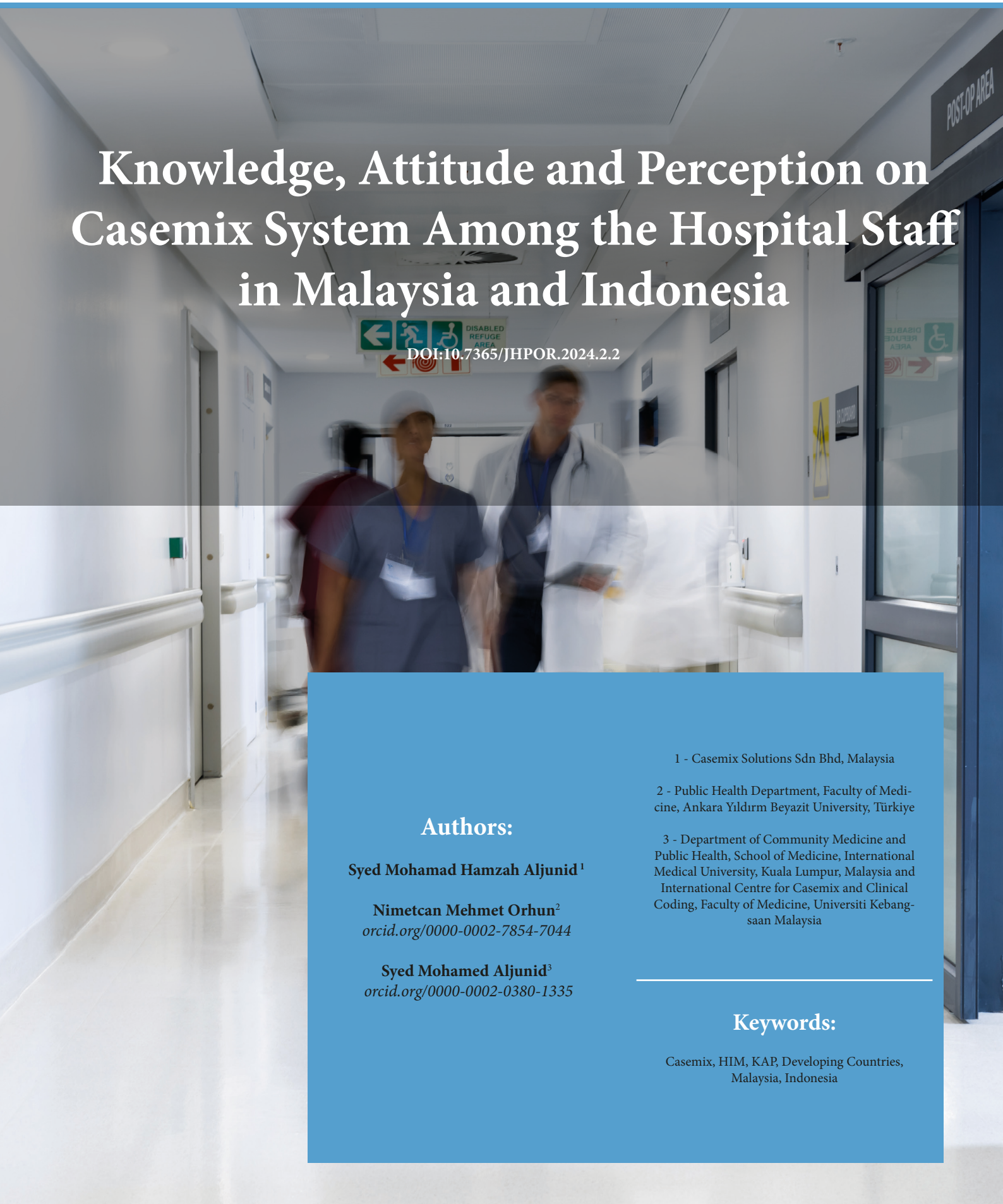
#02/2024
ISSN 2299-1247

JHPOR | Journal of Health Policy & Outcomes Research



Knowledge, Attitude and Perception on Casemix System Among the Hospital Staff in Malaysia and Indonesia

