A PILOT STUDY ON ASSESSMENT OF KNOWLEDGE AND CLINICAL REASONING IN ACUTE ASTHMA MANAGEMENT AMONG HEALTHCARE PROVIDER IN EMERGENCY DEPARTMENT HUSM USING

K-CRAMED INVENTORY

by

DR. SAIFUL AZLAN BIN MOHAMED

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ABSTRAK

Pengenalan:

Serangan asma akut merupakan kes yang biasa dilihat di jabatan kecemasan. Oleh sebab itu, petugas perubatan di jabatan kecemasan perlu memiliki pengetahuan yang mencukupi dan tahap pertimbangan klinikal yang memuaskan.

Objektif:

Kajian ini bertujuan untuk menentukan markah penentu untuk tahap pengetahuan dan pertimbangan klinikal dalam merawat kes kes akut asma. Seterusnya menilai tahap pengetahuan dan pertimbangan klinikal di kalangan petugas perubatan di Jabatan Kecemasan Hospital Universiti Sains Malaysia.

Metodologi:

Kajian ini bermula dari Januari 2017 hingga Mac 2017 di Jabatan Kecemasan Hospital Universiti Sains Malaysia. Semua petugas perubatan di Jabatan Kecemasan Hospital Universiti Sains Malaysia terlibat dengan kajian ini. Kajian menggunakan inventory K-CRAMED. Analisa deskriptif digunakan sebagai frekuensi (peratus) atau min ± standard deviasi. Untuk kajian perkaitan dengan tahap pengetahuan dan tahap pertimbangan klinikal, ujian Independent-Sample T, Pearson Correlation, dan One Way ANOVA digunakan. Untuk seting standard, Teknik Angoff dan Modified Angoff digunakan, dan proses ini melibatkan lima orang pakar dari Jabatan Kecemasan Hospital Universiti Sains Malaysia.

Keputusan:

Peserta kajian ini terdiri daripada 178 orang. Seramai 68 orang jururawat, 66 orang pelajar sarjana,15 orang pembantu perubatan dan 9 orang pegawai perubatan tetap. Kebanyakan petugas perubatan mempunyai pengalaman bekerja di antara 5 – 10 tahun (55.6%), 38.8% peserta pula kurang daripada 5 tahun dan 5.6% mempunyai pengalaman bekerja lebih daripada 10 tahun.

Penetapan standard menggunakan Angoff Method dan Modified Angoff Method dibuat dengan menggunakan 5 orang pakar daripada Jabatan Kecemasan Hospital Universiti Sains Malaysia. Skor penentu yang diperolehi untuk tahap pengetahuan adalah paling tinggi di kalangan pelajar sarjana. Manakala skor paling rendah adalah di kalangan jururawat dan pembantu perubatan. Sementara itu, tahap pertimbangan klinikal paling rendah juga adalah di kalangan pelajar sarjana. Sementara sebahagian pegawai perubatan tetap, pegawai perubatan siswazah, pembantu perubatan dan jururawat memiliki tahap pengetahuan yang rendah.

Kajian juga mendapati lelaki memperolehi skor min lebih tinggi berbanding perempuan ($p=0.020$). Pertambahan umur berkaitan dengan peningkatan tahap pengetahuan ($p=0.000$) dan juga tahap pertimbangan klinikal ($p=0.047$). Sementara itu, pengalaman bekerja tidak berkaitan dengan tahap pengetahuan($p=0.053$) ataupun tahap pertimbangan klinikal($p=0.539$).

Kesimpulan:

Kebanyakan pelajar sarjana memiliki pengetahuan yang tidak mencukupi serta pertimbangan klinikal yang tidak mencukupi. Sementara hanya sebahagian daripada petugas perubatan lain tidak mempunyai tahap pertimbangan klinikal yang mencukupi.

Pihak jabatan perlu melibatkan diri dalam melatih dan mendidik staf supaya tahap pengetahuan dan pertimbangan klinikal mereka mencukupi.

