ORIGINAL ARTICLE

A study on the use of abbreviations among doctors and nurses in the medical department of a tertiary hospital in Malaysia

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ABSTRACT

Introduction: Misinterpretation of abbreviations by healthcare professionals has been reported to compromise patient safety. This study was done to determine the prevalence of abbreviations usage among medical doctors and nurses and their ability to interpret commonly used abbreviations in medical practice.

Methods: Seventy-seven medical doctors and eighty nurses answered a self-administered questionnaire designed to capture demographic data and information regarding abbreviation use in medical practice. Comparisons were made between doctors and nurses with regards to frequency and reasons for using abbreviations; from where abbreviations were learned; frequency of encountering abbreviations in medical practice; prevalence of medical errors due to misinterpretation of abbreviations; and their ability to correctly interpret commonly used abbreviations.

Results: The use of abbreviations was highly prevalent among doctors and nurses. Time saving, avoidance of writing sentences in full and convenience, were the main reasons for using abbreviations. Doctors learned abbreviations from fellow doctors while nurses learned from fellow nurses and doctors. More doctors than nurses reported encountering abbreviations. Both groups reported no difficulties in interpreting abbreviations although nurses reported often resorting to guesswork. Both groups felt abbreviations were necessary and an acceptable part of work. Doctors outperformed nurses in correctly interpreting commonly used standard and non-standard abbreviations.

Conclusion: The use of standard and non-standard abbreviation in clinical practice by doctors and nurses was highly prevalent. Significant variability in interpretation of abbreviations exists between doctors and nurses.

KEY WORDS:
Abbreviations, patient safety, medical practice, healthcare professionals

INTRODUCTION

Abbreviations are shortened or contracted forms of words or phrases. In contrast, acronyms are words formed from the initial letters or group of letters in a set phrase. Healthcare professionals use abbreviations and acronyms extensively in medical practice because they are short, space-saving, convenient and easy to use. Doctors use abbreviations for the documentation of patients' history, physical findings, ordering of relevant investigations and documenting management plans for patients. These abbreviations are read and interpreted by other healthcare professionals in a multidisciplinary team such as other doctors, pharmacists and nurses involved in the delivery of care for the patients. Any misinterpretation of the notes written by the doctors by the others could potentially lead to either delay in the delivery of care or worst, the delivery of suboptimal or even detrimental care to the patients.

Although there is a paucity of evidence that directly link misinterpretation of abbreviations to poor patient outcome, several studies have reported that communication between healthcare personnel were hindered by the use of abbreviations in progress reports; understanding of these abbreviations by the healthcare personnel were at best 'average'; unacceptable abbreviations were used; and documentation errors were associated with longer length of hospital stay.[1,2,3] Abbreviations have even been used to describe patients in an abusive and unacceptable manner.[4]

The use of abbreviations can be hazardous, especially in the context of drug prescription. The Joint Commission on Accreditation of Healthcare Organization (JCAHO) 2005 reported that as much as 5% of all prescription-related errors reported were attributable to the use of abbreviations.[5] Pharmacists and nurses often had to contact the prescribers who had used confounding abbreviations in their prescription and this causes conflict between healthcare professionals and further deteriorating communication.[6] The use of abbreviations may even hinder verbal communications, not only between healthcare professionals but also between healthcare providers and the patients and their carers.[7]

Sinha *et al.* assessed the understanding of commonly used abbreviations in the medical records of surgical inpatients among junior and senior doctors, nurses, pharmacists, dieticians, physiotherapists and occupational therapists; and reported the majority of them had very poor knowledge of

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commonly used abbreviations due to the ambiguous nature of many abbreviations that may have different meanings in different contexts.[8] Similarly, Sheppard *et al.*, in an audit of abbreviations in paediatric note keeping, reported widespread use of abbreviations without any systemic approach, and difficulties in interpretation were demonstrated.[9]

Parvaiz *et al.* picked out all the abbreviations encountered in a week's worth of orthopaedic, surgical and medical records and assessed the ability of different groups of healthcare professionals in understanding these abbreviations. They reported significant variability in the understanding of abbreviations by the different groups of healthcare professionals and between members of the same specialty. They concluded that misinterpretations of abbreviations across the specialties may pose imminent clinical risk and recommended that abbreviations have no place in the multidisciplinary world of medicine.[10]

We conducted this study to explore how prevalent is the use of abbreviations in medical practice and whether there exists significant variability between doctors and nurses in the ability to understand and interpret abbreviations commonly used in the medical wards.

