

**THE KNOWLEDGE OF PAEDIATRICS POST OPERATIVE
PAIN MANAGEMENT AMONG TRAINEES IN
ANAESTHESIOLOGY IN HOSPITAL UNIVERSITI SAINS
MALAYSIA**

DR AMIRA AISHAH CHE ANI



**DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENT FOR THE DEGREE OF MASTERS
OF MEDICINE (ANAESTHESIOLOGY)**

UNIVERSITI SAINS MALAYSIA 2017

Acknowledgements

First and foremost, I would like to express my deepest gratitude to Allah who is pillar of strength.

I am indebted to my supervisor Professor Shamsul Kamalrujan Hassan and my co-supervisor Dr Huda Zainal Abidin for their constant support and encouragement which help me guide me in the right direction to successfully complete this task with confidence.

I would also like to thank all my colleague for their kind cooperation and enthusiasm with the survey conducted. For this I would be forever grateful.

Finally, I dedicate this dissertation to my family and friends for their unconditional love.

Table of contents

	Pages
Acknowledgements	ii
Table of contents	iii
PART 1 : INTRODUCTION	1
1.0 Introduction	1
PART 2 : STUDY OBJECTIVES	9
2.1 General Objectives	9
2.2 Specific Objectives	9
PART 3: BODY OF MANUSCRIPT	
3.0 Title Page	10
3.1 Abstract	10
3.2 Introduction	12
3.3 Materials/Subject Methods	15
3.4 Results	16
3.5 Discussion	18
3.6 Conclusion	23
3.7 References	24
3.8 Result Tables	29

3.9 The Malaysian Journal of Medical Sciences Format (Guidelines for authors)	34
PART 5: STUDY PROTOCOL	50
5.0 Title Page	50
5.1 Literature Review	51
5.2 Objectives	53
5.2.1 General Objectives	53
5.2.2 Specific Objectives	53
5.3 Research Null Hypothesis	53
5.4 Research Design	53
5.5 Sample size estimation	53
5.6 Sampling Method	54
5.7 Case definition	54
5.8 Inclusion and Exclusion Criteria	55
5.9 Recruitment of the subject and Informed consent seeking	55
5.10 Study Area	55
5.11 Research Tool	55
5.12 Data Collection Method	56
5.13 Proposed Data Analysis	56
5.14 Declaration of absence of conflict of interest	56
5.16 Privacy and Confidentiality	57
5.17 Community sensitivities and benefits	57
5.18 Honorarium and Incentives	57

5.19 Referemces	57
5.20 Flow Chart	60
5.21 Research Information	61
5.22 Ethics Approval Letter	72
PART 6: APPENDICES	74
6.0 References for Introduction/Literature Review PART 1	74
6.1 Research Tool (Questionnaire)	80

THE KNOWLEDGE OF PAEDIATRIC POST OPERATIVE PAIN MANAGEMENT AMONG TRAINEES IN ANAESTHESIOLOGY IN HOSPITAL UNIVERSITI SAINS MALAYSIA

Dr Amira Aishah Che Ani

MMed Anaesthesiology

**Department of Anaesthesia,
School of Medical Sciences,
Universiti Sains Malaysia,
Health Campus,16150, Kelantan Malaysia**

Introduction: Hospital Sains Universiti Malaysia is one of the few accredited institutions for anaesthesiology training program. Anaesthetist play an important role as part of multidisciplinary team in managing pain postoperatively. Lack of knowledge and insufficient emphasis on paediatric pain management during specialty training has been attributed as one of the main factor of under recognized and undertreated pain in children.

Objectives: This study aims to assess the level of knowledge of paediatric post-operative pain management among trainees in this centre and to determine if sociodemographic factor (such as gender, level of qualification, prior pain or paediatric posting) have an independent association with level of knowledge

Methods: The questionnaire was adapted from previous studies. The questionnaire has 35 questions consisted of 17 multiple choice questions and 18 true or false questions to cover 2 domains: 1) use of age-appropriate pediatric pain assessment (10 questions) and 2) pediatric pain treatment (25

questions). Performance levels defined based on total score in percentage; Poor (<50 %), Average (50- 69%), Above average (70- 79%) and Excellent (\geq 80%). Frequency of each items answered correctly will reflects; 1) area of strength - if \geq 70% of participants answered correctly for each item analysed ; 2)area of weakness - if \leq 30%of participants answered correctly for each item analysed. All 46 participants were mainly anaesthesiology master students and specialists working in HUSM. Data were analysed by descriptive and inferential statistics.