DOI:10.7365/JHPOR.2024.2.2

Authors:

Syed Mohamad Hamzah Aljunid [1]

Nimetcan Mehmet Orhun[2]
orcid.org/0000-0002-7854-7044

Syed Mohamed Aljunid[3]
orcid.org/0000-0002-0380-1335

1 - Casemix Solutions Sdn Bhd, Malaysia

2 - Public Health Department, Faculty of Medicine, Ankara Yıldırm Beyazit University, Türkiye

3 - Department of Community Medicine and Public Health, School of Medicine, International Medical University, Kuala Lumpur, Malaysia and International Centre for Casemix and Clinical Coding, Faculty of Medicine, Universiti Kebangsaan Malaysia

Keywords:

Casemix, HIM, KAP, Developing Countries, Malaysia, Indonesia

How to cite this article?
Aljunid S.M.H., Orhun N.M., Teper S., Aljunid S.M., Knowledge, Attitude and Perception on Casemix System Among the Hospital Staff in Malaysia and Indonesia J Health Policy Outcomes Res [Internet]. 2024[cited YYYY Mon DD];. Available from: https://jhpor.com/article/2379-knowledge-attitude-and-perception-on-casemix-system-among-the-hospital-staff-in-malaysia-and-indonesia

contributed: 2024-02-26
final review: 2024-10-25
published: 2024-10-28

Corresponding author:
Nimetcan Mehmet Orhun nametjan@gmail.com

Abstract

Objective: The aim of this study is to assess the Knowledge, Attitude, and Perception (KAP) of hospital staff regarding the Casemix System in Developing countries.

Methods: A cross-sectional study was carried among the hospital staffs in Indonesia and Malaysia. The study hospitals and respondents were selected via random and purposive sampling, respectively. Data was collected via self-administered questionnaires.

Results: Total 350 hospital staffs participated, out of this 58.6% of participants were from Indonesia. Most of the respondents (58.0%) had a moderate level of knowledge score, medium level of perception score (84.9%) and negative attitude (90.0%) on Casemix. The study found that years of working experience, type of occupation, hospital type, country, and those with training in Casemix were significantly related to knowledge score. No independent variable except for country was related to perception score. It was also found that majority (66.7%) of the participating hospitals (N=36) completely captured the demographic data in their HIS, 47.2% completely implementing the coding module as per Casemix requirement and 27.8% of the hospitals recorded the Activity Daily Living (ADL) score in their system.

Conclusion: Among the participants, only 2.3% demonstrated a high level of knowledge about Casemix. When it comes to attitudes, majority of respondents expressed a negative view towards Casemix. Regarding perceptions, only 11.4% of respondents had a high perception of Casemix, while the majority, 84.9%, had a medium perception.

