Casemix in the Islamic Republic of Iran: current knowledge and attitudes of health care staff

S. Ghaffari,[1,3] C.M. Doran[1,2] and A. Wilson[1]

نظام تبويب الحالات المرضية في جمهورية إيران الإسلامية: المعارف والمواقف الراهنة للعاملين في الرعاية الصحية

شهرام غفاري، كريستفر دورن، أندرو ويلسون

الخلاصة: إن نظام تبويب الحالات المرضية هو أداة لتصنيف المرضى وفقاً للتشابه في ما بينهم من حيث الحالة السريرية والتجانس في الموارد المطلوبة. وقد أجرى الباحثون دراسة وصفية لتقييم مستوى المعارف والمواقف تجاه نظام التمويل المستند على هذه الأداة، وذلك في أوساط العاملين في المنظمة الإيرانية للضمان الاجتماعي في طهران. وقد أظهر المسح الذي أجراه الباحثون أن المعرفة بهذه الأداة وبالمجموعات المتعلقة بالتشخيص ضئيلة لدى العاملين الذين شملتهم الدراسة، وأن أي محاولة لتطبيق هذا النظام الخاص بتبويب الحالات المرضية، والذي لم يسمع عنه ما يقرب من ثلاثة أرباع العاملين في المراكز العليا من قبل، سيكون مصيرها الفشل. ويؤكّد البحث على ضرورة رفع مستوى الوعي حول هذا النظام ونظم المجموعات المتعلقة بالتشخيص بين العاملين في المستشفيات قبل اتخاذ أي خطوات عملية.

ABSTRACT Casemix is a tool that classifies patients according to their clinical similarity and the homogeneity of resources required. A descriptive study was conducted to assess the level of knowledge and attitude toward the casemix-based funding system among staff working in the Iranian Social Security Organization in Tehran. The survey showed that knowledge of casemix and diagnosis-related groups (DRG) was poor among the study group and any attempt to implement the casemix system—which about three-quarters of high-level staff had never heard of—would be likely to fail. This highlights the necessity for creating awareness of the casemix and DRG systems among the hospital staff before any action takes place.

Le « case-mix » en République islamique d'Iran : connaissances actuelles et attitudes du personnel de santé

RÉSUMÉ Le « case-mix » (ou ensemble des divers cas pris en charge par un établissement hospitalier ou un praticien) est un outil qui permet de classer les patients en fonction de leur similitude clinique et de l'homogénéité des ressources requises. Une étude descriptive a été réalisée afin d'évaluer le niveau de connaissances et les attitudes envers le système de financement fondé sur le « case-mix » parmi le personnel de l'Organisation de la sécurité sociale iranienne à Téhéran. Cette étude a montré que les connaissances relatives au « case-mix » et aux groupes homogènes de malades (GHM) étaient faibles dans le groupe visé par l'étude et que toute tentative de mise en place du système de « case-mix » – dont une majorité d'environ 75 % des responsables n'avaient jamais entendu parler – risquait fort d'échouer. Ce constat met en lumière la nécessité de mieux faire connaître les systèmes de « case-mix » et GHM au personnel hospitalier avant d'adopter des mesures.

[1]School of Population Health; [2]School of Economics, University of Queensland, Brisbane, Australia (Correspondence to S. Ghaffari: sghaffari2000@yahoo.com).
[3]Social Security Organization, Tehran, Islamic Republic of Iran.
Received: 13/02/06; accepted: 01/05/06

Introduction

Casemix is a tool that classifies patients according to their clinical similarity and the homogeneity of resources required [*1*]. Casemix was initially designed for the comparative study of hospital efficiency [*2*] and quality assurance, but is now broadly used for funding purposes. The main objectives of the use of casemix-based funding in hospitals have been to introduce a fair resource allocation system in the context of overall budget reduction; to improve the efficiency of hospitals; and to reduce waiting lists by motivating hospitals to treat more patients [*3*]. Casemix is in fact a broad term that can apply to the classification of acute patients, sub- and non-acute patients, outpatients, etc. Diagnosis-related groups (DRG), which classify hospital acute patients, are the best-known example of the casemix system [*1*].