Result: The response rate was 83.6%. Half of the study population regarded their level of knowledge as low based on self-assessment. For the total of 35 questions, the mean correct score was 20.4 ± 3.34 (58.2%). The highest score was 26 and the lowest score was 13. For pain assessment domain; the mean proportion of correct score was 53% (range 20% to 90%). For pain treatment domain; the mean proportion of correct score was 60.4% (range 36% to 80%). There was no significant association between having done pain and/or paediatric posting and mean score, p-value= 0.698, $X^2(df)= 1.43$).

Conclusion: Knowledge among trainees in HUSM still have a lot of room for improvement. Encouraging more trainees to go for paediatric rotation and providing more time for trainees to rotate in the paediatric area, could potentially improve the quality of knowledge about paediatric postoperative pain management

Prof Shamsul Kamalrujan Hassan: Supervisor

Dr Huda Zainal Abidin: Co- Supervisor

PART 1: INTRODUCTION

Pain according to IASP is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

Acute pain is a normal response to tissue injury or disease and has an important biological function. It is adaptive and promotes healing by restricting behaviours that might incur further tissue trauma.

Post-operative pain is an acute pain. It is self-limiting and require only short term care (1). However, if it is not suppressed or controlled, will lead to various medical complications such as pneumonia, deep vein thrombosis, infections, delayed wound healing, depression and progression to chronic pain (1). Uncontrolled acute pain will not only cause suffering to the patient but also cause significant financial burden either directly or indirectly via loss of productivity at work place and absenteeism. Therefore, all postoperative pain should be put to an end if possible or if not diagnosed and treated immediately and adequately.

For decades, many have reported that pain in hospitalised adults is both common and under treated. Evidence from the available publications suggests that pain is also under treated in children in variety of settings.

‘Children’ encompasses an extremely broad group from premature neonates to adolescents. There are distinctive age-related changes affecting all aspects of pain management including assessment, physiological and pharmacological responses (2).

Pain in children is a subjective experience that “has sensory, emotional, cognitive, and behavioural components that are interrelated with environmental, developmental, socio-cultural, and contextual factors,” and is often considered under assessed and under

treated (3). The prevalence of postoperative pain in children was common ranging from 55 to 90 percent with intensity of moderate to severe (4) (5). This high incidence of pain not only lasted while they are in hospital but is extended post discharge.

In one prospective audit involving 225 children to assess current pain management strategies both in-hospital and at home after day surgery. A telephone questionnaire was administered 48 h post discharge for at home data. Pain reports and scores were significantly higher at home compared with in-hospital. Children undergoing certain procedures were more likely to experience significant pain. (6)

Another study also supports the high prevalence of pain among children post operatively where 93% of children had pain. In addition, 73% exhibited pain behaviour on day 2 after discharge. The incidence of pain and pain behaviour decreased over time, quarter of the children still had pain and 32% had pain behaviour after one month. (7)

Poorly controlled acute pain had been known to cause chronic pain in adult. This fact has also been demonstrated in children as evident by a study conducted to examine the fate of paediatric chronic postsurgical pain (CPSP) over the first year after surgery and to determine acute postsurgical predictors of CPSP. Results showed that 1 year after surgery, 22% of children developed moderate to severe CPSP with slight functional disability. Children who reported a Numeric Rating Scale pain-intensity score more than 3 out of 10 two weeks after discharge were more than three times as likely to develop moderate/severe CPSP at 6 months. They were also noted to be twice as likely to develop moderate/severe CPSP at 12 months than those who reported a Numeric Rating Scale pain score less than 3 out of 10 (8).

Acute pain is a highly complicated, dynamic, subjective experience that is important to growing children, function to warn them of danger and restricting exposure to additional injury. Children usually learn effective methods of preventing and coping with

the everyday pains of growing up. However, untreated acute, recurrent, or chronic pain related to disease or medical care may have significant and lifelong physiological and psychological consequences (9).

One study showed unrelieved pain during the perinatal period is associated with permanent reduction in pain sensitivity, blunted cortisol responses and high rates of neuropsychiatric disorders (10). In addition to abnormal neurological and endocrine response, poorly managed postoperative pain can lead to impaired metabolic, pulmonary and immunologic functions where the end result can also be a significantly lowered pain threshold continuing for a long period after the painful stimulus (11).

In recent times, the advances in paediatric pain research have allowed clinicians to provide effective and safe relief to children with acute, cancer related, and several other types of chronic pain (12). Unfortunately, pain in children is always inadequately assessed and under treated.

There are many logistic and systemic factors within an institution that can be attributed to these problem in translating knowledge into practice. These include poor health care system, lack of infrastructure, staff shortages and limited funds (13). However according to WHO is that lack of knowledge among health care provider also contribute to these problems.

Pain management require healthcare professionals to be educated and knowledgeable in the evaluation and management of pain (14). In the post-operative period its management has however remained a major problem.