Introduction

The idea of using Casemix classification to manage hospital services has existed for some time but was limited by technology. It was only after Medicare was introduced in 1965 that serious efforts to measure hospital production and control costs began.[1] Casemix was developed by Robert B Fetter for managing patients in hospitals, Casemix systems are continuous learning systems which aim to improve transparency, efficiency and quality in health service provision.[2] Casemix systems are subject to the specific health system they are embedded in and they can constitute powerful incentive mechanisms within the health system.[3] Casemix systems, as important tools for resource distribution within health systems, are subject to various influences and vested interests that go beyond predictive ability and homogeneity in case groups.[4] They introduced a standardized method for describing the product of health services and their respective resource utilization while linking this information to costs. The most commonly known and widely used Casemix system is the Diagnosis Related Groups Casemix system (DRGs), a system that groups hospital inpatients primarily based on routinely collected patient variables, such as demographic, diagnostic and therapeutic characteristics.[5] The World Health Organization (WHO) Family of International Classifications[6] has been developing into an array of interlinked domain classifications since its introduction in 2001.[7] The interconnections provide a base for a rethinking and refinement of Casemix structures. Building upon the success of DRGs, several Casemix systems have been developed.[8] The development of Casemix in rehabilitation poses similar challenges for healthcare systems all around the world. Casemix tools must capture all the key cost-determinants of treatment for patients with complex needs.[9] Casemix models for funding and outcome analysis of healthcare rely on accurate and complete data to classify the complexity and costliness of the care required.[10] Casemix systems improves predictive ability and fosters homogeneity in Casemix groups about costs and length of stay. Collection and integration of functioning information varied across studies. Results suggest that, in particular, DRG Casemix systems can be improved in predicting resource use and capturing outcomes for frail elderly or severely functioning-impaired patients.[11] Implementation of Casemix system needs a well-organized and computerized system with well-trained and oriented staff.[12] The International Centre for Casemix and Clinical Coding (ITCC) in National University of Malaysia, considering its experience and technical capacity to conduct training in this field, proposed to establish a universal case-mix education programs, especially for developing country, through providing an e-learning program (ELP) for Casemix and clinical coding and evaluate its success.[13] The ITCC can provide accessible, affordable, continuous and high quality training program for capacity building in Casemix system to support implementation of case-mix system in developing countries.[14] Universiti Kebangsaan Malaysia Medical

Center (UKMMC) is one of Malaysia's leading hospitals that adopted the case-mix system in 2002. This system was implemented as a suitable provider payment mechanism, aligning with the ongoing national health reform efforts to deliver equitable and efficient health services.[15] In 2010, the Ministry of Health (MOH) introduced the Malaysian DRG casemix system and progressively rolled it out across the entire country.[16, 17] In 2005, the Indonesian government chose to adopt casemix as a provider payment mechanism. Initially implemented as a pilot project in 15 selected government hospitals, it was later expanded to include all government hospitals across Indonesia by 2008. In 2010, the casemix Indonesian Diagnosis Related Groups (INA-DRG) system was introduced, and later that year, the Ministry of Health implemented a more comprehensive casemix system known as Indonesia Case Base Groups (INACBG), following a formal decree.[18] Hospital staff play an essential role in the hospital for developing and maintaining the health information system (HIS). They also play significant roles in ensuring the success of Casemix system implementation. Casemix system consists of four main components that need to be simultaneously implemented. One of them is Information technology (IT) components involving adopting and maintaining the software and linking it with the current system. Without proper knowledge on Casemix system, they cannot adequately support the Casemix implementation. Thus, the implementation will face a major problem and cannot be sustained in the long term. Researchers found that by increasing understanding of the funding system and health systems and improving knowledge among staff and managers in Social Security Organization (SSO), these can help in providing the groundwork for service improvements. The level of knowledge about funding system as well as the need for education, not only about Casemix, but about the funding mechanisms in general can be revealed using a simple questionnaire.[19] Adequate knowledge, good attitude, and perception towards Casemix system is important to implement and maintain the system. There was no study done before regarding Knowledge, Attitude, and Perception towards Casemix system among the hospital staff in Malaysia and Indonesia. The aim of the study was to evaluate the knowledge, attitudes, and perceptions of the Casemix system among hospital staff in selected hospitals in developing countries, with a focus on Malaysia and Indonesia.

Material and Methods

Study design and sampling

A cross-sectional study was conducted among hospitals staffs in Malaysia and Indonesia. We calculated the sample size for this study using a 95% confidence level, a 70% proportion[19] of hospital staff meeting the selection criteria, and a 5% margin of error. Based on these parameters, the minimum required sample size was determined to be 323. We had chosen purposively thirty-six (36) hospitals in total from Malaysia and Indonesia to assess their HIS. These hospitals were selected according to the convenient of the researcher. The chosen hospitals were inter-related with the hospital staffs who answered the KAP questionnaire.