The use of casemix has become an important part of hospital funding systems in developed countries [*4*] and is becoming increasingly common in Asia and developing countries. China examined the feasibility of applying the all-patient (AP)-DRG system in the 1990s and the Australian-refined (AR)-DRG system to the description of Chinese hospital activity in 2003 [*5*], and Malaysia held its 2nd international casemix conference in September 2005 to better understand the application of the casemix system to hospital cost administration.

The Islamic Republic of Iran is steadily preparing itself for implementing the casemix system in its hospitals. A 2-day workshop was held in August 2005 to introduce the concept of casemix to employees of the Iranian Social Security Organization (SSO). The workshop was organized by the SSO in conjunction with the World Health Organization (WHO) and the Iranian Ministry of Health.

The funding for hospitals in the Iranian SSO is based on annual budgeting. This system does not provide adequate incentives for efficiency improvement [*6*]. Efficient use of scarce health resources is of critical importance for hospitals because they consume 30%–40% of total health care expenditure in developed countries [*7*] and 50%–80% of government expenditure in developing countries [*8*].

To move from the current system of annual budgeting to the new one of casemix funding, sound knowledge and education of hospital staff and physicians are essential. Evidence suggests that resistance to change, which is a common problem whenever new systems are to be implemented, is closely tied to the participants' knowledge of and attitudes towards the new system [*9*]. The purpose of this study was to examine the feasibility of the casemix and DRG systems through assessing the knowledge of high-level staff and identifying their attitudes toward these concepts.

Methods

This was a descriptive study conducted in 2005 to assess the level of knowledge of and attitude toward the casemix funding and DRG systems among high-level staff working in the SSO in Tehran, Islamic Republic of Iran, including heads of hospitals and hospital managers, heads of clinics, nurse mangers, accountants and health care experts. This study also aimed to identify the staff's expectations and preferences towards the casemix system.

An 11-item questionnaire, including 6 multiple-choice and 5 open-ended questions, was designed to identify the participants' knowledge of the current funding system, and of the concepts of casemix and DRG. There was no gold standard to evaluate

the questionnaires, so criteria identified in the literature were used to evaluate the questions about the current funding system [*10–12*], and casemix and DRG [*1,3,13*].

Question 1 asked respondents what the current funding mechanism used for resource allocation in their hospital was (global budgeting, capitation, per diem, fee-for-services, case-based payment, mixed payment, don't know). Questions 2–4 asked about the benefits and constraints of the current funding system and respondents' views about its efficiency. Questions 5–8 asked respondents if they had ever heard about the casemix classification system and about DRG and to explain their concept of them. Question 9 asked what they saw as the benefits of casemix and DRG. Questions 10 and 11 aimed to measure participants' attitudes toward the feasibility of implementing casemix and DRG within their hospital and the anticipated barriers.

The survey was administered twice, before and after an educational session (hereafter called pre- and post-intervention study). The pre-intervention study aimed to measure the current funding and knowledge about casemix of the participants before the educational session. Based on the assumption that the casemix knowledge of the participants would not be at a reasonable level, a 2-hour educational session was held immediately after the pre-intervention study to provide some basic information about the different systems of hospital funding as well as their strengths and weaknesses. The focus of the educational session was to introduce the casemix classification system and its funding applications. At the end of the educational session, the participants were asked to complete the same questionnaire again (i.e. post-intervention study).

A scoring system was used to assess the level of the knowledge of the current funding, casemix and DRG:

- Score 0: had no idea about the current funding system (or chose incorrect answers); had not heard of casemix or DRG.
- Score 1: knew what the current funding system was but had no further information; knew the terms "casemix" and '"DRG" but unable to explain them correctly.
- Score 2: could explain the relevant advantages or disadvantages and had the correct concepts of the funding system; could explain the concept of DRG and casemix properly.
- Score 3: had the right concept of, and could address some advantages or disadvantages of, casemix and DRG to varying degrees.

Using *STATA* statistical package [*14*], the 2-sample test of proportion was calculated to determine changes in participants' knowledge of casemix and DRG before and after the educational session.