Asma, jabatan kecemasan, pengetahuan, perubatan akut

ABSTRACT

Introduction:

Acute asthma attack is a common presentation to emergency department. Thus, healthcare provider at emergency department need to have sufficient knowledge and acceptable level of clinical reasoning to manage such cases.

Objective:

This study aimed to determine the cut off score for level of knowledge and clinical reasoning in acute asthma management through standard setting. Then attempt to assess level of knowledge and clinical reasoning in acute asthma management among healthcare provider in Emergency Department Hospital Universiti Sains Malaysia.

Methodology:

This study was a cross-sectional study from January 2017 until March 2017 at Emergency Department (ED) Hospital Universiti Sains Malaysia (HUSM). All healthcare provider available at ED HUSM from January 2015 until March 2015 were included. Purposeful sampling was used, and a total of 178 participants were involved in this study. K-CRAMED inventory were used as the tool to assess knowledge and clinical reasoning. Descriptive statistics were expressed as frequency (percentage) or mean ± standard deviation for numerical variables. For association study, Independent-Sample T Test, Pearson Correlation test and One-Way ANOVA were used. Standard setting was implemented using Angoff Method and Modified Angoff Method involving five specialists from ED HUSM.

Results:

Participants for this study consists of 178 people. The participants consist of 68 (38.2%) staff nurses, 66 (37.1%) postgraduate students, 20 (11.2%) medical assistants, 15 (8.4%) house officers and 9 (5.1%) service medical officers. Most healthcare provider had working experience of between 5-10 year, which was 55.6%, 38.8% participant had experience less than five years, and another 5.6% had working experience of more than 10 years.

Standard setting using Angoff Method and Modified Angoff Method and was done with five emergency physicians from ED HUSM. Cut off score for adequacy of knowledge

were highest in the postgraduate students group with 75.6%, while the lowest cut off score was for the medical assistant group and staff nurses group with 28.4%. For level of clinical reasoning, postgraduate students received the highest cut off score of 66.8%, while the lowest cut off score was 29.9% also shared by both medical assistants and staff nurses group.

This study found that majority of postgraduate students had inadequate knowledge (78.8%) and inadequate clinical reasoning (90.9%). A proportion of service medical officers, house officers, medical assistants and staff nurses also having inadequate level of clinical reasoning with total of 55.6%, 13.3%, 25.0% and 39.7% respectively.

Association study found that males had higher mean score than female in level of knowledge ($p = 0.020$). However, there was no significant difference in level of clinical reasoning with gender ($p = 0.055$). Increase in age had a moderate positive correlation with level of knowledge ($p = 0.000$) and level of clinical reasoning ($p = 0.047$). While work experience had no relationship with level of knowledge ($p = 0.053$) or level of clinical reasoning ($p = 0.539$).

Conclusions:

Majority of postgraduate students had inadequate level of knowledge and clinical reasoning. A proportion of other healthcare provider also having inadequate level of clinical reasoning. Intervention by the department is needed to fill in the knowledge gap and to achieve acceptable level of clinical reasoning.

Keywords:

Asthma, emergency department, knowledge, acute management

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CHAPTER 1 : INTRODUCTION

1.1 Overview of Asthma

Asthma is a common chronic airway disorder characterized by periods of reversible airflow obstruction known as asthma attacks. Symptoms of acute asthmatic attack ranges from mild or moderate to severe life-threatening attack. Asthmatic attack which is not resolving after using self-medication such as metered dose inhaler (MDI) will require asthma patient to seek treatment at clinics or hospital. Upon presentation to emergency department/unit, these patients will be immediately triaged to the asthma bay or acute resuscitation area based on severity of symptoms.

According to World Health Organization (WHO), asthma is one of the major non-communicable diseases affecting about 235 million people worldwide, especially children. In December 2016, WHO made an estimation of around 383,000 deaths occurred due to asthma in 2015 (1). In Malaysia, around 2 million of its population was estimated to have asthma, with 90% of those asthma patients had poor symptom control of their disease (2). Asthma is one of the top 10 diagnosis for ICU admission in Malaysia for the year 2015 (3).