Study questionnaire

A questionnaire was used for data collection. The questionnaire was developed from inception, as it was a novel questionnaire designed specifically to test participants' knowledge, attitude, and perception on various level of Casemix implementation. There are four sections in this questionnaire that include data on basic respondents' socio-demographic profile, knowledge, attitude, and perception. In addition to collecting socio-demographic profiles of the participants, questions were also asked about their years of experience, type of occupation, type of hospital, and attendance at Casemix workshops. Years of experience in Casemix were categorized as follows: less than one year was considered low experience, while more than one year was classified as high experience. Occupations were categorized into officer and operational staff; officers include IT officers, Programmers, Doctors, or any personnel in the hospital's IT department who hold a bachelor's degree, the operational staffs are referred to support staff that working in the IT department who hold a diploma. Hospitals in Indonesia were classified into four categories: Class A: General hospitals with extensive facilities and broad capabilities in both medical and subspecialty services. Class B: Public hospitals with medical facilities and at least 11 limited specialists and subspecialists. Class C: Public hospitals offering essential specialist medical services. Class D: General hospitals with basic medical facilities and skills.[16]

The experts designed the questionnaire with a 5-point Likert scale (1 to 5) response options. These options were: highly agree (coded as 5), agree (4), unsure (3), disagree (2) and highly disagree (1). These were later reclassified into two categories; "False" (which include answers that are "Unsure, Disagree and Highly Disagree") answers and "True" (which include answers that are "Highly Agree and Agree") answers for knowledge. There were twelve (12) questions on respondents' attitude; on costing, tariff, and the grouper, which assessed the respondents' response towards Casemix during the working tenure and their attitude to implementing it. The options were: Highly Agree (coded as 5), Agree (4), Unsure (3), Disagree (2) and Highly Disagree (1). There were no right or wrong answers on their attitude-wise as these were how they perceived their own experiences. The last section consisted of ten (10) questions on the perception of respondents on Casemix implementation. These were reclassified into

three classes; highly agree and agree were combined into agree, disagree, and highly disagree were combined into disagree, and the last option was "unsure".

Cut-off points

Knowledge was categorized into three groups which are High Knowledge (score 8 to 10), Moderate Knowledge (score 5 to 7), and Low Knowledge (score 0 to 4).

The total score was 60-point based on the answers given by the respondents and were categorized into three (3) groups; Positive Attitude (score = 47 to 60), Neutral Attitude (score = 41 to 46) and Negative Attitude (score = 12 to 40). Perception was categorized into three groups which are High Perception (score 16 to 20), Medium Perception (score 8 to 15), and Low Perception (score 0 to 7).

Validation

All questions were designed by experts in the field and further validated by face validation and internal consistency. The Alpha Cronbach reliability analysis showed an acceptable alpha value of 0.722 for ten (10) items on knowledge, 0.802 for twelve (12) items on attitude, and 0.710 for ten (10) items on perception.

Statistical analysis

The data was analysed using the Social Sciences Statistical Package (SPSS) version 26 computer software programme. Descriptive and inferential statistics were used such as frequency tables, graphs, standard deviations, percentages, bivariate (Chi-square test), and multiple regression analysis.

Ethical Clearance

This study was approved by the Universiti Kebangsaan Malaysia (UKM) Research and Ethics Committee. Participants were supplied with information about the research. They also had been briefed through verbal and written descriptions and explanations, about their position in the study and their rights as participants. Those who decided to participate acknowledged their consent was aware and voluntary, not due to misinformation or coercion from the researcher.

Results

A total of five hundred and fifty (550) self-administered questionnaires were distributed among the hospital staffs and three hundred and fifty (350) questionnaires were completed and returned giving the response rate of 63.6%. Most of the respondents were from Indonesia (58.6%) and the rest were from Malaysia. Female respondents dominated the study at 60%. The demographic result also showed that 64.0% from respondents were working as Operational Staffs. The high percentage (86.6%) of the respondents who had never attended any prior Casemix training. Among the participants, 75.1% from the respondents were below than 40 years' old. Most of the respondents had low experienced in Casemix (72.6%). Respondents from type B hospitals dominated at 64.0%, followed by type C hospitals (19.7%), type A hospital (14.0%), and type D hospitals (2.3%) in the study (Table 1).