MATERIALS AND METHODS

Study setting and sample size

This study was a cross-sectional survey conducted between December 2013 and May 2014 in Hospital Tuanku Ja'afar Seremban (HTJS). HTJS is a 1070 bedded tertiary referral hospital in the state of Negeri Sembilan in Malaysia. The department of internal medicine is one of the largest departments within HTJS. HTJS has its own list of approved abbreviations that was largely based on the national guideline. At the time of survey, there were 88 doctors (60 house officers and 28 medical officers), and 120 nurses from the department of internal medicine working in the general medical wards in HTJS. All the doctors and nurses were invited to participate in this survey.

Sample size calculation was done assuming a confidence level and interval of 95% and 0.05, respectively. Based on this, 71 doctors and 90 nurses were the calculated required sample size, respectively. Seventy-seven doctors and eighty nurses from the department of internal medicine of Hospital Tuanku Ja'afar Seremban (HTJS) in Malaysia eventually participated in the survey.

A House Officer (HO) is a junior doctor who possess a basic medical degree and is employed by the Ministry of Health, Malaysia to work by rotations in the various departments of a government hospital. One rotation in a department is typically four months in duration. In Malaysia, the tenure of housemanship is two years. A Medical Officer (MO) is a senior doctor who had completed two years of housemanship and is usually seconded to work in a specific department in the hospital for an extended period of time, usually exceeding four months.

Survey tool

The survey tool was a self-administered questionnaire consisting of five sections. The first section contained questions designed to capture demographic data such as name, gender, age, ethnicity, and profession (doctor or nurse). The second section contained questions dedicated to capturing the frequency of abbreviation usage, the source from where abbreviations were learned by the respondents, and the reasons for using abbreviations. The respondents were allowed to select more than one answer in this section where appropriate.

The third section contained questions designed to evaluate the perceptions of the respondents regarding the use of abbreviations in medical practice. They were asked to rate their responses to a number of statements using a 5-point Likert Scale that ranges from '1: strong agree' to '5: strongly disagree' (Table III). The fourth section contained questions designed to discover if the survey participants had experienced any negative impact to the quality of patient care as a direct result from misinterpretation of abbreviations.

The fifth and final section contained a list of selected abbreviations where the survey participants were required to correctly interpret their meanings. The list of abbreviations was compiled from a pilot survey of admission notes documented by junior doctors in two male and two female general medical wards in HTJS, respectively. In the pilot study, all the abbreviations encountered were documented and analysed. For the purpose of this study, a final list comprising fifty-three of the most commonly used abbreviations were selected. We used the hospital's guidelines for the use of abbreviations as a reference to identify approved abbreviations in the final list. Twenty-three (43%) of the abbreviations in the final list were found in the hospital's guidelines as approved abbreviations while the rest were not listed in the hospital's guideline.

Data collection

Data collection was done in the male and female general medical wards of HTJS. Doctors and nurses working in these wards were briefed at pre-scheduled meetings on the objectives of the survey and their participations were voluntary. Informed consent was taken from the respondents before distribution of the survey tool. Survey participants were given uninterrupted twenty minutes to complete the questionnaire.

Ethical considerations

This study was approved by the International Medical University Joint Research and Ethics Committee (Research Number CSc/Sem6(01)2014) and registered with the National Medical Research Registry of Malaysia (NMRR-14-1075-19367).

Statistical analyses

Data was presented in mean or percentage where appropriate. Descriptive analysis was used to delineate the demographic data of the respondents. Comparison between doctors and nurses were analysed using the independent Student's t-test and the chi-square test where appropriate. A p value of <0.05 with 95% confidence interval was considered

significant. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 20 for Windows 7.