Results

Pre-intervention results

Participants' demographic information

Overall 63 participants (70% of the total number of participants in the workshop) took part in the pre-educational survey and completed the questionnaire. The demographic information of the participants is outlined in Table 1: 54% were male, 41% had a BSc degree, and 43% had more than 10 years work experience. In the SSO context, chiefs of hospitals are always physicians (MD degree), and the hospital managers are second to the hospital chief and could be a physician, a professional in health care management systems or other qualified staff. A health care expert was someone working in the central office to supervise the system.

Table 1 **Demographic background of the study participants (*n* = 63)**

Variable	%
Sex	
Male	54
Female	46
Age (years)	
< 30	11
30–50	84
> 50	5
Education	
High-school diploma	6
BSc degree	41
MSc degree	18
MD degree	35
Job position	
Hospital chief	3
Hospital manager	9
Head of clinic	17
Nurse manger	13
Accountant	16
Health care expert	35
Unknown	7
Work experience (years)	
< 5	15
5–10	37
> 10	43
Unknown	5

Knowledge of and attitudes to the current funding system

In total, 51% of the participants at the initial survey (n = 63) acknowledged that they had no idea about the current funding system, 21% knew the current system but had no more information about it, and 28% in addition to understanding the system were able to address advantages and disadvantages to varying degrees (Table 2). Using the 2-sample proportion test there was no significant difference (P = 0.75) comparing the proportions who did not know about the current funding system at all (score 0) and those who knew about it (sum of score 1 and 2), or between the proportion of participants who were grouped into score 1 and 2 (P = 0.17). Regarding job positions, 30% of the accountants and 86% of the nurse managers did not understand the current funding system.

Only 18 (28%) of respondents answered the questions about the benefits/constraints of the current funding system. Benefits were identified as: ability to control total hospital costs (21%); capped budget (18%); easy implementation (12%); sufficient level of autonomy to managers (9%); and overcoming the budget deficit by lobbying for extra funds (9%). Participants identified the constraints of the current funding system mainly as: an unfair system which does not take account of hospital activities (25%); disincentives for innovation (24%); and budget crises when facing unpredicted events (20%). About 31% gave irrelevant answers to these questions.

From a total of 31 (49%) participants who knew what the current funding system was (score 1 and 2), 69% believed that it was a low efficiency/inefficient system

Table 2 **Participants' knowledge scores about the current funding system, the casemix system and diagnosis-related groups (DRG) in the pre-intervention study (*n* = 63)**

Knowledge item	Score 0		Score 1		Score 2		Score 3		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Current funding system	32	51	13	21	18	28	n/a		63	100
Casemix	47	75	5	8	6	9	5	8	63	100
DRG	37	58	8	13	8	13	10	16	63	100

n/a = not applicable.

compared with 10% who believed that it was an efficient system. About 21% had no idea about the efficiency of the current funding system.

Knowledge of and attitudes to casemix and DRG

According to the initial survey, the majority of participants had no knowledge of casemix (75%) and DRG (58%) (score 0) (Table 2). About 8% and of the participants acknowledged that they had only heard about the term casemix and 13% had heard of DRG (score 1). Only 9% explained casemix and 13% explained DRG correctly, to a varying degree, and were classified into the group with moderate knowledge (score 2). Finally, some of the participants could address some advantages of the systems (8% for casemix and 16% for DRG) and were grouped as having good knowledge (score 3). Significantly more participants had never heard about the casemix and DRG at all (score 0) compared with those who had some or a good degree of knowledge about them (total of score 1, 2 and 3) ($P < 0.05$).

From those who knew about casemix (score 1, 2 and 3, $n = 16$) and DRG (score 1, 2 and 3, $n = 26$), almost 56% were health care experts and 16% were hospital managers; only 4% were accountants and nurse mangers. Almost 50% of the participants who knew both casemix and DRG and could explain them properly (score 1 and 2[*0*], $n = 11$), still did not have a correct understanding of the current funding system.

