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Allocation of point of care testing analyzers to rural primary hospitals
A report on allocation planning

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Κατανομή των συσκευών μέτρησης παρά την κλίνη του ασθενούς (POCTs) στα περιφερειακά νοσοκομεία, καθώς και σχεδιασμός της κατανομής τους

Περίληψη στο τέλος του άρθρου

OBJECTIVE **Laboratory investigation plays important roles in the management of diabetes mellitus (DM). The use of point of care testing analyzers (POCTs) can provide a solution for the rural local primary care hospital that has limited facilities for the setting up of a standard medical laboratory. An important concern at present is the management of the limited available resources for the local primary hospital in developing countries.** METHOD **A basic study was made in resource allocation planning for POCT analyzers to primary hospitals in a rural province in a developing country, Thailand. Starting from site survey, budget allocation was further assigned on the necessity based principle.** RESULTS **The necessity based principle permitted a final plan for allocation of POCT analyzers to be derived. Planning was made for running a POCT screening program.** CONCLUSIONS **The allocation plan for POCT analyzers proved to be successful. The planning process reported here can be a useful reference for planning for medical facilities distribution in remote settings in developing countries.**

Key words

Allocation
Analyzer
Point of care testing
Resource
Rural

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Laboratory investigation plays an important role in the management of diabetes mellitus (DM). Many laboratory investigations including hemoglobin (Hb) A1C and microalbumin are recommended for regular monitoring of complications of DM.[1] The use of point of care testing analyzers (POCTs) can be a solution for the rural local primary hospital that has limited facilities for the setting up of a standard medical laboratory.[2]

An important concern at present is the management of the limited available resources for the local primary hospitals in developing countries.[3] A basic study was made of resource allocation planning for distribution of POCT analyzers to primary care hospitals in a rural province in a developing country, Thailand.

MATERIAL AND METHOD

This was made in order to plan for an appropriate resource allocation plan for distribution of POCT analyzers to primary hospitals in a rural province in the Northeast Region of Thailand. The setting is about 650 kms from Bangkok, the capital of Thailand. There are 21 primary hospitals within this area. In order to plan for POCT analyzer allocation, a site survey was first made. The data on needs for laboratory testing for the two important laboratory investigations, HbA1C and microalbumin were collected from all 21 primary hospitals settings. The allocation plan was set for distribution of the available 35 POCT analyzers between the 21 primary hospital settings.

The main primary question in the allocation is "how many POCT analyzers will be allocated to each setting?" and the secondary question is "what is the appropriate plan for running the POCT screening program in each setting?".

RESULTS

The details of needs for laboratory testing derived from each primary hospital are shown in table 1. For allocation, the basic rule is "each setting must get at least 1 POCT analyzer". Hence, the first 21 POCT analyzers can be allocated, one to each primary hospital. The next step is to identify which setting should be issued with more than one analyzer. In order to identify those hospitals requiring an extra analyzer, the average needs of all the hospitals was calculated, which equaled 476. Any hospitals with needs higher than the average level can be considered candidates to get the second analyzers. In this study there were 9 candidates eligible to get the second analyzer at this stage (hospitals no 1, 2, 4, 5, 6, 7, 11, 12 and 21). In

Table 1. The details of the needs for laboratory testing reported by each primary care hospital.*

	Required number of tests	
Primary hospital	**Hemoglobin A1C**	**Microalbumin**
1	1050	525
2	1835	918
3	380	190
4	1734	867
5	1054	527
6	1430	715
7	1150	575
8	400	200
9	635	318
10	630	315
11	1365	683
12	2000	1000
13	426	213
14	652	326
15	251	126
16	475	238
17	1747	874
18	347	174
19	799	400
20	675	338
21	965	483

* The local policy is to perform testing on HbA1C 2 times/year and microalbumin 1 time/year for all registered patients with diabetes mellitus

this way, the first 30 analyzers could be allocated at this stage. The left 5 analyzers to be allocated as the third analyzers to the five primary hospitals with the greatest needs (specifically, hospitals no 2, 4, 6, 11 and 12).