It remains a fact that asthma is not curable, but the symptoms can be controlled with good optimal management. In fact, asthma has a relatively low mortality rate compared to other diseases (1). To avoid under diagnose or under treated asthma, guidelines were developed to assist healthcare provider throughout the world in managing asthma patient. Two main guidelines existed, the Global Strategy for Asthma Management and Prevention published

by Global Initiative for Asthma (GINA) and the British Guideline on The Management of Asthma produced by British Thoracic Society (BTS).

1.2 Dilemma in Asthma Management

The continuing update of guideline means that there are always new evidences to improve asthma care. But surprisingly, not all healthcare providers are practicing according to the suggested guidelines. A study by Lougheed *et al*. in 2009 suggests that healthcare provider at ED were not practicing according to suggested clinical practice guidelines. There were gaps between utilizing best practice and adhering to latest guideline (4). It is without a doubt that clinical judgement is crucial when managing a sick patient rather than strictly following a guideline. However, the adherence to a standardized evidence-based asthma clinical practice guideline in ED setting is more effective and will provide a better asthma care and improve outcome (5)

Meanwhile, a study done in Kuwait found that although physicians had good attitude towards asthma clinical practice guidelines, the physicians were not adhering to the guidelines (6). The fact that healthcare provider not adhering to suggested clinical practice guidelines despite not rejecting them creates a question to be answered. A study by Ting in 2002 suggests four common reasons why physician did not adhere to the guidelines. The main reason was that physicians did not remember all the details listed in the guidelines, which was the parameters to classify severity of asthma, list of asthma triggers, and list of steroid doses to be used in step therapy. The fourth reason given was not having sufficient time or resources to provide their patient with asthma education and an asthma action plan,

as suggested in the guidelines (7). It seems logical, physician could not practice what they did not remember, furthermore in a busy environment with time constraint. Thus, a simplified asthma guideline reminder was introduced in that study as a tool to enhance adherence to asthma guidelines (7).

1.3 Justification of the study

On July 2013, an observational study at ED Hospital Universiti Sains Malaysia (HUSM) found non-adherence to clinical practice guidelines among its healthcare provider. The observation saw delays in treatment, and ED revisit within 48 hours after another episode of exacerbation, due to managing asthma without following the guidelines.

Assessment on acute asthma management among healthcare provider regarding is crucial for optimized patient care. However, there were no tools available to assess acute asthma management among healthcare provider.

Three domains were identified as a challenge for healthcare provider at ED in managing acute asthma. First domain was to recognize the disease (diagnosis). Second domain was the usage of the acute reliever medication (treatment). Finally, third domain was discharge management plan or admission (disposition).

A series of studies were planned, with the first study had developed a set of questionnaires designated K-CRAMED inventory. It was designed as the inventory to assess those three domains, and at the same time assess the adherence to the proposed guidelines. K-CRAMED stands for Knowledge and Clinical Reasoning in Acute Asthma Management in ED. K-CRAMED inventory differs from Knowledge, Attitude and Practice (KAP) type

questionnaire. Two major aspects have to be tested in this inventory which are knowledge and clinical reasoning. Clinical reasoning component is replacing attitude and practice questionnaire. Knowledge component was developed using supplied type question to avoid bias, and script concordance test was used to measure the clinical reasoning. The three domains mentioned earlier will be applied to both knowledge assessment and clinical reasoning assessment.

The development of the K-CRAMED inventory was done by another senior colleague in ED HUSM using the Delphi Technique. Process of development started with item construction, content validity, and face validity. Blue printing was developed based on the asthma guidelines, the Global Strategy for Asthma Management and Prevention 2015 published by GINA and the British Guideline on The Management of Asthma 2014 produced by BTS.