Various myths, barriers and unsatisfactory knowledge of pain assessment and treatment contribute to the challenges encountered by health providers in their service to patients (15). There are six main barriers to treatment of pain in children: 1) the myth that children do not feel pain the way adults do; 2) lack of assessment and reassessment for the

presence of pain; 3) misunderstanding of how to conceptualise and quantify a subjective experience; 4) lack of knowledge of pain treatment; 5) the notion that addressing pain in children takes too much time and effort; and 6) fears of adverse effects of analgesic medications, including respiratory depression and addictions (16).

30 years ago, the practice of infant surgery was routinely conducted under minimal or no anaesthesia. This is due to the suspicion toward infant pain that define much of 20th century research and clinical practice (17). Historically, neonate and infant were thought to experience no pain due to immature nervous system. Fortunately, various studies done by neuroscientist and pain specialist established the fact that components required for pain perception are fully developed at about 25 weeks of gestation. In addition the endogenous descending inhibitory pathways remain underdeveloped till mid-infancy (18)

Given the advances in neonatal care in the last decade, neonates are increasingly exposed to noxious stimuli from medical procedures or surgery. This not only increase their suffering, but also alter the patterns of exposure that will have an impact on how they would perceive pain later in life(19). Survey conducted among anaesthetist in UK enquiring into their attitudes towards the perception of pain, showed that paediatric anaesthetists agree that even the smallest babies feel pain and can respond to noxious stimuli. (20)(19). Despite increasing understanding of the developmental aspect of nociception and improved methods of pain assessment (21), there seem to be a gap between evidence based knowledge and the current state of practice as demonstrated by the unacceptably high incidence of pain among hospitalised children.

From literature review, the level of knowledge of pain assessment and management among healthcare workers has been shown to be low or unacceptable and has room for improvement. A survey of degree of knowledge of health care professionals about pain management and use of opioids in paediatrics revealed the average percentage of correct

answers was $63.2 \pm 1.4\%$. Knowledge deficit were demonstrated in usage of opioid (47%), incidence of respiratory depression (42.3%) and confusion about symptoms of withdrawal, tolerance, and dependency syndromes (81.9%) (22)

Another prospective, descriptive, analytical, and cross-sectional study was conducted to investigate the knowledge and attitudes among nurses and nursing students regarding paediatric pain. The final scores for paediatric nurses and nursing students were reported to be low in both groups (23)

To prevent sensation or pain the fundamental aspect of the practice of anaesthesiology. Hence, profound knowledge of anatomy, physiology of pain, mechanism of pain and its pathway, pharmacology of analgesic, all contribute to the anaesthesiologist to be an expert in pain management (24).

Among other subspecialty that also deal closely with pain management in postoperative patient such as surgery, orthopaedics or paediatrics, anaesthesiology as a subspecialty seem to fair better. One study reported that anaesthesiology residents performed better than paediatric and orthopaedic residents in answering questions related to their knowledge of acute pain management (25). A survey of the knowledge and attitudes of Italian health care professionals toward pain also prove that knowledge was best among physicians in anaesthesiology and emergency followed by doctors in medicine and then surgeons (26).

Nevertheless, within the anaesthesiology subspecialty itself the level of knowledge has much room for improvement. Survey assessing paediatric postoperative pain knowledge among third year anaesthesiology resident in six training centers in Thailand showed the proportion of the correct score was 67.7% which was lower than the minimal passing level (27).

Knowledge deficit in term of assessing pain using validated tools has been consistently demonstrated across literature among healthcare workers both in adults and children. Young children often not able to properly express their levels of pain. As a result, many tools have been created to help assess pain correctly in children. Various methods to gauge pain include physiologic, self-report, behavioural and parent input (28).

Self- report tools are regarded as the gold standard. Hence it is necessary to use it as often as possible. Tools available for self-report include Hester's Poker Chip tool, the Oucher Scale, the Wong-Baker FACES Scale, the Visual Analog Scale (VAS), and the Finger Span Scale. When self-report is not achievable, behavioural scale such as The Face, Legs, Activity, Cry, and Consolability (FLACC) Scale, the Premature Infant Pain Profile (PIPP), the Toddler-Preschooler Pain Scale (TPPPS), and the Preverbal, Early Verbal Paediatric Pain Scale (PEPPS) have shown effectiveness in behavioural pain assessment (28). Physiologic indicators of acute pain include an increase in heart rate, blood pressure, or respirations(28).

Pain scales are perceive as important by healthcare providers but somehow it is not an apparent choice to use in postoperative care (29). Lack of knowledge regarding usage of available tools were reported in the literature. As evident in one study exploring nurses' views concerning children's pain assessment tools. The researchers discovered that even though these nurses were treating pain, they did not automatically use any pain tool. The nurses felt they were not familiar enough about the tools to use them well (30).