Table 1. Distribution of respondents by socio-demographic characteristic

Factors		N	%
Country	Indonesia	205	58.6
	Malaysia	145	41.4
Gender	Male	140	40.0
	Female	210	60.0
Type of Occupation	Officer	126	36.0
	Operational Staffs	224	64.0
Attended Casemix Workshops	Yes	47	13.4
	No	303	86.6
Age Group	Younger (<40)	263	75.1
	Older (≥ 40)	87	24.9
Experience in Casemix	High Experience (≥1)	96	27.4
	Low Experience (<1)	254	72.6
Type of the study hospitals	Type A	49	14
	Type B	224	64
	Type C	69	19.7
	Type D	8	2.3

Knowledge on Casemix system of the respondents showed that 39.7% of respondents had low knowledge, 58% of them had moderate knowledge, while only 2.3% had high knowledge. The mean knowledge score for the respondents was 4.84 out of the possible 10 points (SD=2.088). Factors such as the location of the hospitals ($p < 0.0001$), hospital types ($p < 0.0001$), respondents that had attended the Casemix workshop ($p=0.001$), years of experience of the respondents ($p=0.000$), and type of occupation of the respondents ($p=0.002$) were significantly associated with the level of knowledge (Table 2).

Study found that 90.0% of respondents have a negative attitude towards Casemix. Only 0.6% of them have positive attitude while the rest 9.4% of them have neutral attitude towards Casemix. The mean attitude score for all respondents was 35.92 out of a possible 60 points (SD = 5.192). The range of attitude scores was 12 to 51 respectively. Bivariate analysis was performed using Pearson Chi-square test to compare the attitude scores with factors though to influence such as gender, country, hospital type, attended Casemix workshop, age, experience, and types of occupation of the respondents. Results shows that all factors were not statistically significant ($p > 0.05$) except age ($p=0.034$) associated with the attitude towards Casemix (Table 3).

Table 2. Determination of factors associated with knowledge level

Factors N		High Knowledge		Moderate Knowledge		Low Knowledge		p
		%	N	%	N	%		
Country	Malaysia	1	1	30	21	114	79	<0.0001
	Indonesia	7	3	173	85	25	12	
Hospital Types	A	0	0	28	57	21	43	< 0.0001
	B	5	2	111	50	108	48	
	C	2	3	57	83	10	14	
	D	1	13	7	88	0	0	
Attended Casemix Workshop	Yes	1	2	39	83	7	15	0.001
	No	7	2	164	54	132	44	
Experience (Years)	High Experience	2	2	76	79	18	19	<0.0001
	Low Experience	6	2	127	50	121	48	
Type of Occupation	Officers	4	4	64	70	23	25	0.002
	Operational Staffs	4	2	139	54	116	45	
Gender	Male	5	4	87	62	48	34	0.128
	Female	3	1	116	55	91	43	
Age Group	Younger (<40)	4	2	148	56	111	42	0.086
	Older (≥ 40)	4	5	55	63	28	32	

Table 3. Determination of factors associated with attitude

Factors N		Positive		Neutral		Negative		p
		%	N	%	N	%		
Country	Malaysia	1	1	12	8%	132	91	0.672
	Indonesia	1	0	21	10	183	89	
Hospital Types	A	0	0	3	6	46	94	0.827
	B	2	1	23	10	199	89	
	C	0	0	7	10	62	90	
	D	0	0	0	0	8	100	
Attended Casemix Workshop	Yes	1	2	7	15	39	83	0.115
	No	1	0	26	9	276	91	
AgeGroup	Younger (<40)	0	0	23	9	240	91	0.034
	Older (≥ 40)	2	2	10	12	75	86	
Gender	Male	0	0	15	11	125	89	0.146
	Female	2	1	18	9	190	90	
Experience (Years)	More Experience	1	1	14	15	81	84	0.095
	Less Experience	1	0	19	7	234	92	
Type of Occupation	Officers	0	0	12	13	79	87	0.261
	Operational Staffs	2	1	21	8	236	91	