RESULTS

Demographic characteristics.

Seventy-seven out of 88 doctors and 80 out of 120 nurses participated in the survey, giving response rates of 87.5% and 66.7 % respectively. The male to female ratio among doctors was 2:3 and 1:10 among the nurses. Malays were the largest ethnicity in both groups (Table I). Regression analyses showed none of the demographic parameters were significant predictors toward the prevalence, perceptions on abbreviation use and abbreviation interpretation skill, either among the doctors or the nurses in this study.

Prevalence of abbreviation use.

Details regarding the use of abbreviations by doctors and nurses are tabulated in Table II. Compared to the nurses, more doctors reported using abbreviations 'all the time' (22.1% doctors vs 12.5% nurses), 'most of the time' (29.9% doctors vs 22.5% nurses) and 'sometimes' (44.2% doctors vs 40.0% nurses). Most of the doctors learned to use abbreviations from fellow doctors or from notes written by fellow doctors. Similarly, most of the nurses learned to use abbreviations from fellow nurses or from notes written by fellow nurses. In addition, about one-fifth to one-quarter of nurses also reported learning the use of abbreviations from doctors.

Reasons for the use of abbreviations

The most common reason for using abbreviations in medical practice was to 'save time' although significantly more doctors compared to nurses reported this (85.7% doctors vs. 57.5% nurses, $p < 0.001$). In addition, more doctors compared

Table I: Demographic characteristics of doctors and nurses (N = 157)

	Doctors (%)	Nurses (%)	Total (%)
Total Number	77 (100)	80 (100)	157 (100)
House officers	53 (69)		
Medical officers	24 (31)		
Gender			
Male	30 (39)	7 (9)	37 (24)
Female	47 (61)	73 (91)	120 (76)
Ethnicity			
Malay	39 (51)	75 (94)	114 (73)
Chinese	24 (31)	0 (0)	24 (15)
Indian	10 (13)	4 (5)	14 (9)
Others	4 (5)	1 (1)	5 (3)

Table II: Abbreviations use by doctors and nurses

No. Item	Doctors		Nurses		P value#
	N	(%)	N	(%)	
1. Frequency of using abbreviations					
All the time	17	(22.1)	10	(12.5)	
Most of the time	23	(29.9)	18	(22.5)	
Sometimes	23	(44.2)	32	(40.0)	
Rarely	3	(3.9)	15	(18.8)	
Never	0	(0.0)	2	(2.5)	
2. Source of learning the use of abbreviations					
Taught by House Officer	52	(67.5)	21	(26.3)	<0.001
Taught by Medical officer	27	(35.1)	19	(23.8)	0.175
Taught by Nurses	1	(1.3)	41	(51.3)	<0.001
Copied House Officer's entry	33	(42.9)	17	(21.3)	0.007
Copied Medical Officer's entry	33	(42.9)	9	(11.3)	<0.001
Copied from Nurses' entry	1	(1.3)	10	(12.5)	0.005
3. Reasons for using abbreviations					
Saves time	66	(85.7)	46	(57.5)	<0.001
Saves space	24	(31.2)	30	(37.5)	0.282
Tedious to write full sentences	31	(40.3)	12	(15.0)	0.001
It is convenient	33	(42.9)	16	(20.0)	0.004
Everyone understands the abbreviations	33	(42.9)	24	(30.0)	0.149
4. Problems encountered due to misinterpretation of abbreviations					
Delay in administrating therapy	13	(16.9)	12	(15.0)	0.883
Delay in procedure	10	(13.0)	13	(16.3)	0.455
Delay in diagnosis	12	(15.6)	6	(7.5)	0.148
Wrong therapy given	7	(9.1)	4	(5.0)	0.371
Wrong procedure done	2	(2.6)	4	(5.0)	0.386
Wrong diagnosis made	9	(11.7)	4	(5.0)	0.161

* P value derived from chi-square test between doctors and nurses with 95% confidence interval

Table III: Doctors and nurses perceptions on the use of abbreviations in medical practice