Focusing on the question "what is the appropriate plan for running the POCT screening program in each setting?", the basic principle of regular practice is employed. Hence, weekly appointment of the patients should be arranged and there should be at least one day per week for the specific POCT screening program activity, which can be in the DM clinic. The settings with more than 1 allocated analyzer should set more days/week for the program according to the number of their analyzers. Focusing on the property of the POCT analyzer, average 5 tests/hour is feasible (covering specimen collection, specimen analyzing, result recording) and this can amount to 20 tests per 4-hour morning clinic. With this recommendation, the analyzer can serve the needs of testing for both HbA1C and microalbumin in a yearly plan.

Table 2. Number of POCT analyzers allocated to each primary hospital.

Primary hospital	Number of analyzers
1	2
2	3
3	1
4	3
5	2
6	3
7	2
8	1
9	1
10	1
11	3
12	3
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	2

DISCUSSION

The POCT analyzer can be helpful for screening for DM and its complications in rural settings with limited facilities.[2] Because of the good properties of the new POCT analyzer, with its clear wave (acceptable and easy to use by non-medical technologist), the control of the POCT screening program can be performed in primary care units. To set such POCT screening program, however, the POCT analyzer must be available. With limited resources in developing countries, allocation of medical instruments including POCT analyzers is a major point of concern in medical management.[4] Shyyan et al proposed a concept for the allocation of diagnostic facilities that "incremental allocation of resources can help address economic disparities and help ensure equity in access to timely diagnosis".[5] Here, the author shows an example of allocation of a limited number of POCT analyzers to hospitals in a rural province in a developing country.

It can be seen from the preliminary study that the needs for testing of the various hospitals is different. Some settings require a few tests while others require many more

tests. The allocation must be based on equity[6] (each setting must get facilities at the minimum level) and actual needs (each setting must get facilities varying according to the requirements). Also, the number of analyzers allocated can further dictate the necessity to set the concordant plans for running of the POCT screening program in each setting. The setting with greater needs must get more analyzers, but that setting must undertake the responsibility of providing more services per week to the patients in that area.

As a conclusion, this study showed that the use of an allocation plan can be successful in the equitable management of limited resources. The process reported here can be a useful reference for planning for distribution of medical facilities in remote settings in developing countries.

ΠΕΡΙΛΗΨΗ

Κατανομή των συσκευών μέτρησης παρά την κλίνη του ασθενούς (POCTs) στα περιφερειακά νοσοκομεία, καθώς και σχεδιασμός της κατανομής τους

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ΣΚΟΠΟΣ Σήμερα, η εργαστηριακή διερεύνηση διαδραματίζει σημαντικό ρόλο στο χειρισμό των διαβητικών ασθενών. Η χρήση αναλυτών παρά την κλίνη των ασθενών (POCTs) είναι μια λύση για τα περιφερειακά νοσοκομεία πρωτοβάθμιας φροντίδας με περιορισμό των κλασικών εργαστηρίων. Προς το παρόν, είναι σημαντική η χρησιμοποίηση περιορισμένου αριθμού συσκευών στα εν λόγω νοσοκομεία, ιδιαίτερα στις υπό ανάπτυξη χώρες. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Αναφέρεται η βασική μελέτη του σχεδίου κατανομής των αναλυτών POCT σε νοσοκομεία πρωτογενούς ιατρικής φροντίδας, σε αγροτικές περιοχές αναπτυσσόμενων χωρών, όπως η Ταϊλάνδη, με βάση τη γενική αξιολόγηση, την κατανομή κονδυλίων και την αναγκαιότητά τους. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Αξιολόγηση του τελικού σχεδίου για την κατανομή των αναλυτών POCT και εφαρμογή του αδρού προγράμματος ελέγχου με τους συγκεκριμένους αναλυτές. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Το σχέδιο κατανομής μπορεί να εφαρμοστεί με επιτυχία στην πρωτοβάθμια φροντίδα, ιδιαίτερα σε περιφερειακά νοσοκομεία των υπό ανάπτυξη χωρών.

Λέξεις ευρετηρίου: Αναλυτές παρά την κλίνη ασθενών, Κατανομή, Πρωτοβάθμια φροντίδα, Υπό ανάπτυξη χώρες

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