Table 4. Determination of factor associated with perception

Factors N		High Perception		Medium Perception		Low Perception		p
		%	N	%	N	%		
Country	Malaysia	9	6	126	87	10	7	0.009
	Indonesia	31	15	171	83	3	1	
Hospital Types	A	6	12	43	88	0	0	0.230
	B	23	10	191	85	10	4	
	C	8	12	58	84	3	4	
	D	3	38	5	63	0	0	
Attended Casemix Workshop	Yes	6	13	39	83	2	4	0.928
	No	34	11	258	85	11	4	
Age Group	Younger (<40)	28	13	186	83	10	4	0.157
	Older (≥ 40)	12	10	111	88	3	2	
Gender	Male	19	14	116	83	5	4	0.589
	Female	21	10	181	86	8	4	
Experience (Years)	More Experience	15	16	79	82	2	2	0.213
	Less Experience	25	10	218	86	11	4	
Type of Occupation	Officer	11	12	79	87	1	1	0.306
	Operational Staff	29	11	218	84	12	5	

The perception level, 11.4% of respondents (n=40) has high perceptions towards Casemix; however, the majority at 84.9% (n=297) has medium perception towards Casemix. The mean perception score for all respondents were 12.07 out of a possible 20 points (SD = 2.67). The range of perception score was 6 and 20, respectively. The perception scores were tested with factors that influence gender, country, hospital type, attended Casemix workshop, age, experience, and type of occupation of the respondents using Pearson Chi-square test. Result shows that the only country factor was significantly associated with the level of perception (p=0.009) in the study (Table 4).

Discussion

The findings revealed a generally low level of knowledge among the respondents, primarily due to their limited experience with Casemix and the high number who had not attended Casemix training. Similar results have been reported in other studies.[19-23] The findings indicate that operational staff have less knowledge compared to officers. This aligns with a study in Australia.[24] Participants who attended a Casemix workshop demonstrated better knowledge compared to those who did not attend. This finding is consistent with another study[25], which reported that individuals who participated in workshops or training programs on the DRG system had greater knowledge than those who did not attend. Many studies demonstrated that participating any training course or workshop can help to increase knowledge. Training helps employees gain a clearer understanding of their responsibilities and equips them with the necessary knowledge and skills to perform their job effectively. Indonesia participants had better knowledge than Malaysian participants it may due to Since January 1, 2014, the Indonesian government has implemented the National Health Insurance program, known as National Health Insurance Scheme (JKN), with the aim of achieving Universal Health Coverage in Indonesia. By 2019, JKN covered 72% of the country's population. This shift in the health service system presents both opportunities and challenges for hospitals. Additionally, the tariff structure for healthcare services has been updated to the INA-CBGs packages, a unique case-mix model tailored for Indonesia.[26] Knowledge levels differed significantly among participants based on hospital type, work experience, and their roles as officers or operational staff. This variation may be due to forgetfulness, a lack of perceived value in the behavior, and potentially inadequate educational materials on the Casemix System. The majority of participants in this study had a negative attitude toward Casemix. The findings suggest that the participants' level of knowledge directly influences their attitudes. The knowledge level of the participants was low. Another possible reason for this is that various other factors may impede the process; behavior is influenced not only by attitude and knowledge but also by motivation, perceived benefits, social factors, and other elements. It's also possible that these individuals do not fully appreciate the significance of their role in Casemix implementation. Some may believe that Casemix will simply increase their workload without providing any tangible benefits. Indonesian participants had a more positive perception of Casemix than Malaysian participants. This is maybe because of Indonesia hospital's staff get more access to a training programme as part of their development programme and the system has implemented in whole nations. To successfully implement the Casemix system, training providers or the government could consider subsidizing training fees to encourage participation. The study has several limitations. Due to constraints of time and resources, it was conducted solely in selected hospi-

tals in Malaysia and Indonesia, which may not represent all developing countries or the entire staff population in these nations. Future research should encompass a broader range of developing countries, include more hospitals, and involve a larger number of participants.