The term casemix and DRG were explained (score 2 and 3), by 17% ($n = 11$) and 29% ($n = 18$) of the participants respectively. The majority of the participants at the initial survey explained casemix and DRG as cost allocation and funding tools instead of patient classification or acute inpatient classification systems, quality improvement or management tools. They referred to casemix mainly as: a cost allocation system (25%); a patient classification system (13%); and a patient classification and cost allocation system (10%) (other answers were not relevant). Almost 42% of the participants explained casemix incorrectly. DRG was also described mainly as a system for cost allocation (40%), patient classification (20%), both cost allocation and patient classification (20%), and a quality improvement tool (4%).

Almost 37% of the total participants, and 89% of those who could explain casemix and DRG properly, believed that casemix would be a feasible model in their system. All physicians (MD degrees) believed that casemix would be applicable, compared with 88% of the 41 participants with MSc and BSc degrees and 66% of the 6 people with a high-school qualification. Almost all of the hospital managers, clinic heads and nurse mangers believed that casemix would be an applicable model compared with 67% of the accountants and 88% of health care experts.

The possible barriers associated with casemix implementation were inappropriateness of the system and lack of a good climate, as mentioned by 12 (20%) of the total participants. Difficulty in accessing the data (15%), lack of or incomplete knowledge about casemix and DRG among the chief managers and staff (15%), invalid DRG and DRG creep (10%) were some other problems identified by the participants (40% gave irrelevant answers to the question).

Post-intervention study

Knowledge of casemix and DRG

Out of 37 questionnaires returned by the participants at the post-intervention study, 32 were matched to identify the effect of the educational session on the participants' knowledge. There were no significant

changes in participants' knowledge about the current funding system in the post-intervention survey compared to the pre-intervention study (Table 3). Global budgeting was believed to be the current system by 48% of participants in the pre-intervention study and 53% in the post-intervention study ($P = 0.57$).

Table 3 **Participants' knowledge scores about the current funding system, the casemix system and diagnosis-related groups (DRG) comparing those who participated pre- and post-intervention (matched group) ($n = 32$)**

Knowledge item	Score 0				Score 1				Score 2				Score 3			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Current funding	15	47	17	53	6	19	3	9	11	34	12	38	n/a		n/a	
Casemix	26	81	2	6	1	3	2	6	3	9	9	28	3	9	19	59
DRG	18	56	1	3	4	13	0	0	6	19	9	28	4	12	22	69

n/a = not applicable.

Table 4 **Demographic background of those who participated in the post-intervention study ($n = 32$) with those who did not ($n = 31$)**

Variable	Participation		No participation	
	No.	%	No.	%
Sex				
Male	13	40	21	68
Female	19	60	10	32
Age (years)				
< 30	6	22	1	3
30–50	23	72	29	94
> 50	2	6	1	3
Education				
High-school diploma	2	6	3	10
BSc degree	21	66	5	16
MSc degree	4	12	6	19
MD degree	5	16	17	55
Job position				
Hospital head	0	0	2	6
Hospital manager	1	3	5	16
Clinic head	4	13	7	23
Nurse manager	7	22	1	3
Accountant	7	22	3	10
Health care expert	12	37	11	35
Unknown	1	3	2	6
Work experience (years)				
< 5	7	22	4	13
5–10	9	28	14	45
> 5	15	47	12	39
Unknown	1	3	1	3

However, participants' knowledge about casemix and DRG (score 2 and 3) increased considerably (Table 3). About 9% of the participants could explain some advantages or disadvantages of the casemix system in the initial study compared with 60% in the follow-up survey, a statistically significant difference ($P < 0.001$).

A positive attitude to the feasibility of the casemix system increased from around 37% of participants in the pre-intervention study to about 70% after the educational session ($P < 0.001$).

Comparison of participants and non-participants in the post-intervention study

Out of 63 participants, 31 did not participate at the post-intervention study. The demographic information of those who did not participate and those who did is given in Table 4. The female participants, those aged < 30 years, and those with work experience < 5 years were keener to participate in the post-intervention study. Accountants and nurse managers had a higher participation rate at the post-intervention study compared with the others.