The initial validation process involved content validation index (CVI), face validation index (FVI) and intraclass correlation coefficient (ICC) for each domain.

CVI for domain of diagnosis showed scale-level content validity index, universal agreement method (S-CVI/UA) of 0.83 and scale-level content validity index, averaging method (S-CVI/Ave) of 0.91. The second domain, which is treatment showed S-CVI/UA of 0.85 and S-CVI/Ave of 0.85, while the domain of disposition showed S-CVI/UA of 0.89 and S-CVI/Ave of 0.89.

Regarding face validation index, FVI of clarity among doctors was 0.97, while the FVI of clarity among paramedics was 0.87. FVI for comprehension of the doctors and paramedics were 0.97 and 0.83 respectively.

Inter-rater reliability measured using ICC scoring was 0.989 (CI 95% 0.982, 0.994, P value = <0.001). Cronbach alpha was not measured because K-CRAMED inventory is an assessment of knowledge component.

The new K-CRAMED inventory requires further analysis to strengthen the reliability and validity. Due to the questionnaire had been developed approaching exam type (supplied type question), standard setting for cut off marking in differentiating two groups was suggested using Angoff and Modified Angoff Method.

This was a continuation study, and will serve as a pilot study to conduct standard setting on the K-CRAMED inventory. Thus, deciding the cut off score for adequate/inadequate knowledge and safe/unsafe clinical reasoning, while at the same time making an assessment on knowledge and clinical reasoning in acute asthma management among healthcare provider in ED HUSM. Healthcare worker in ED HUSM consists of postgraduate students, service medical officers, and house officers who are doctors, and paramedics who consists of medical assistants and staff nurses.

This study was also part of the study entitled "Development and Assessment of Knowledge and Clinical Reasoning of Acute Asthma Management (K-CRAMED) Inventory in Emergency Department among Healthcare Provider in Kelantan".

Data acquired from this study will be used to guide the administration of ED in advocating proper training and intervention such as Continuous Medical Education (CME) sessions for all its healthcare provider. Furthermore, the same data may also extend the knowledge in the field of asthma. Finally, K-CRAMED inventory can be promoted as product of USM to other institution.

CHAPTER 2 : STUDY PROTOCOL

2.1 Introduction

a) Background of Study

Asthma is a common chronic airway disorder characterized by periods of reversible airflow obstruction known as asthma attacks. Because of this most of the emergency department in Malaysia will have the specific asthma bay to facilitate the early treatment of asthmatic attack.

Symptoms of acute asthmatic attack ranges from mild or moderate to severe life-threatening attack. Upon presentation to emergency department, this patient will be immediately triaged to the asthma bay or acute resuscitation area based on severity of symptoms.

Thus, knowledge in management of acute asthmatic attack is crucial for healthcare provider in emergency department. There were few suggested guidelines provided by GINA (updated 2014) or British Thoracic Society Guideline (updated 2014) or Malaysian CPG (2002) for management of asthma. There is evidence in support of asthma clinical guideline to optimize asthma care and outcomes in emergency department settings.

Three domains were identified as a challenge for healthcare provider at ED

1. First is to recognize the disease (diagnosis)
2. Second is the usage of the acute reliever medication (treatment)
3. Finally discharge management plan or admission (disposition)

A set of questionnaire designated K-CRAMED inventory is designed as the inventory to assess those three domains. K-CRAMED inventory differs from Knowledge, Attitude and Practice (KAP) type questionnaire (8). Two major aspects to be tested in this inventory is knowledge and clinical reasoning. Clinical reasoning component is replacing attitude and practice questionnaire. Knowledge component was using supplied type question to avoid bias, and script concordance test was used to measure the clinical reasoning. The three domains mentioned earlier will be applied to both knowledge assessment and clinical reasoning assessment.

The development of the K-CRAMED inventory was done by another senior colleague using the Delphi Technique. Process of development started with item construction, content validity, and face validity. Blue printing was developed based on the Global Initiative for Asthma (GINA) guideline updated in December 2012, British Guideline on the Management of Asthma updated in January 2012 and Malaysian Clinical Practice Guideline 2002.