Items	Doctors*						Nurses*						P value#
	1	2	3	4	5	Mean	1	2	3	4	5	Mean	
(1) I often encounter abbreviations in my work	59	20	1	0	0	1.47	56	15	2	0	1	2.32	<0.001
(2) I have difficulty interpreting abbreviations	17	39	22	2	0	3.09	4	38	22	9	1	3.04	0.706
(3) I often have to guess the meaning of abbreviations	22	39	12	6	1	3.12	10	42	14	8	0	2.77	0.017
(4) I feel frustrated when interpreting abbreviations	25	20	27	7	1	3.13	6	29	24	13	2	3.11	0.896
(5) I find interpreting abbreviations delays my work	4	16	22	27	8	3.25	0	17	32	20	4	3.15	0.543
(6) I think abbreviations are necessary	17	30	27	5	1	2.29	10	24	32	8	0	2.28	0.961
(7) I think abbreviations are acceptable	17	43	15	4	1	2.14	7	42	23	2	0	2.32	0.141

*Number of respondents under each category of the Likert scale: 1: strongly agree; 2: agree; 3: neutral; 4: disagree; 5: strongly disagree.
#P value derived from comparison of means between doctors and nurses using the Student t-test with 95% confidence interval.

to nurses, reported 'avoidance of the tedium of writing in full sentences' (40.3% doctors vs. 15.0% nurses, p = 0.001), and 'convenience' (42.9% doctors vs. 20.0% nurses, p = 0.004), as reasons for using abbreviations. On the other hand, more nurses than doctors reported 'space saving' as a reason for using abbreviations, although the difference between them was not statistically significant (37.5% nurses vs. 31,2% doctors, p = 0.282). Interestingly, 42.9% of doctors and 30.0% of nurses reported using abbreviations because they assumed that the abbreviations were 'understood by everyone'.

Problems encountered from the use of abbreviations

Only a small proportion of the doctors and nurses in this study reported having encountered problems in medical practice as a direct result from misinterpretation of abbreviations. The problems fell mainly in the categories of 'delay in the administration of therapy', 'procedural delays' and 'delay in diagnosis'. (Table II)

Perceptions of doctors and nurses regarding the use of abbreviations in medical practice.

The findings in this domain are tabulated in Table III. More doctors compared to nurses reported often encountering abbreviations in their daily work (p <0.001). Both groups reported no difficulty in interpreting abbreviations although the nurses reported they often had to guess the meaning of abbreviations compared to doctors (p = 0.017).

Both groups also reported feeling no frustrations when interpreting abbreviations nor were there any delay in their work as a result of abbreviations usage. Both groups agreed that abbreviations were acceptable and necessary.

Correct interpretation of abbreviations.

Doctors consistently outperformed the nurses in correctly interpreting commonly used standard and non-standard abbreviations (Table IV). The difference between the two groups was more marked in the interpretation of non-standard abbreviations. Nurses, unsurprisingly, were adept at correctly interpreting abbreviations that were more likely to be encountered in their day-to-day work (e.g. BP: blood pressure; GXM: group cross match; NBM: nil by mouth; and DFU: diabetic foot ulcer).

DISCUSSION

The use of abbreviations among doctors and nurses in the government hospital was highly prevalent in this study. Although doctors were more adept at correctly interpreting standard and non-standard abbreviations compared to nurses; and the latter reported often having to resort to guessing the meaning of some of the abbreviations they encountered; both groups agreed that the use of abbreviations were acceptable and necessary, This is unsurprising because in a busy medical ward, any shortcuts that could help hasten work process are welcomed. Indeed, among the main compelling reasons reported for the use of abbreviation use in medicine were its ease of use, time and space saving, and convenience.[11]

Although there exists a guideline for the use of standard abbreviations, produced by the Ministry of Health Malaysia,[12]

Table IV: Proportions of doctors and nurses correctly interpreting commonly used abbreviations