One cross sectional study involving 236 hospitals in Kenya assessing the knowledge and practices among clinicians who manage postsurgical pain in adult patient showed that despite 81% of the respondents implying that they had the knowledge on how to assess and measure pain, 73% of them felt they had inadequate knowledge on objective pain evaluation using validated tools that are available. shockingly, a further 21% said they

had no knowledge at all on pain assessment tools. The Verbal descriptive scale had an application frequency of 38% (15).

Concerns of adverse effects of analgesic medications, including respiratory depression and addictions (16) was noted as one of the barrier to effective pain management. Majority of anaesthetists around 74% showed knowledge deficit in opioid induced respiratory depression (unpublished). Misunderstanding about opioids use among physicians, nurses and pharmacists regarding risk for addiction, side effects as well as difficulty to calculate opioid dosages was also shown in another study (31)

According to IASP, gaps in the quality of pain care delivery reflect 1) Problems related to health care professionals; 2) Problems related to patients; 1) Problems related to the health care system. Pertinent to this study, problems related to health care professionals include out-of-date or inadequate attitudes and knowledge. Problems related to the health care system include low priority given to pain control education for health professionals.

Most of the doctors believe that barriers coming from health professionals and systems are more notable than the ones resulting from patients (32). Most had not have any formal education about pain management during their medical school or residency training and the ones reporting "any" education, described this as "limited in quality and as hours of lessons" and were not satisfied.(32). A large group of doctors expressed disappointment with their training for pain management in medical school and in residency (33).

Most medical school has been observed to not including pain in their medical curriculum (34). In the UK, for example, pain is not taught as a discrete subject. Furthermore the median time spent on pain management by a medical undergraduate is only 13 hours, and in some cases as little as 6 hours (35). A survey of 242 medical schools in 15 European countries discovered that pain management was taught only within

compulsory non-pain-specific modules in 55%, and that 7% showed no evidence of any pain teaching (35).

Inadequate paediatric pain management educational requirements for residency programs are also a likely contributor to the under treatment of pain in hospitalised children (25). IASP deduced that insufficient pain education in medical schools and during specialty trainings was an important factor responsible for abysmal knowledge of doctors regarding pain in clinical practice. Because more than a few clinicians will at one point in their practice be confronted with pain management, a medical degree without core knowledge in pain management should be considered unsatisfactory.

One of the primary responsibilities of physician is to reduce pain and suffering. Unfortunately, paediatric pain management has been left largely unaddressed. The apparent under treatment of pain is ethically unjustifiable. While the literature review highlights the fact that the poor knowledge and misconceptions regarding post operative pain management in children are pervasive, there have been no studies carried out in our setting to capture prevailing pain management knowledge in paediatric population.

There is a paramount need for better understanding of the factors that influence our ability to accomplish ideal pain management for children. Thus a survey on knowledge of anaesthetist in Hospital Universiti Sains Malaysia will help elicit knowledge deficits regarding currently accepted principles of post-operative pain management in paediatric population.

Review of knowledge level will be used to direct future paediatric pain management assessments and educational interventions at postgraduate level with the ultimate goal being outcome measure, in this case, alleviating pain of hospitalised children.

PART 2: STUDY OBJECTIVES

2.1 General Objective:

To assess knowledge of paediatric regarding postoperative pain management among anaesthetists in Hospital Universiti Sains Malaysia

2.2 Specific Objective:

2.2.1 To assess the level of knowledge of paediatric post operative management among anaesthetist in Hospital Universiti Sains Malaysia (HUSM)

2.2.2 To determine if sociodemographic factor (such as gender, level of qualification, have done pain or paediatric posting) have an independent association with level of knowledge

PART 3: BODY OF MANUSCRIPT

The Knowledge of Paediatrics Post Operative Pain Management among Anaesthetist's in Hospital Universiti Sains Malaysia

Amira Aishah CHE ANI, Shamsul Kamalrujan HASSAN, Huda ZAINAL ABIDIN

*Department of Anaesthesia, School of Medical Sciences, UNiversiti Sains Malaysia,
16150, Kota Bharu*

3.1 Abstract

Background Hospital Sains Universiti Malaysia is one of the few accredited institutions for anesthesiology training program. Anesthetist play an important role as part of multidisciplinary team in managing pain postoperatively. Lack of knowledge and insufficient emphasis on paediatric pain management during specialty training has been attributed as one of the main factor of under recognized and undertreated pain in children. This study aims to assess the level of knowledge of paediatric post-operative pain management among anaesthetist in this center.