The initial validation process involved content validation index (CVI), face validation index (FVI) and intraclass correlation coefficient (ICC) for each domain.

CVI for domain of diagnosis showed scale-level content validity index, universal agreement method (S-CVI/UA) of 0.83 and scale-level content validity index, averaging method (S-CVI/Ave) of 0.91. CVI for domain of treatment showed S-CVI/UA of 0.85 and S-CVI/Ave of 0.85. CVI for domain of disposition showed S-CVI/UA of 0.89 and S-CVI/Ave of 0.89.

FVI of clarity among doctors was 0.97 and FVI clarity among paramedics was 0.87. FVI for comprehension of the doctors was 0.97 and comprehension of the paramedics was 0.83.

Inter rater reliability measured using ICC scoring was 0.989 (CI 95% 0.982, 0.994, P value = <0.001). Cronbach alpha is not measured because K-CRAMED inventory is an assessment of knowledge component.

The new K-CRAMED inventory requires further analysis to strengthen the reliability and validity. Standard setting for the K-CRAMED inventory will be implemented in this study. Due to the questionnaire had been developed approaching exam type (supplied type question), standard setting for cut off marking in differentiating two groups was suggested using Modified Angoff Method.

Finally, this study is part of the study under the short-term grant entitled “Development and Assessment of Knowledge and Clinical Reasoning of Acute Asthma Management (K-CRAMED) Inventory in Emergency Department among Healthcare Provider in Kelantan”.

b) Problem Statement

From an observation study done at ED HUSM in October 2013 found non-adherence to the recommended guidelines in asthma management. Thus, arise the need for assessment of knowledge and clinical reasoning in managing asthma patient among healthcare provider in emergency unit/department.

A specific tool is required to objectively determine the adequacy of knowledge and to determine safe/unsafe clinical reasoning. At this moment, such tool is not available. A series of study was planned, involving the development of a questionnaire called K-CRAMED inventory and to use it to conduct study among healthcare provider at emergency unit/department in Kelantan.

2.2 Justification of the Study

1. Data acquired from this study will be used to:
    - guide the department administration in advocating proper training & intervention such as CMEs
    - Extend the knowledge in the field of asthma
2. Pilot study and validation of K-CRAMED inventory
3. K-CRAMED inventory can be promoted as product of USM to other institution.

2.3 Literature Review

Asthma is a chronic respiratory illness affecting the world population. World Health Organization (WHO) mentioned on their website as of November 2013 an estimate of about 235 million people around the world currently suffer from asthma. Furthermore, asthma is the most common noncommunicable disease among children. Data from the United States of America showed asthma prevalence increases from 7.3% in 2001 to 8.4% in 2010, when 25.7 million persons had asthma. (Lara J. Akinbami *et al*., 2012)

Although asthma affects many people, healthcare providers still have problem in diagnosing asthma. For example, general practitioners were good at excluding those who did not have asthma (specificity 99%) but less good in correctly diagnosing those who actually had current asthma (sensitivity 59%), which suggests an underdiagnosis of asthma. (Montnémery *et al.,* 2002). A study by Tinkelman *et al.* (2006) mentioned that healthcare worker was having confusion between diagnosis of COPD and asthma. This occurred despite the availability of consensus guideline and diagnostic recommendations. (Tinkelman *et al.,* 2006)

There was evidence to suggest that the use of asthma clinical pathways (which is integrating the asthma clinical guideline) in the emergency department is effective in optimizing asthma care and its outcomes (Lougheed MD, Olajos-Clow JG., 2010).