No.	Abbreviation Standard/approved	Meaning	Doctors (%)	Nurses (%)	P value#
1	A/B	Antibiotic	72 (93.5)	75 (93.8)	0.950
2	ADL	Activity of Daily Living	63 (81.8)	63 (78.8)	0.629
3	ANA	Anti-Nuclear Antibody	56 (72.7)	21 (26.3)	< 0.001
4	BKA	Below Knee Amputation	72 (93.5)	72 (90.0)	0.425
5	BP	Blood Pressure	77 (100)	78 (97.5)	0.163
6	BPH	Benign Prostate Hypertrophy/ Hyperplasia	74 (96.1)	50 (62.5)	< 0.001
7	Cm	Coming/ Come Morning	75 (97.4)	66 (82.5)	0.002
8	FFP	Fresh Frozen Plasma	70 (90.9)	59 (73.8)	0.005
9	GXM	Group Cross Match	60 (77.9)	65 (81.3)	0.605
10	HD	Haemodialysis	75 (97.4)	73 (91.3)	0.097
11	MCL	Mid Clavicular Line	58 (75.3)	16 (20.0)	< 0.001
12	NBM	Nil By Mouth	72 (93.5)	70 (87.5)	0.201
13	O/E	On Examination	76 (98.7)	55 (68.8)	<0.001
14	OT	Occupational Therapy	54 (70.1)	38 (48.8)	0.006
15	PR	Pulse Rate	76 (98.7)	70 (87.5)	0.006
16	RA	Rheumatoid Arthritis	73 (94.8)	43 (53.8)	< 0.001
17	RTF/RT	Ryle's Tube Feeding/ Ryle's Tube	71 (92.2)	66 (82.5)	0.068
18	SOB	Shortness of Breath	76 (98.7)	80 (100.0)	0.307
19	STI	Soft Tissue Injury/ Infection	47 (61.0)	32 (40.0)	0.008
20	STO	Suture To Open/ Off	47 (61.0)	39 (48.8)	0.122
21	TRO	To Rule Out	76 (98.7)	52 (65.0)	< 0.001
22	Tx	Transfusion	35 (45.5)	18 (22.5)	0.002
23	U/S	Ultrasound/ Ultrasonography	77 (100.0)	71 (88.8)	0.002
No.	**Non-standard/not-approved**				
1	A/E	Air Entry	75 (97.4)	21 (26.3)	< 0.001
2	Bil	Bilirubin	57 (74.0)	10 (12.5)	< 0.001
3	BPPV	Benign Paroxysmal Positional/Postural Vertigo	39 (50.6)	11 (13.8)	< 0.001
4	CECT	Contrast Enhanced Computerized Tomography	43 (55.8)	21 (26.3)	< 0.001
5	Cigg	Cigarette	67 (87.0)	25 (31.3)	< 0.001
6	CRT	Capillary Refill Time	70 (90.9)	27 (33.8)	< 0.001
7	DFU	Diabetic Foot Ulcer	73 (94.8)	75 (93.8)	0.776
8	DIL	Death In Line	64 (83.1)	29 (36.3)	< 0.001
9	DRNM	Dual Rhythm No Murmur	72 (93.5)	22 (27.5)	< 0.001
10	HAP	Hospital Acquired Pneumonia	67 (87.0)	71 (88.8)	0.739
11	ICD	Implanted Cardioversion Defibrillator	22 (28.6)	14 (17.5)	0.099
12	ICS	Intercostal Space	51 (66.2)	15 (18.8)	< 0.001
13	IVI	Intravenous Infusion	66 (85.7)	51 (63.8)	0.002
14	K/C/O	Known Case Of	67 (87.0)	40 (50.0)	< 0.001
15	KUB	Kidney Ureter Bladder	43 (55.8)	20 (25.0)	< 0.001
16	LTOT	Long Term Oxygen Therapy/Treatment	69 (89.6)	45 (56.3)	< 0.001
17	MTF	Metformin	66 (85.7)	38 (47.5)	< 0.001
18	MZ	Mid/ Middle Zone	73 (94.8)	27 (33.8)	< 0.001
19	N&V	Nausea and Vomiting	62 (80.5)	16 (20.0)	< 0.001
20	N/A	No Abnormalities	39 (50.6)	1 (1.3)	< 0.001
21	NKFA	No Known Food Allergies	47 (61.0)	11 (13.8)	< 0.001
22	NKDA	No Known Drug Allergies	65 (84.4)	23 (28.8)	< 0.001
23	NPO2	Nasal Prong Oxygen	70 (90.9)	55 (68.8)	0.001
24	OHA	Oral Hypoglycemic Agent	67 (87.0)	47 (58.8)	< 0.001
25	P/w	Presents With	75 (97.4)	40 (50.0)	< 0.001
26	RN	Runny Nose	68 (88.3)	26 (32.5)	< 0.001
27	RRT	Renal Replacement Therapy/ Treatment	59 (76.6)	27 (33.8)	< 0.001
28	SNT	Soft Non Tender	64 (83.1)	14 (17.5)	< 0.001
29	U/L	Underlying	76 (98.7)	71 (88.8)	0.011
30	W/out	Watch Out	53 (68.8)	51 (63.8)	0.501