Methods The questionnaire was adapted from previous studies. The questionnaire has 35 questions consisted of 17 multiple choice questions and 18 true or false questions to cover

2 domains: 1) use of age-appropriate pediatric pain assessment (10 questions) and 2) pediatric pain treatment (25 questions). Performance levels defined based on total score in percentage; Poor (<50 %), Average (50- 69%), Above average (70- 79%) and Excellent (\geq 80%). Frequency of each items answered correctly will reflects; 1) area of strength - if \geq 70% of participants answered correctly for each item analysed ; 2)area of weakness - if \leq 30%of participants answered correctly for each item analysed. All 46 participants were mainly anaesthesiology master students and specialists working in HUSM. Data were analyzed by descriptive and inferential statistics.

Result The response rate was 83.6%. Half of the study population regarded their level of knowledge as low based on self-assessment. For the total of 35 questions, the mean correct score was 20.4 ± 3.34 (58.2%). The highest score was 26 and the lowest score was 13. For pain assessment domain; the mean proportion of correct score was 53% (range 20% to 90%). For pain treatment domain; the mean proportion of correct score was 60.4% (range 36% to 80%). There was no significant association between having done pain and/or paediatric posting and mean score, p-value= 0.698, $X^2(df)= 1.43$).

Conclusion Knowledge among anaesthetist in HUSM still have a lot of room for improvement. Encouraging more trainees to go for paediatric rotation and providing more time for trainees to rotate in the paediatric area, could potentially improve the quality of knowledge about paediatric postoperative pain management

Keywords *Anaesthesiology Resident, Knowledge, Pediatric, Postoperative Pain Management*

3.2 Introduction

Pain relief is a human right. Unfortunately, pain in children is under-recognised and inadequately treated. They not only suffered pain from life threatening diseases, but also pain as a result of surgeries and procedures done to treat and diagnose diseases.(1)

‘Children’ covers an extremely broad group from premature neonates to adolescents. There are distinctive age-related changes affecting all aspects of pain management including assessment, physiological and pharmacological responses (2). Even so, children still suffer postoperative pain in the same way as adults. The main difference is that factors such as fear, anxiety, coping style and lack of social support can further amplify the physical pain in children (3)

The prevalence of postoperative pain in children was common ranging from 55 to 90 percent with intensity of moderate to severe (2) (4). This high incidence of pain not only lasted while they are in hospital but is extended post discharge. (5)

In United states, approximately 450,000 children under 18 years of age are admitted for surgery as inpatients annually (6). According to Health Indicator 2007 by the Malaysian Department of Statistics, the number of children requiring cardiothoracic surgery is about 2,000 to 3,000 each year (7)

There have been improvements in management of acute pain in some pediatric hospitals and units (8), but pain management techniques in many centers around the world have not progressed in the past 20 years. Advances in health care, such as new knowledge of pain prevention strategies, have not been consistently translated into decreased prevalence or intensity of pain experienced by children in hospitals (9).This mismatch between state of the science and the state of practice has led to inadequate pain treatment for children (10)

There are many logistic and systemic factors within an institution that can be attributed to these problem in translating knowledge into practice. These include poor health care system, lack of infrastructure, staff shortages and limited funds (11). However, another important factors according to World Health organization (WHO) is that lack of knowledge among health care provider also contribute to these problems.

Fundamental aspect of the practice of anaesthesiology is to prevent sensation or pain. Profound knowledge of anatomy, understanding of pain pathways and the mechanisms and physiology of pain, knowledge of pharmacology, pharmacodynamics and pharmacokinetics of analgesic drugs, all contribute to the anaesthesiologist to be a competent pain therapist (12).

Among other subspecialty that also deal with pain management in postoperative patient, anaesthesiology as a subspecialty seem to fair better. One study reported that anaesthesiology residents performed better than paediatric and orthopaedic residents in answering questions related to their knowledge of acute pain management (10). This was attributed to directed educational programs.

Nonetheless, within the anaesthesiology subspecialty itself the level of knowledge has much room for improvement. Survey assessing paediatric postoperative pain knowledge among third year anaesthesiology resident in six training centers in Thailand showed the proportion of the correct score was 67.7% which was lower than the minimal passing level (13).

International Association of Study of Pain concluded that lack of knowledge of pain management arises from 2 main problems. Firstly, from the out of date and insufficient knowledge and attitude of healthcare providers themselves. Secondly problems that stem from the educational system itself either from undergraduate level or postgraduate or subspecialty training program. Most doctors had not have any formal

education about pain management during their medical school or residency training and the ones reporting "any" education, described this as "limited in quality and as hours of lessons" and were not satisfied (14).

While the literature review highlights the fact that the poor knowledge and misconceptions regarding post- operative pain management in children are widespread, there have been no studies carried out in our setting to capture prevailing pain management knowledge in paediatric population.

There is a paramount need for better understanding of the factors that influence our ability to achieve optimal pain management for children. Thus a study on knowledge will help identify knowledge deficits regarding currently accepted principles of pain management.