Conclusion

Most of participants demonstrated a low level of knowledge about Casemix and expressed a negative view towards Casemix. Regarding perceptions, a minority had a high perception of Casemix, while most had a medium perception. To successfully implement the Casemix system, it is crucial to address the low level of staff knowledge and gain their support. This can be achieved by using an effective system integrated with existing processes.

Acknowledgment
We would like to thank all the respondents in the respective hospitals that participated in this study.

Declaration of Conflicting Interests: The author(s) declared no potential conflicts of interest

Funding: no funding.

References

1. R. B. Fetter, "Casemix classification systems," Aust. Heal. Rev., vol. 22, no. 2, p. 16, 1999, doi: 10.1071/AH990016.
2. R. Busse et al., "Diagnosis related groups in Europe: Moving towards transparency, efficiency, and quality in hospitals?," BMJ, vol. 347, no. 7916, pp. 1–7, 2013, doi: 10.1136/bmj.f3197.
3. R. Busse, J. Schreyögg, and P. C. Smith, "Editorial: Hospital case payment systems in Europe," Health Care Manag. Sci., vol. 9, no. 3, pp. 211–213, Aug. 2006, doi: 10.1007/s10729-006-9039-7.
4. M. Hopfe, G. Stucki, R. Marshall, C. D. Twomey, T. B. Üstün, and B. Prodinger, "Capturing patients' needs in casemix: a systematic literature review on the value of adding functioning information in reimbursement systems," BMC Health Serv. Res., vol. 16, no. 1, p. 40, Dec. 2016, doi: 10.1186/s12913-016-1277-x.
5. T. J. Fetter RB, Shin Y, Freeman JL, Averill RF, "Case mix definition by diagnosis-related groups.," Med Care, vol. iii, 1-53., 1980.
6. R. C. Madden, C. Sykes, and T. B. Ustun, "World Health Organization Family of International Classifications : definition , scope and purpose," World Heal. Organ., pp. 1–27, 2007.
7. U. TB, "Integration for health classifications: Sharing ontologies.," in Think before you measure symposium, 2011.
8. W. Fischer, "The DRG Family," State Aff. 2007.https//fischer-zim.ch/, pp. 1–33, 2008.
9. L. Turner-Stokes, S. Sutch, R. Dredge, and K. Eagar, "International casemix and funding models: Lessons for rehabilitation," Clin. Rehabil., vol. 26, no. 3, pp. 195–208, 2012, doi: 10.1177/0269215511417468.
10. R. Madden, R. Marshall, and S. Race, "ICF and casemix models for healthcare funding: Use of the WHO family of classifications to improve casemix," Disabil. Rehabil., vol. 35, no. 13, pp. 1074–1077, 2013, doi: 10.3109/09638288.2012.720349.
11. M. Hopfe, G. Stucki, R. Marshall, C. D. Twomey, T. B. Üstün, and B. Prodinger, "Capturing patients' needs in casemix: A systematic literature review on the value of adding functioning information in reimbursement systems Utilization, expenditure, economics and financing systems," BMC Health Serv. Res., vol. 16, no. 1, 2016, doi: 10.1186/s12913-016-1277-x.
12. A. Rahimi, S. B. Sulong, M. A. Embi, and S. M. Aljunid, "Evaluation of introduction to UNU-Casemix grouper & IT in Casemix system workshop for health staff in Indonesia," BMC Health Serv. Res., vol. 12, no. S1, p. 6963, 2012, doi: 10.1186/1472-6963-12-s1-o5.
13. A. Rahimi, N. Maimaiti, A. Rahimi, S. M. Aljunid, and S. B. Sulong, "Developing an E-learning education program for casemix system; Process and out come," Malaysian J. Public Heal. Med., vol. 16, no. 1, pp. 31–39, 2016.
14. A. Rahimi, N. Maimaiti, A. Rahimi, S. M. Aljunid, and S. B. Sulong, "Reasons to attend the first casemix and clinical coding e-learning program," Malaysian J. Public Heal. Med., vol. 16, no. 3, pp. 93–98, 2016.
15. S. A. Amrizal MN, Rohaizat Y, Zafar A, Saperi, "Case-mix costing in Universiti Kebangsaan Malaysia hospital a top-down approach: cost analysis for cardiology cases," MJPHM, vol. 5, no. (Supplement 2), pp. 33–44, 2005.
16. S. Saizan, R. Jaudin, N. M. Yaacob, and S. Sukeri, "The MalaysianDRG casemix system: Financial implications of inaccurate clinical documentation and coding error," Malaysian J. Med. Heal. Sci., vol. 17, no. 1, pp. 83–87, 2021.

