ORIGINAL ARTICLE

The Current Practice of Sedation and Analgesia in Intensive Care Units in Malaysian Public Hospitals

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SUMMARY

We sought to review the current practice of sedation and analgesia in intensive care units (ICUs) in Malaysian public hospitals. A questionnaire survey was designed and sent by mail to 40 public hospitals with ICU facility in Malaysia. The anaesthesiologists in charge of ICU were asked to complete the questionnaire. Thirty seven questionnaires were returned (92.5% response rate). Only 35% respondents routinely assess the degree of sedation. The Ramsay scale was used prevalently. A written protocol for sedation was available in only 14 centers (38%). Although 36 centers (95%) routinely adjust the degree of sedation according to patient's clinical progress, only 10 centers (14%) interrupt sedation on a daily basis. Most respondents agreed that the selection of agents for sedation depends on familiarity (97%), pharmacology (97%), the expected duration for sedation (92%), patient's clinical diagnosis (89%) and cost (73%). Midazolam (89%) and morphine (86%) were the most commonly used agents for sedation and analgesia, respectively. Only 14% respondents still frequently use neuromuscular blocking agents, mostly in head injury patients. Our survey showed similarity in the choice of sedative and analgesic agents in ICUs in Malaysian public hospitals comparable to international practice. Nevertheless, the standard of practice could still be improved by implementing the practice of sedation score assessment and daily interruption of sedative infusion as well as having a written protocol for sedation and analgesia.

KEY WORDS:
Sedation, Analgesia, Intensive care, Questionnaire survey

INTRODUCTION

The practice of sedation and analgesia is necessary for managing critically ill patients in the intensive care unit (ICU). Adequate sedation and analgesia is essential to keep the patient comfortable, calm and pain-free during their stay in ICU and to improve tolerance to mechanical ventilation and invasive clinical procedures. It also modulates the "stress response" that is related to inflammation and trauma[1].

There are variations in sedative and analgesic practices throughout the world with the use of a wide variety of pharmacological agents, alone or in combination[2]. Several studies [3,4,5,6,7] have found practice variations between and within ICUs. The choice of agents depends on many factors such as the expected duration of sedation, patient's clinical condition, the pharmacokinetics and pharmacodynamics of the drug, physician's familiarity, the availability of the agents and cost of the agents. Thus far, there has been no published data on the sedative and analgesic practices in Malaysia. The objective of this survey was to review the current practice of sedation and analgesia in ICUs in Malaysian public hospitals.

MATERIALS AND METHODS

Data collection
A questionnaire (Appendix 1) was designed. Forty public hospitals with ICU facility in Malaysia were identified to participate in the survey, which comprised of 36 government hospitals including 16 state hospitals and 20 district hospitals from the Malaysian Ministry of Health (MOH) list, three university hospitals and one army hospital. Private hospitals were excluded in our survey as the ICUs are not managed by a dedicated anaesthesiologist.

Questionnaires were sent by mail with stamped self-addressed envelopes to all 40 public hospitals with ICU facility. Anaesthesiologists in charge of ICU were asked to complete the questionnaires. Anonymity was preserved as far as possible. All answers were processed and recorded and the data was analysed using statistical computer software Minitab for Windows version 11.12. All data were included in the analysis.

Statistical analysis
Statistical analysis involved Mann-Whitney U-test for quantitative variables and Chi-squared tests or Fisher's exact tests for qualitative variables. The level of statistical significance was set at $p < 0.05$.

RESULTS

Response
A total of 40 public hospitals with ICU facility were identified and 37 hospitals completed and returned the questionnaires (92.5% response rate).

Demography
For analysis, state government and university hospitals were combined into one group (Level 1 centers: centers with ICUs that provide comprehensive care for a wide range of disorders requiring intensive care)[8]; while district and army hospitals as another group (Level 2 centers: centers with the capability to provide comprehensive critical care but may not have

resources to care for specific patient populations e.g. cardiothoracic surgery, neurosurgery, trauma[8]. Overall, the median number of ICU beds was 6 and median annual admissions 350. The median number of ICU beds and median annual admission was different between Level 1 and Level 2 centers, which were statistically significant (Table I). When a linear regression was performed, there was a positive correlation between the number of admission and the number of ICU beds (Figure 1), which was statistically significant (Pearson coefficient, r = +0.833).