Knowledge about the current funding system was not statistically significant different (between the 2 groups $P = 0.15$); 38% of those who did not participate at the post-intervention study chose global budgeting compared with 56% who did participate. Also, in general, there was no statistically significant difference in knowledge about casemix and DRG among the participants who took part at the post-intervention study and those who did not (Table 5). An average of 69% of those who did not participate in the post-intervention study stated that they had no idea of the casemix system and DRG compared with 62% of those who did participate ($P = 0.065$).

About 35% of the participants who did not participate at the post-intervention study believed that casemix could be a feasible model compared with 37% of those who did participate.

Discussion

The casemix classification system, which is a popular method used for patient classification [*15*], employs DRG to classify hospital inpatients according to the condition they suffer and the treatment they receive [*1*]. Casemix is a technically complicated model to apply due to the requirement of a comprehensive classification system of

Table 5 **Participants' knowledge scores about the current funding system, the casemix system and diagnosis-related groups (DRG) comparing those who participated in the post-intervention study (*n* = 32) and those who did not (*n* = 31)**

Knowledge item	Score 0		Score 1		Score 2		Score 3	
	Participation %	No participation %	Participation %	No participation %	Participation %	No participation %	Participation %	No participation %
Current funding	44	62	22	8	34	30	n/a	n/a
Casemix system	82	71	18	3	16	17	9	9
DRG	57	67	43	4	31	13	15	16

n/a = not applicable.

output and regular updating of the system in line with changes in clinical practice [*16*]. Invalid demographic and clinical information about patients, including incorrect principal diagnoses, and other data entry problems are some issues that limit the performance of casemix system. The implementation of casemix needs a well-organized and computerized system with well-oriented staff, otherwise the system will fail.

Improving knowledge and understanding of the funding system among staff and mangers in hospitals and health systems can provide the groundwork for service improvements. A simple questionnaire can reveal the level of knowledge about the funding system as well as the need for education, not only about casemix, but about the funding mechanisms in general. About 50% of the participants in our study had no information about the current funding system or they had incorrect knowledge.

The results provide a better understanding of the current level of casemix and DRG knowledge of staff occupying the top positions and highlight the need for education about the funding system and casemix. The survey showed that knowledge of the casemix and DRG systems was poor among the study group and a short educational programme did influence the level of knowledge of and attitudes toward the casemix system. However, the result of the study cannot be extrapolated to all staff working at the SSO in Tehran province and as such the results may not be a good indicator of the staff knowledge throughout the country. The level of knowledge of the participants may be overestimated owing to personal communication of some of the participants with the author before the study took place.

Any attempt to implement casemix, which about three-quarters of the top level staff had never heard of, into the current system would be likely to fail. The problems become more complex when casemix is considered as a cost allocation and cost containment tool, as in this study. The majority of the participants in the initial survey believed that casemix was a funding tool rather than a tool for quality promotion, which was the original aim of the casemix designer [*17*]. This misunderstanding would result in an increasing resistance to change among health care staff. Therefore, further education should focus on introducing the different uses of the casemix system, such as efficiency improvement, utilization review, management and benchmarking applications, to ensure a better understanding of the casemix system.

To implement casemix in the Islamic Republic of Iran, a high level of cooperation is required by managers, staff and clinicians. A survey by Bridges, Mazevska and Haas to develop better casemix education for rural staff working in New South Wales identified that clinical staff would not be interested in the casemix system until they were assured that there would be no negative effects either on the hospital or on the financial status of the staff [*18*]. "What does the casemix mean for a clinician as an individual? "Does it mean more money or less money?" Answers to such questions could act as incentives for staff and clinicians to cooperate [*18*]. Nursing staff may not encourage casemix if they identify it as a tool with a negative impact on their practice and patient care, which was the common concern identified by Baker in a study on the evaluation of Australian nurses' attitudes toward the casemix funding: most of the participants (about 75%) believed that casemix was part of a scenario to maintain costs and reduce the state debt [*19*]. This view should be modified by explaining the various uses of the casemix system. Otherwise resistance to

change would reduce the active participation and cooperation of the staff in the new programme. Resistance to change poses serious challenges for the system, especially when the changes need active participation and cooperation.