17. Casemix Unit, "Overview of Case-mix System," Unit Rekod Perubatan, editor. Jabatan Kesihatan Negeri Terengganu: Ministry of Health Malaysia, 2016.

18. K. Kasra, S. M. Aljunid, and A. M. Nur, "Does Provider Payment Method Improve the Completeness of Medical Records? a Study on the Impact of the Case-mix System on Medical Record Documentation in a Public Specialist Hospital in West Sumatra Province, Indonesia," Malaysian J. Public Heal. Med., vol. 22, no. 2, pp. 237–243, 2022, doi: 10.37268/mjphm/vol.22/no.2/art.1633.

19. S. Ghaffari, C. M. Doran, and A. Wilson, "Casemix in the Islamic Republic of Iran: Current knowledge and attitudes of heath care staff," East. Mediterr. Heal. J., vol. 14, no. 4, pp. 931–940, 2008.

20. K. J. Ngcobo, "" Knowledge , attitudes and practice of healthcare workers on the use of Health Information Technology : A mixed method descriptive survey among healthcare workers in Princess," Sunscholar, no. April, pp. 16–57, 2019.

21. R. Edirippulige, S., Smith, A. C., Beattie, H., Davies, E., & Wootton, "Pre-registration Nurses: An Investigation of Knowledge, Experience and Comprehension of E-health," Aust. J. Adv. Nurs., vol. 25, no. 2, pp. 78–83, 2007.

22. S. M. A. Azam Rahimi, Saperi b. Sulong, Mohamed Amin Embi, Amrizal M. Nur, "Knowledge and Attitude regarding Case-mix system among health staff in Indonesia," in the 6th Postgraduate Forum on Health Systems and Policies. Melaka, Malaysia. May 21-22, 2012.

23. F. Sukums, N. Mensah, R. Mpembeni, J. Kaltschmidt, W. E. Haefeli, and A. Blank, "Health workers' knowledge of and attitudes towards computer applications in rural African health facilities," Glob. Health Action, vol. 7, no. 1, 2014, doi: 10.3402/gha.v7.24534.

24. P. DEGELING, "HEALTH PLANNING AS CONTEXT-DEPENDENT LANGUAGE PLAY," Int. J. Health Plann. Manage., vol. 11, no. 2, pp. 101–117, Apr. 1996, doi: 10.1002/(SICI)1099-1751(199604)11:2<101::AID-HPM428>3.0.CO;2-Z.

25. S. A. A. Jadoo et al., "Turkish healthcare providers' level of knowledge, attitude and practice toward diagnosis related group system - A cross sectional study," Malaysian J. Public Heal. Med., vol. 16, no. 1, pp. 121–128, 2016.

26. W. Kiyah and G. Albert, "Strategy Choices for Casemix System at a Private Hospital in Indonesia," Utopía y Prax. Latinoam., vol. 25, no. 1, pp. 334–343, 2020.