Practice

The responses regarding sedation practice are summarized in Table II. Only 35% of respondents routinely assess the degree of sedation, with no statistically significant difference between Level 1 and Level 2 centers. The Ramsay Scale was used exclusively by respondents. A written protocol for sedation was available in only 38% of respondents. Sedation protocol was more readily available in Level 2 centers (statistically significant). Ninety seven percent respondents routinely adjust the degree of sedation according to patient's clinical progress. Only 27% respondents practice daily sedative interruptive which was not statistically significant between Level 1 and Level 2 centers. Most respondents agreed that the selection of agents for sedation depends on familiarity, pharmacokinetics and pharmacodynamics of drugs, the expected duration of sedation, patient's clinical diagnosis and cost (Table III).

Agents

In patients requiring mechanical ventilation, 89% respondents replied that they frequently used midazolam as sedative agents (frequent use was defined as responses of often or always) while 19% used propofol. Midazolam was also frequently used in patients with heart disease and patients with head injury, both 81% (Figure 2). The frequent use of midazolam was not different between the Level 1 and Level 2 centers (84% and 94%, respectively); however propofol was more frequently used in Level 1 centers than in Level 2 centers (31% versus 5%, respectively; p<0.05). Propofol was not used at all in patients with heart disease. The use of propofol in patients with head injury requiring mechanical ventilation was similar with the use in other patients requiring mechanical ventilation. Dexmedetomidine was only regularly used by 19% of respondents. Other agents used for sedation included haloperidol, diazepam, lorazepam and thiopentone (Table IV).

Eighty-six percent respondents stated that they frequently used morphine as analgesic agents in patients requiring mechanical ventilation, 16% frequently used fentanyl and one respondent frequently used ketamine, with no significant difference between the Level 1 and Level 2 centers. The choice of analgesic agents was not different in patients with heart disease and patients with head injury. Other miscellaneous analgesic agents used were tramadol, alfentanil and pethidine (Table IV).

Muscle relaxant was frequently used in patients requiring mechanical ventilation by only 14% of respondents, mainly in patients with head injury (24%). None of the respondents used non-steroidal anti-inflammatory drug as adjuvant.

Table I: Number of ICU beds and annual admissions
Number expressed in median (inter-quartile range)

	No. of ICU beds	No. of annual admissions
Level 1 Centres	7 (6-10) *	500 (350-800) †
Level 2 Centres	4 (4-6) *	245 (196.25-307.5) †

Mann-Whitney U-test * p=0.0005 † p=0.0003

Table II: Practice of ICU sedation

Practice	N / %	Level 1	Level 2	P value
Use of sedation scale	13 (35%) All use Ramsay scale	31.6%	38.9%	NS
Availability of written protocol	14 (38%)	21.1%	55.6%	< 0.05
Routine adjustment of sedation	36 (97%)	100%	94.4%	NS
Routine interruption of sedation	10 (27%)	26.3%	27.8%	NS

NS = not significant

Table III: Factors influencing selection of agents for sedation

Factors	Respondent (%)
Familiarity	97
Pharmacology	97
Expected duration	92
Clinical diagnosis	89
Cost	73

Table IV: Prevalence of frequent use (often or always) of sedative and analgesic drugs in patients requiring mechanical ventilation

Sedative drug	N / %	Analgesic drug	N / %
Midazolam	33 (89%)	Morphine	32 (87%)
Propofol	7 (19%)	Fentanyl	6 (16%)
Dexmedetomidine	1 (3%)	Tramadol	6 (16%)
Haloperidol	1 (3%)	Alfentanil	1 (3%)
Diazepam	1 (3%)	Ketamine	1 (3%)
Lorazepam	1 (3%)		