In a study by Gleeson it was concluded that limited knowledge of the casemix system may result in negative attitudes to casemix [*20*]. In our survey, only 8% of the participants had knowledge of both casemix and DRG and could explain them adequately and most of them did not consider casemix a management tool designed for improvement of quality and efficiency.

Conclusion

The study illustrates that knowledge of the casemix system as well as knowledge of the current funding system in hospitals in Tehran is poor among the high-level staff surveyed. This highlights the need to create awareness of the casemix and DRG systems among staff before any action takes place. Considering that they are mostly known as funding and cost containment tools rather than management or quality and efficiency improvement systems, staff and clinician resistance would be a real challenge if continuing education is not put in place. To increase the cooperation of clinicians and allied health staff, further education should focus on how casemix can be used to improve patient care and how it affects the funding situation of the departments and staff in hospitals. While a single education session may positively affect the participants' knowledge of the casemix and DRG systems, an integrated and comprehensive educational programme and periodic feedback are recommended.

References

1. Duckett SJ. Casemix funding for acute hospital inpatient services in Australia. *Medical journal of Australia*, 1998, 169: S17–S21.
2. Nicholas T-F. Blame casemix funding. *Quadrant*, 1995, 39(6):42–5.
3. Duckett SJ. *Reform of public hospital funding in Victoria*. Sydney, School of Health Services Management, University of New South Wales, 1994:119.
4. Reid B, Palmer G, Aisbett C. The performance of Australian DRGs. *Australian health review*, 2000, 23(2):20–31.
5. Gong Z et al. Describing Chinese hospital activity with diagnosis related groups (DRGs): a case study in Chengdu. *Health policy*, 2004, 69(1):93–100.
6. Shaw RP. *Improving performance and outcomes through provider payment mechanisms. Presentation to WBI core course on "Adapting to change: population, RH & HSR"*, September 26, 2001. Washington DC, World Bank Institute, 2001.
7. Santerre RE, Neun SP, eds. *Health economics: theories, insight, and industry studies. Volume 3.* Ohio, Thomson, 2004.
8. Barnum H, Kutzin J. Public hospitals in developing countries: resource use, costs, financing. In: Newbrander W, Barnum H, Kutzin J, eds. *Hospital economics and financing in developing countries*. Geneva, World Health Organization, 1992 (WHO/SHS/NHP/92.2).

9. Public administration and public policy. In: Kilpatrick AO, Johnson JA, eds. *Handbook of health administration and policy*. New York, Marcel Dekker, 1998.

10. Aas IHM. Incentives and financing methods. *Health policy*, 1995, 34(3):205–20.

11. Barnum H, Kutzin J, Saxenian H. Incentives and provider payment methods. *International journal of health planning and management*, 1995, 10(1):23–45.

12. Payment and regulation of providers. In: Maynard A, Bloor K, eds. *Flagship course on health sector reform and sustainable financing*. Washington DC, World Bank, 2000.

13. Eagar K, Hindle D. *Casemix in Australia: an overview. The national education series. Volume 1*. Canberra, Commonwealth of Australia, 1994.

14. Bland M. *An introduction to medical statistics*. New York, Oxford University Press, 2000.

15. Podger A, Hagan P. Reforming the Australian health care system: the role of government. In: Bloom AL, ed. *Health reform in Australia and New Zealand*. Melbourne, Oxford University Press, 2000.

16. Hindle D. Health care funding in New South Wales: from health care needs to hospital outputs. *Australian health review*, 2002, 25(1):40–71.

17. Byron AL, McCathie HFC. Casemix: the allied health response. *Medical journal of Australia*, 1998, 169:S46–7.

18. Bridges JFP, Mazevska D, Haas M. Developing better casemix education for rural New South Wales. *Australian journal of rural health*, 2001, 9(4):193–9.

19. Baker A. Casemix: your views. *Australian nursing journal*, 1995, 3(4).

20. Gleeson M. Casemix-education a top priority. *Australian nursing journal*, 1995, 3(3):34.