The aim of this study is to assess knowledge of paediatric regarding postoperative pain management among anaesthetists in Hospital Universiti Sains Malaysia (HUSM) and to determine if sociodemographic factor (such as gender, level of qualification, having done pain or paediatric posting) have an independent association with level of knowledge. Assessment of knowledge will be used to direct future paediatric pain management assessments and educational interventions at postgraduate level with the eventual goal being outcome measure, in this case, decreased pain of hospitalised children.

3.3 Materials/Subjects Methods

The protocol was approved by the ethical committee of Hospital Universiti Sains Malaysia.

This survey was done between October 2016 and November 2016. All participants were the anaesthetist specialists and anaesthesiology master students working in Hospital Universiti Sains Malaysia. The paediatric postoperative pain management questionnaire was adapted from The Third Year Anesthesiology Residents' Knowledge Regarding Pediatric Postoperative Pain Management developed by Thienthong in 2013 from Thailand. The content of the questionnaire has gone through both qualitative and phase validation

The questionnaire has two parts: part one is about demographic of participants, e.g., gender, academic training curriculum including paediatric rotation and pain rotation, level of qualification, knowledge seeking behavior and self-evaluation about their knowledge; Part two is about the knowledge on pediatric postoperative pain management; there were 17 multiple choice questions and 18 true or false questions to cover 2 domains: 1) use of age-appropriate paediatric pain assessment (10 questions) and 2) pediatric pain treatment (25 questions). One score for one right answer and total scores were 35.

Performance levels defined based on total score in percentage; Poor (<50 %), Average (50- 69%), Above average (70- 79%) and Excellent (\geq 80%). Frequency of each items answered correctly will reflect; 1) area of strength - if \geq 70% of participants answered correctly for each item analysed ; 2) area of weakness - if \leq 30% of participants answered correctly for each item analysed

The questionnaires were distributed during morning departmental CME sessions to all anaesthetists specialists and anaesthesiology master students. Participants were asked to answer all questions according to their knowledge and not allowed to open any book. They

were given 15 to 30 minutes to complete the questionnaires. Afterwards, all questionnaires were returned back to the researcher.

The participation was completely voluntary as evident by the consent form filled in by them and also handing in a completed questionnaire implies their consent to participate. They were assured that they are not obliged to participate and not participating will not affect their work assessment. They were assured that anonymity will be ensured throughout the study.

Data will be entered and analysed using SPSS version 22. Level of knowledge among participants will be assessed using descriptive statistics. Numerical data will be presented as mean (SD). Categorical data will be presented as frequency and percentage. While association between demographic factors and the level of knowledge will be analysed using chi square test.

3.4 Results

A total of 46 out of 55 anaesthetist participated in this study. Demographic study according to gender, self evaluation about pediatric pain knowledge and knowledge seeking behavior, having done pain and/or paediatric rotation were presented in table 1. Only 10.9% (n=5) have done both pain and paediatric rotation. Half of the study population regarded their level of knowledge as low based on self assessment. For the total of 35 questions, the mean correct score was 20.4 ± 3.34 (58.2%). The highest score was 26 and the lowest score was 13. The proportion of participants who had correct answer for each question was presented in Table 2.

For 10 questions about the use of age-appropriate paediatric pain assessment domain, the mean correct score was 5.3 (53%). The highest score was 9 (90%) and the lowest score was 2 (20%). There were 5 questions from this domain that the correct

answers given by participant were less than 50%. Out of the 5 questions, 1 of them was define as area of weakness as correct answers was less than 30%.

For 25 questions about the paediatric pain treatment domain; the mean correct score was 15.1 (60.4%). The highest score was 20 (80%) and the lowest score was 9 (36%). There were 7 questions from this domain that the correct answers given by participants were less than 50%. Out of 7 question 4 of them is define as area of weakness as less than 30% correct answers were given by participants.

Percentage of total score based on performance level showed majority of participants are in the average group (score range between 50% to 69%). Participants who scored poorly account for 21.7%. While 8.7% score above average and no participant score above 80% as shown in table 3.

Using Chi- square test, there was no significant mean total knowledge between gender (p-value= 0.528, $X^2(df) = 0.399$). There was no significant mean total knowledge between having done paediatric and/or pain rotation p-value= 0.698, $X^2(df)= 1.43$) None of the sociodemographic factors showed significant association with level of knowledge among anaesthetists.