#P value derived from chi-square test between doctors and nurses with 95% confidence interval

guidance on the proper use of abbreviations listed in the guideline was not part of the orientation program for new doctors and nurses reporting for work at the department of medicine in HTJS. Instead, peer teaching appeared to the main source of the acquisition of the habit of abbreviation use among doctors and nurses in this study. In short, doctors learned from other doctors and the nurses learned from other nurses. The lack of implementation and enforcement of existing guidelines, together with peer-learning of abbreviations, may give rise to a conducive environment for the proliferation of the use of non-standard abbreviations.

Doctors, for the sake of convenience, often create abbreviations that are neither standard nor approved. These abbreviations are shared with other doctors who use them for their own convenience. The meaning attached to these abbreviations may evolve over time and usage, taking on different meaning for different users in different settings. The danger with using non-standard abbreviations is that other healthcare professionals who are unfamiliar with them may misinterpret them.9,10 Unfamiliarity may be the most likely reason why the nurses in this study performed poorly, compared to doctors, in correctly interpreting abbreviations. Similarly, both the doctors and nurses misinterpreted some of the abbreviations because these abbreviations had more than one meaning. For example, the abbreviation, 'MCL' can mean 'mid-clavicular line' or 'medial collateral ligament', 'OT' can mean 'occupation therapy' or 'operation theatre', 'STI' can mean 'sexually transmitted infections' or 'soft tissue injury' and 'Tx' can mean 'treatment' or 'transfusion', depending on the context these abbreviations were used in the wards. Unfamiliarity with and ambiguity of abbreviations have been identified as significant factors contributing to medical errors that may compromise patient safety.[11,13,14]

Fortunately, despite the widespread use of abbreviations, only a small number of doctors and nurses in this study reported encountering medical errors as a direct result of misinterpretation of abbreviations. Most of these errors caused delays in administration of therapy or procedures rather than morbidity or mortality. Nevertheless, the potential for serious adverse effect from misinterpretation of abbreviations do exist and has been reported in many studies.[5,6]

A simplistic strategy to address the potential threat of abbreviation use to patient safety would be to totally eliminate the use of abbreviations in medical practice. This strategy, however, is unlikely to succeed because of the widespread use of abbreviations and its acceptance among healthcare professionals. A more realistic approach would be to regulate the use of abbreviations through strategies that encourage the use of standard and approved abbreviations and discourage the use of potentially harmful non-standard abbreviations. The JCAHO recommended a 'Do Not Use' list of abbreviations in order to reduce errors in commonly misinterpreted abbreviations.[5] Sinha *et al.* proposed the removal of abbreviations that have more than one meaning.[8] Limiting the use of abbreviations has been reported to improve patient safety and patient care.[6,11] Dimond *et al.* proposed the implementation of internationally accepted standardized abbreviation to prevent errors in recognizing abbreviations.[4] Similarly, The Institute For Safe Medication Practices (ISMP) and Joint Commission, in recognizing that the abolition of abbreviation use is probably impractical, recommended a three-pronged approach to minimize the adverse effects of abbreviation use, namely: education, enforcement and leadership.[6]

