of an antiplatelet drug within the last 12 months	4	0.03	280.00	89.77	132.17

Table 4.27 Statistic values of QI in outcome component

Code	Key issues and QIs	N	Min	Max	Mean	Sd.
	RUDs (1 QIs)					
OC5	Rate of population safety from drug utilization without recurrent of ADR	29	0	8.20	0.59	2.07

After a set of potential QIs were measured from databases of 30 community hospitals, the Cronbach's Alpha Coefficient was used to calculate the internal consistency of the tool. The value for internal consistency was calculated only from the results of QIs in resource and activity component and the cut point was either equal or more than 0.7. The alpha coefficient of overall 27 QIs was 0.8: 11 QIs of resource component was 0.7 and 16 QIs of activity component was 0.7 (Table 4.28).

Table 4.28 Reliability value of QIs in resource component (11 QIs), activity components (16 QIs), and total of QIs from resource and activity components (27 QIs)

Component of QIs	N of items	Cronbach 's Alpha
Resource component	11	0.7
Activity component	16	0.7
Total	27	0.8

The score of drug safety standard is a tool for evaluating the performance of hospital affiliated with the MOPH composed of 13 issues as follows. (1) management of drug safety system at the hospitals, (2) Structure and environment for supporting to create the drug safety, (3) development of personnel competency , (4) service of drug dispensing of out-patients, (5) dispensing drugs of in-patients, (6) consultation service of drugs for out-patients, (7) Pharmaceutical care in ward, (8) Monitoring ADR from the use of drugs and health products, (9) Drug use evaluation, (10) Service of drug information, (11) Drug preparation of the hospital, (12) Drug slection systen of the hospitals, and (13) Purchasing and inventory of drugs. From the result of 30 community hospitals, the score of drug safety standard was presented by mean value of 3.35 ± 0.6. The statistic was shown in Table 4.29.

Table 4.29 Statistic value of the score of drug safety standard from 30 community hospitals.

	N	Min	Max	Mean	Sd.
Scoring of drug safety standard	30	1.80	4.60	3.35	0.61

The correlation analysis is used for tessting the correlation between the result of each QI (47 QIs) which have potential and the results of the score of drug safety standard from 30 community hospitals. Thus, QIs of resource component were tested. The results showed the medium correlation for RE13 (r = 0.42, p-value = 0.02) and RE48 (r = 0.42, p-value = 0.02). The potential QIs with small correlation were RE25, RE27, and RE53. The results are shown in Table 4.30.

Table 4.30 Pearson correlation coefficient (r) for the relation of each QI in resource component with the assessment score of the drug safety standard

Component and QIs	N	R	P-value
Policy and regulation (5 QIs)			
RE1	30	0.07	0.72
RE2[a]	30	-	-
RE7	30	0.06	0.74
RE13	30	0.42*	0.02
RE14	30	-0.09	0.61
Knowledge management (3 QIs)			
RE25	30	0.20	0.92
RE27	29	0.12	0.54
RE36	30	0.06	0.74
Human resource (3 QIs)			
RE48	30	0.45*	0.01
RE50	30	0.06	0.76
RE53	26	0.32	0.11

[a] cannot be computed because at least one of the variable is constant.

* Correlation is significant at the 0.05 level

16 potential QIs of activity component were analysed. The results classified as the medium correlation was AC39 (r = 0.38, p-value = 0.04). The potential QIs with small correlation were AC2, AC27, AC30, AC31, AC34, AC57 and AC58. The results are shown in Table 4.31.

Table 4.31 Pearson correlation coefficient (r) for the relation of each QI in activity component with the assessment score of the drug safety standard

Activity component and QIs	N	R	P-value
Drug selection (2 QIs)			
AC1	30	-0.21	0.27
AC2	30	0.14	0.47
Drug procurement (4 QIs)			
AC16	30	-0.66	0.73
AC19 [a]	29	-	-
AC21	30	0.04	0.85
AC27	30	0.13	0.50
Drug storage and distribution (6 QIs)			
AC30	29	0.27	0.16
AC31	30	0.14	0.48
AC34	30	0.11	0.57
AC38	30	-0.05	0.78
AC39	29	0.38*	0.04
AC41	29	-0.24	0.20
Drug use (4 QIs)			
AC55	30	-0.10	0.60
AC56	30	-0.07	0.71
AC57	30	0.12	0.51
AC58	30	0.22	0.23

a cannot be computed because at least one of the variable is constant.

* Correlation is significant at the 0.05 level

19 potential QIs of output component were analyzed. The results classified as the strong association was OP34 (r_s = 0.57, p-value = 0.04). The potential QIs with medium association were OP7, OP17, OP23, OP28, and OP33. The results are presented in Table 4.32.