3.5 Discussion

Children's pain is often underestimated and undertreated. Anaesthetist play an important role as part of the multidisciplinary team in managing pain especially postoperatively. Therefore, good level of knowledge about paediatric pain management is expected from anaesthetist to ensure pain is relieve adequately in hospitalised children. From the data gathered half of the participants based on knowledge self-assessment feel that they have low level of knowledge in paediatric post- operative management. Despite the assumption of having low knowledge, the frequency of knowledge seeking behaviour on 2 to 3 weekly basis is reported in less than 20% of the participants. Most of the participants seek knowledge of paediatric pain management from textbook which account for 50% of participants, followed by resources from internet (23.9%) and others (19.6%). There seemed to be a gap between awareness of low level of knowledge and effort to improve them. The reason behind this is not known as this study did not assess directly about attitudes and practices of the anaesthetist. Although previous study assessing attitudes of anaesthesiology residents towards pain management revealed desirable attitude towards pain and that the majority of physicians recognized the importance of pain management priority and acknowledged the problem of inadequate pain management in their settings (16).

As mentioned earlier half of the participants regarded themselves as having low level of knowledge while the other half of participants evaluated themselves as having modest knowledge. Only one participant regarded him or herself as having good knowledge. This finding correlate with level of knowledge where majority of them (69.9%) perform modestly. While only 8.7% of participants score above average and none have excellent score.

Analysed data revealed mean correct score of 20.4 (58.2%). The mean correct score in this study is lower than study by Somboon et al (12) (58.2% vs 67.7%) in which the questionnaire of present study is adapted from. Study by Somboon et al (12) assessed the third year anaesthesiology residents paediatric pain knowledge from 6 training centers in Thailand. What contribute to the lower mean correct score may be multi-factorial. All 6 training centers in Somboon et al (12) study had both pain specialists and paediatric anaesthesia specialists to contribute to give knowledge for their residents. In comparison, the department of anaesthesiology in Hospital Universiti Sains Malaysia (HUSM) only have one pain specialist and no paediatric anaesthesia specialist. The unavailability of in house training by paediatric anaesthesia specialist could be one of the reason for lower knowledge performance. One study cited that inability to access professionals in this subspecialty also contribute to barriers to good pain management (16). A cross sectional study done in one of the national hospital in Kenya showed similar mean score in paediatric pain management (56% vs 52%). However this study assessed knowledge among doctors in general not anaesthetist.(unpublished)

Knowledge deficit was identified in both domains of the questionnaires. The first domain is about the use of age-appropriate paediatric pain assessment. Out of 10 questions, areas of weakness were identified in 1 question where the percentage of correct answers were less than 30%. Knowledge deficit in term of assessing pain using validated tools has been consistently demonstrated across literature among healthcare workers both in adults and children. It is difficult for health care professionals to foresee which measurement systems apply to accurately measure pain in the pediatric population [1]. Pain scales are perceived by healthcare professionals as important but not an apparent choice to use in postoperative care(17)(18). They prefer practical method such as tracking the pain control over time rather than using pain assessment tool with proven inter observer reliability

(19). For example in one study the verbal descriptive scale had an application frequency of only 38% (18). This mainly is attributed to the lack of knowledge regarding usage of available tools. As evident by one cross sectional study involving 236 hospitals in Kenya assessing the knowledge and practices among clinicians who manage postsurgical pain in adult patient showed that despite 81% of the respondents indicating that they had the knowledge on how to assess and measure pain, 73% of them felt they had insufficient knowledge on objective pain evaluation using tools that have been tested and validated for this purpose.

In the second domain concerning paediatric pain treatment, 4 questions reported to have less than 30% correct answers. All of these questions are related to opioid usage particularly morphine. These questions are concerns with equianalgesic dose, effect of respiratory depression, duration of action and dosage in epidural infusion.

Concerns of adverse effects of analgesic medications, including respiratory depression and addictions is one of the six main barriers to managing pain in children (20). This finding of current study is consistent with previous studies that have proven time and time again, that healthcare providers are apprehensive of opioid causing respiratory depression. This study showed that only 26.1% participants believed that respiratory depression rarely occurs in children and adolescent who have been receiving opioid over period of time. One study showed 74% of anesthetists around showed knowledge deficit in opioid induced respiratory depression (unpublished). Another study showed around 72% of anesthetists wrongly agreed that analgesic tolerance and addiction to opioids usually occurs following postoperative treatment, even though opioids have < 1% risk of tolerance and addiction with breathing problems caused by opioid analgesia(21). Remarkably, even though respiratory depression is considered a notorious side effects, majority of

participants agree that young infants, less than 6 months of age, can tolerate opioids pain relief.

Notably, only 6.5% of participants correctly answered the question regarding appropriate dose of morphine in continuous epidural infusion. Regional anaesthesia is generally accepted as an integral component of postoperative pain relief in paediatric patients (22) and commonly performed (23). From general observation most anaesthetist in our center do not usually practice epidural in children. Inadequate practice of epidural in children probably lead to the low knowledge level for the appropriate dose of morphine for epidural infusion. This is merely an observation of what has been generally practiced. Further study to verify the actual practice is needed. It is common that knowledge and skills gradually decrease after learning something, especially, when the knowledge is not integrated into practice (12)

Hospital Universiti Sains Malaysia (HUSM) is one of the few higher learning institutions in Malaysia that are accredited for anesthesiology training program. The four year program provides specialist training in anaesthesia, pain medicine, resuscitation and intensive care. Hence, trainees are required to undergo rotation or training in certain subspecialty including paediatric and pain management. Higher academic qualification correlate with higher mean score of knowledge (24) and have positive correlation with attitude towards pain management (25). In addition, years in training also have shown to increase level of knowledge (26).