STUDY LIMITATIONS

Although the demographic composition of doctors and nurses in this study closely reflected the same composition in every government hospitals in Malaysia, the results of this study may not be generalized to other hospitals or even other departments within the same hospital. This is because every department and hospital have their own peculiar list of abbreviations that may not be universally applicable. Additionally, the responses by participants in this study could not be verified due to the inherent biases associated with the use of a self-administered questionnaire. Furthermore, although the required calculated sample size for doctors was achieved in this study, the sample size for nurses was slightly below the calculated sample size required for statistical significance. The latter may impact the outcome of statistical analyses in this study.

CONCLUSIONS

This study has shown that the use of abbreviations among doctors and nurses in the study site was widespread and widely acceptable. These abbreviations included many non-standard abbreviations that were not included in the approved guidelines of the study site. This study has also shown that nurses often had difficulties interpreting abbreviated notes documented by the doctors. This was a weak link identified in the work process that may potentially compromise patient safety.

We recommend that young doctors and nurses be familiarized with and use only the approved list of abbreviations produced by the hospital. This can be done through the three-pronged approach proposed by Brunetti *et al:* education, enforcement and leadership. New doctors and nurses joining the department should be educated on the correct use of approved abbreviations and the reason for using them, i.e. to reduce risk of medical errors. Periodic internal audits can be carried out to ensure compliance to the rules of abbreviation use. Rewards may be used to encourage compliance. Finally, senior doctors and nurses should lead by example by strict adherence to using only approved abbreviations in their documentations.

REFERENCES

1. Dawson KP, Capaldi N, Haydon M, *et al.* The paediatric hospital medical record: a quality assessment. Aust Clin Rev. 1992; 12: 89-93.
2. Manzar S, Naik AK, Govind Pai M, *et al.* Use of abbreviations in daily progress notes. Arch Dis Child Fetal Neonatal Ed. 2004; 89: F374.
3. Carroll AE, Tarczy-Hornoch P, O'Reilly E, *et al.* Resident documentation discrepancies in a neonatal intensive care unit. Pediatrics 2003; 111(5): 976-80.
4. Dimond B. Abbreviations: the need for legibility and accuracy in documentation. Brit J Nurs 2005; 14(12): 665-6.

5. Joint Commission on Accreditation of Healthcare Organization. Medication errors related to potentially dangerous abbreviations. Sentinel Event Alert 2001; (23): 1-4.
6. Brunetti L, Santell JP, Hicks RW. The impact of abbreviations on patient safety. Jt Comm J Qual Patient Saf 2007; 33(9): 576-83.
7. Walsh KE, Gurwitz JH. Medical abbreviations: writing little and communicating less. Arch Dis Child Oct. 2008;93(10):816-17.
8. Sinha S, McDermott F, Srinivas G, *et al.* Use of abbreviations by healthcare professionals: what is the way forward. Postgrad Med J. 2011; 87: 450-2.
9. Sheppard JE, Weidner LCE, Zakai S, *et al.* Ambiguous abbreviations: an audit of abbreviations in paediatric note keeping. Arch Dis Child. 2008; 93: 204-6.
10. Parvaiz MA, Subramaniam MA, Kendall NS. The use of abbreviations in medical records in multidisciplinary world – an imminent disaster. Commun Med. 2008; 5(1): 25-33.
11. Kuhn IF. Abbreviations and acronyms in healthcare: when shorter isn't sweeter. Pediatc Nurs. 2007; 33(5): 392-8.
12. Senarai Kata Singkatan untuk Rekod Perubatan. Ministry of Health, Malaysia; 2006.
13. Das-Purkayastha P, McLeod K, Canter R. Specialist medical abbreviations as a foreign language. Journal of the Royal Society of Medicine. 2004; 97: 456-7.
14. Manzar S, Nair A, Pai GM, Al-Khusaiby S. Use of abbreviations in daily progress notes. Archives of Disease in Childhood Fetal and Neonatal Edition. 2004; 89(4): F374-6.