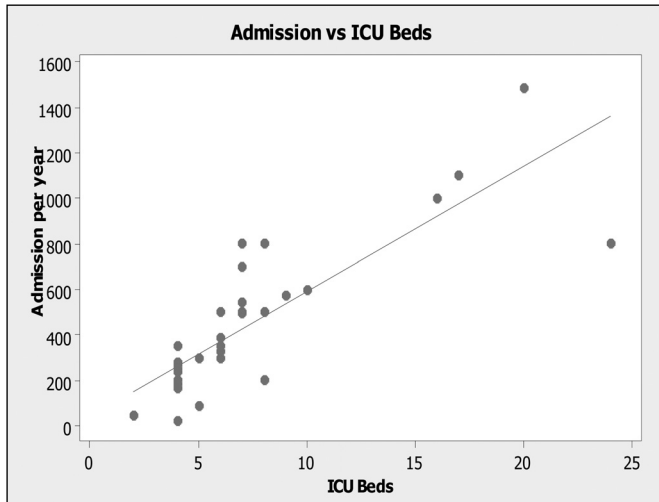**Fig. 1:** Correlation between number of annual admissions and number of ICU beds
Pearson coefficient, r =+ 0.833 (p=0.01)
The regression equation is Expected No. of annual admission = 40.9 + 54.9 No. of bed
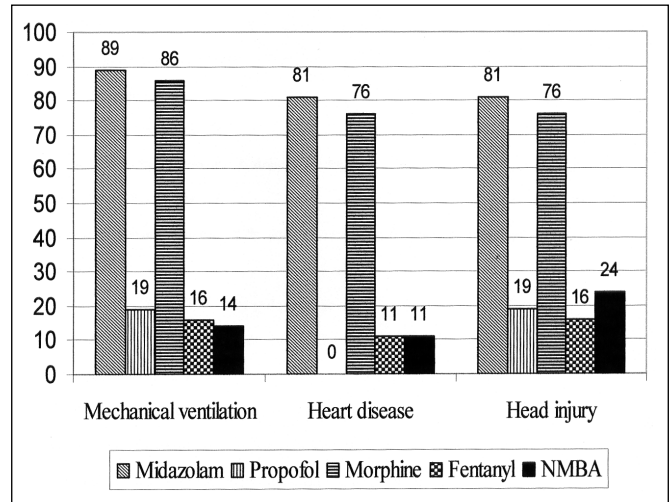

Fig. 2: Use of agents in different patient categories (all patients requiring mechanical ventilation, patients with heart disease and patients with head injury).
Number expressed as percentage.

DISCUSSION

Since there is no previously published data on the sedative and analgesic practices in Malaysia, we embarked on this questionnaire survey to elucidate the current practice in the country. The survey found that midazolam and morphine were the most commonly used for sedative and analgesic agents, respectively, in ICUs in Malaysian public hospitals. Our practice is comparable to international practice. This finding was similar to the recent Australian survey by Botha et al[6] who found that midazolam and morphine were still the drugs of choice for sedation and analgesia in most Australian ICUs consistent with the earlier finding by Margarey[3]. When Murdoch and Cohen[4] reviewed the British practice of intensive care sedation, they also found that morphine and midazolam were among the most widely used drugs for sedation. Additionally, Soliman et al[5] in a European survey also found that midazolam and morphine were the preferred sedative and analgesic agents, respectively; albeit there were considerable variations between the western European countries. It would be interesting to speculate the reasons for this consistent finding. It may be because the midazolam and morphine combination regime has been "time-tested", has familiar pharmacologic profile, is cheap and easily prepared and administered.

Our questionnaire was designed to find out whether clinical conditions namely heart disease and head injury influence the choice of agents used. We speculated that the preferred agents would be different. For example, the combination of propofol and fentanyl without muscle relaxant has been used in all our neurosurgical patients during cerebral resuscitation period. However, we found that midazolam and morphine were still the commonly used agents in patients with head injury. Cost and pharmacodynamic profile of propofol may be the influential factors. We also found that propofol and ketamine were not used at all in patients with heart disease probably due to their undesirable haemodynamics effects (hypotension and hypertension, respectively) in these patients.

The choice of agents should change according to the expected duration of ICU stay. The American guidelines[10] clustered the duration of sedation into the following groups: duration of sedation less than 24 hours, 24-72 hours and more than 72 hours. Murdoch and Cohen[4] found that the sedation policy changes with the time a patient spends in intensive care with propofol being preferred in patients sedated for less than 72 hours. Martin et al[8] found that the selection of different agents depended on expected length of sedation. They found that the most commonly used agent for sedation up to 24 hours and during weaning from ventilation was propofol, while midazolam was used mainly for sedation longer than 72 hours.