International Association for the Study of Pain (IASP) deduced that insufficient pain education in medical schools and during specialty trainings was an important factor responsible for abysmal knowledge of doctors regarding pain in clinical practice. Because especially anaesthetist are expected to be well verse in managing pain, degree without core knowledge in pain management should be considered unsatisfactory

From demographic data gathered 43.5% have done pain rotation, 17.4% have done paediatric rotation, 28.2% have done both while 10.9% have not done both rotations. Less than half of the participants have the exposure to both of these specialties. The demand for anaesthetic services has been growing exponentially in recent times. To cope with these demand, department of anaesthesiology of HUSM are currently expanding its services to meet these demands. As a result, some of the trainees were regrettably denied the opportunity for off campus rotation due to inadequate manpower in campus, although these rotations are set to be compulsory for all trainees. This could also be one of the reasons of lower performance level compared to previous similar study.

However, from analysis there were no significant association between having done these rotations and the level of knowledge among anesthetist in HUSM. The reasons for this finding is not clear. It could be due to lack of emphasis on paediatric pain management during the respective rotation or inadequate time spent during each rotation as trainee usually are given only one month to complete each rotation.

Does education improve outcome? Studies suggest that a systematic education of doctors and educational program for residents can make a significant impact on the levels of acquired expertise on pain (27)(28). Study by Saroyan et al (29) showed preliminary evidence that a paediatric pain management lecture, combined with the use of a portable reference card, improves residents' performance on a knowledge assessment of acute paediatric pain management in hospitalized children. However, Wells et al (30) suggests that improving knowledge and changing attitudes can be a very slow process. He described that what is possible and what is generally achieved with regards to pain control can often be very different. After specific educational efforts significant change is difficult to achieved. Even if it occurs, it is difficult to sustained the change.

There were some limitations in the present study: Firstly, questionnaires have a low return rate. While the overall response rate was satisfactory in achieving the desired sample size, the return rate among specialist was very low at only 13%. This prevented us from achieving a more comprehensive analysis on knowledge of anaesthetist in HUSM regarding pain in children. Secondly, this study did not directly assess attitude and practice of the participants.

3.6 Conclusion

From this study we concluded that the knowledge among anaesthetist in HUSM still have a lot of room for improvement. Knowledge deficit mostly arises from pain assessment and opioid related issues such as respiratory depression, duration of action as well appropriate duration and dosages. If the training program encourages more trainees to go for paediatric rotation and provides more time for trainees to rotate in the paediatric area, the quality of knowledge about paediatric postoperative pain management would be improved further. In addition, there should also be continuous education with practical session and frequent assessment to ensure knowledge acquired is sustained.

3.8 References

1. Carr DB, Adele Giamberardino M, Goh CR, Jadad AR, Lipkowski AW, Neuropharmacology Ds, et al. Why Children's Pain Matters Editor-in-Chief Children Suffer Pain from Many Causes. 2005;
2. Walker SM. Pain in children: Recent advances and ongoing challenges. Vol. 101, British Journal of Anaesthesia. 2008. p. 101–10.
3. Verghese ST, Hannallah RS. Acute pain management in children. J Pain Res [Internet]. 2010 Jul 15 [cited 2016 Nov 16];3:105–23. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21197314>
4. AMERICAN ACADEMY OF PEDIATRICS AMERICAN PAIN SOCIETY The Assessment and Management of Acute Pain in Infants, Children, and Adolescents.
5. Shum S, Lim J, Page T, Lamb E, Gow J, Ansermino JM, et al. An audit of pain management following pediatric day surgery at British Columbia Children's Hospital. Pain Res Manag [Internet]. [cited 2016 Oct 23];17(5):328–34. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23061083>
6. Tzong KYS, Han S, Roh A, Ing C. Epidemiology of Pediatric Surgical Admissions in US Children. J Neurosurg Anesthesiol [Internet]. 2012 Oct [cited 2016 Nov 13];24(4):391–5. Available from: <http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00008506-201210000-00019>
7. Piros C, Pillai K, Yoshida Y, Lawrence PJ, Yamamoto E, Reyer JA, et al. Pediatric cardiothoracic program in Malaysia: a study based on the outcome of the program. Nagoya J Med Sci. 2016;78(17).