Table 4.32 Spearman's correlation coefficient (r_s) for the relation of each QI in output component with the assessment score of the drug safety standard

Output component and QIs	N	r_s	P-value
Drug procurement (1QIs)			
OP7	30	0.21	0.25
Drug storage and distribution (4QIs)			
OP12	30	-0.23	0.22
OP13	29	0.31	0.12
OP16	19	-0.43	0.07
OP17	16	0.10	0.71
Drug use (14QIs)			
OP18.1	25	0.08	0.70
OP18.2	23	0.04	0.85
OP23	29	0.11	0.96
OP24	30	-0.22	0.24
OP25	23	-0.16	0.46
OP26	30	-0.38*	0.04
OP28	10	0.19	0.61
OP29	21	-0.25	0.29
OP30	25	-0.07	0.75
OP31	26	0.01	0.98
OP32	28	-0.31	0.11
OP33	28	0.26	0.12
OP34	13	0.57*	0.04
OP35	29	-0.01	0.97
OP52	4	0.32	0.68

* Correlation is significant at the 0.05 level

The potential QI, OC5, of outcome component showed small positive correlation (r_s = 0.22, p-value = 0.25). (Table 4.33)

Table 4.33 Spearman's correlation coefficient (r_s) for the relation of the QI in outcome component with the assessment score of the drug safety standard

Outcome component and QIs	N	r_s	P-value
RUDs (1QIs)			
OC5	29	0.22	0.25

Disscussion

This part focuses on developing of the set of potential QIs for assessing of DSM performance and the QIs are classified according to four components of Logic model. The set of potential QIs was tested in 30 community hospitals under MOPH. For the results, most potential QIs can be collected from databases of the hospitals. Whereas, for some potential QIs in drug use issue of output component, the results could not be collected, such as the QIs which are involving the medication error and the recorded use of an antiplatelet drugs. These QIs data could be gathered only from four community hospitals. For the community hospitals with 30 beds and 10 beds, these QIs could not be collected and data of antiplatelet drug used did not be recorded, due to inadequacy of health personnels in the hospitals giving rise of limitation of drug information, data collection, or other reports, etc. Thus, medication error rate could not be calculated for some QIs. From the total of 47 potential QIs, only 25 (53.19%) of the QIs could be calculated from all 30 community hospitals but the other QIs did not. The set of potential QI was tested for reliability. The reliability of 11 potential QIs of resource component and 16 potential QIs of activity component represented the reliability of this set of potential QIs.

For consideration of the correlation of each potential QIs with the score of the drug safety standard, it was found that only 4 QIs were significant. They were RE13, RE48, RE39, and OP34. RE13 in policy and regulation issue of resource component, involves the responsibility of PTCs to the DSM at the community hospitals. Most of hospitals (28 out of 30 hospitals) are given precedence to the role of PTCs. Similarly, the study about PTCs in Thai hospitals under health care reform found that indicators

for measuring the performance of PTCs were drug selection, satisfaction of providers and receivers, drug quality, drug pricing, DUE, ADR, medication error, etc (Sripairoj, 2006). Moreover, NSW TAG in Australia studied the indicators for DTCs performance. It was found that process indicators were needed to be measured for PTCs performance (Weekes et al., 1998).

RE48 in human resource issue of resource component, involved an essential role of PTC in consideration of requests for using non-NLED. Pharmacists of the hospitals suggested that the non-NLED offered to be used on request should be strictly considered because most of the drugs are expensive. In accordance to the study of NHS in the UK, the use of new drugs or non-NLED effected the growing of drug expenditure and irrational use of drugs. Therefore, ED acceptance or rejection of non-NLED was a focused decision. Scientific evidence, cost of drug and budget situation should be considered (Jenkings and Barber, 2004). Similarly, in Thailand the drug selection procedure related to the consideration of the requests on using of non-NLED to control drug items in the hospital formulary, to save drug budget, and to support rational drug use (Office of the Permanent Secretary, 1999; Sripairoj, 2006).

AC39 in drug storage and distribution issue of activity component, relates the management of automated dispensing system (ADS) when pharmacy is closed. ADS is created to provide a full course of prescribing medications to patients in emergency room that do not have a 24 hour pharmacy on site. 16 community hospitals can operate for specification of drug items and revision information of drugs prescribed. Congruence with the other studies, ADS can improve the timing of medication administration in patients presenting at the emergency room or emergency department (ED) and reviewing of drugs prescribed (Andres et al, 2003; Gordon et al, 2005; Adham and Hamad, 2011).

OP34 in drug use issue of output component, relates pre-administration error rate of in-patient. It relates the processes before administration of drugs for the patients in ward such as writing medication card, medication administration record, etc. From the studies of pre-administration error rate of Headford et al. (2001) and Hicks et al. (2004), it was found to be 8:100 and found 5:100, respectively.