It should be emphasized that it is not the choice of agents that is important but the practice of sedation itself. There are many evidence-based good clinical practices in the literature which could improve the practice of sedation and analgesia in critically ill patients and also improve cost-effectiveness and, most importantly, patient care.

The clinical practice guidelines of the Society of Critical Care Medicine emphasize the need for goal-directed delivery of psychoactive medications[9]. Our survey revealed that only 35% of respondents routinely assess the degree of sedation. There are many sedation scales such as Ramsay Scale,[10] Richmond Agitation-Sedation Scale (RASS)[11] and Riker Sedation-Agitation Score (SAS)[12]. In our survey, the Ramsay Scale was prevalently used by respondents although it was not originally intended for use as a clinical monitoring tool and it was never validated for clinical use. Recently, Ely *et al* had validated the RASS for its ability to detect changes in sedation status over consecutive days of ICU care[11]. Whichever sedation scale utilized, the recommended standard now is to monitor sedation score of patients to guide the delivery of sedative medication.

The availability of written protocol to guide the use of sedation and analgesia in ICU can reduce the duration of mechanical ventilation, the intensive care unit and hospital length of stay, and the need for tracheostomy among critically ill patients with acute respiratory failure[13]. Daily interruption of sedative drug infusions can also decrease the duration of mechanical ventilation and the length of stay in the intensive care unit in patients receiving mechanical ventilation[14]. Nevertheless, our survey revealed that only 38% respondents have a written protocol available in their ICUs and only 27% practice daily interruption of sedation.

In conclusion, our survey showed similarity in the choice of sedative and analgesic agents in ICUs in Malaysian public hospitals comparable to international practice. Nevertheless, the standards of practice could still be improved by implementing the practice of sedation score assessment and daily interruption of sedative infusion as well as having a written protocol for sedation and analgesia available in ICU.

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Appendix 1

QUESTIONNAIRE SURVEY ON THE PRACTICE OF SEDATION AND ANALGESIA IN INTENSIVE CARE UNITS IN MALAYSIA

1. Do you use routinely a sedation scale to assess the degree of sedation in your patients?
   ❑ Yes   ❑ No
   If yes, what type?
   ❑ Ramsay Sedation Scale ❑ Richmond Agitation-Sedation Scale (RASS)
   ❑ Riker Sedation-Agitation Score (SAS) ❑ Others
   Please specify: _____

2. Do you have a written protocol to guide the use of sedation and analgesia in your unit?
   ❑ Yes   ❑ No

3. Do you adjust routinely the degree of sedation according to your patient's clinical progress?
   ❑ Yes   ❑ No

4. Do you interrupt routinely the sedative infusions given to your patients on a daily basis?
   ❑ Yes   ❑ No

5. Do any of these factors play a role in the selection of agents for sedation?

Expected duration for sedation	❑ Yes	❑ No
Pharmacokinetics & pharmacodynamics of the drug	❑ Yes	❑ No
Patient's clinical diagnosis	❑ Yes	❑ No
Familiarity	❑ Yes	❑ No
Cost	❑ Yes	❑ No
Others (please state) _____		

Note:

❑ Never (0%) ❑ Seldom (<25%) ❑ Regularly (50%) ❑ Often (>75%) ❑ Always (100%)

Sedation	Analgesia	Adjuvant
Midazolam	Morphine	Muscle relaxant
Propofol	Fentanyl	NSAIDs
Dexmedetomidine	Ketamine	Other(please specify)
Other(please specify)	Other(please specify)	

6. In patient requiring mechanical ventilation, how often do you use the following agents?

7. In patients with heart disease (e.g. ischaemic, heart failure) requiring mechanical ventilation, how often do you use the following agents?

8. In patients with head injury requiring mechanical ventilation, how often do you use the following agents?

9. Type of hospital (one answer)
   ❑ University hospital   ❑ MOH State hospital   ❑ MOH District hospital

10. Structure of the intensive care unit
    a) Number of beds   _____ beds
    b) Number of admissions per year (estimate)   _____ patients per year