However, despite the evidence that asthma clinical guideline improves asthma care, physicians at the primary health care centers had a low adherence rate to asthma guidelines. Although they had high positive attitude toward asthma, yet th`eir knowledge and practice need improvement. (Fahad Nasser Almutawaa *et al.,* 2014). Even among emergency

healthcare provider in North American emergency departments, there are gaps between using the best practices and using the current clinical guidelines in the management of asthma in children and adults. (Lougheed MD, Olajos-Clow JG., 2010).

A study done by Ting (2002) with the background that clinicians in general have not widely and consistently used asthma guidelines in their practices around the world. This study attempted to identify reasons for the poor adherence to asthma guidelines by primary care physicians. Four common reasons were identified; (a) not remembering classification parameters of asthma severity, (b) not remembering various brand and exact dosages of inhaled steroids for different asthma severity, (c) not remembering to ask about various triggers of asthma, and (d) not having sufficient time or resources to provide asthma education and an asthma action plan. (S. Ting., 2002).

This study will involve a finite population. To simplify the process of determining the sample size, Krejcie & Morgan table will be used. (Robert V. Krejcie, Daryle V. Morgan., 1970).

2.4 Research Questions, Research Hypothesis, Objectives

Research Questions

What is the level of knowledge among healthcare provider at Emergency Department HUSM?

Are they making safe or unsafe clinical decision?

Research Hypothesis

Healthcare provider in Emergency Department HUSM possesses adequate knowledge and safe clinical reasoning in the management of acute asthma.

Objectives

General Objective:

1. To determine the knowledge and clinical reasoning among healthcare provider regarding acute asthma management in Emergency Department HUSM using K-CRAMED inventory.

Specific Objectives:

1. To determine the cut off score for adequate/inadequate knowledge through standard setting
2. To determine the cut off score for safe/unsafe clinical reasoning through standard setting
3. To determine knowledge level among healthcare provider in Emergency Department HUSM regarding acute asthma management.
4. To determine clinical reasoning level among healthcare providers in Emergency Department HUSM regarding acute asthma management.
5. To determine associated factors for knowledge and clinical reasoning among healthcare provider in Emergency Department HUSM.

2.5 Methodology

1. Study Design:
    - Cross-sectional study
2. Sampling Method:
    - Purposive sampling
3. Reference Population:
    - Healthcare provider in emergency department/unit in Kelantan
4. Source Population:
    - Healthcare provider in Emergency Department HUSM
5. Study Subjects:
    - Healthcare provider in Emergency Department HUSM who are available and consented
    - Subject will consist of emergency medicine postgraduate students, medical officers, house officers, medical assistants and staff nurses.
6. Inclusion Criteria:
    - Healthcare Provider in Emergency Department HUSM
7. Exclusion Criteria:
    - Refused to participate
8. Instrument:
    - K-CRAMED inventory
9. Sample Size:
    - To conduct standard setting, a panel of minimum 5 experts from Emergency Department will be selected.

- To determine the knowledge and clinical reasoning, sample size will be calculated using Krejcie and Morgan Table.

Table 1: Table for Determining Sample Size for a Finite Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Sample size calculation for this study:

Category	**Population Size (N)**	**Sample Size (S)**
Postgraduate Students	82	66
Service Medical Officers	12	10
House Officers	13	14
Medical Assisstants	24	24
Staff Nurses	131	97
TOTAL	**262**	**211**

Sample size will be 211 participants.

10. Data Collection:

Subject selection will be done in two methods, first during regular departmental CME and second by approaching subject after working shift has ended for those who are unable to attend department CME.

Subject will be given explanation regarding the background and purpose of this study. Then those who agree to participate will be given the consent form. After signing the consent form, participants will be given the K-CRAMED inventory. They will be explained on how to answer the question.

Primary Investigator will be in the same room/lecture hall to conduct the session in exam style, where participant is not allowed to copy or discuss with anyone, or making references to any electronic or written/printed materials.

Participants will be required to answer all questions within 30 minutes. After time is up, investigator consent form and questionnaire will be collected. Participants are also not allowed to copy any part of the K-CRAMED inventory. Participants will not be involved in the study anymore once the session ended.

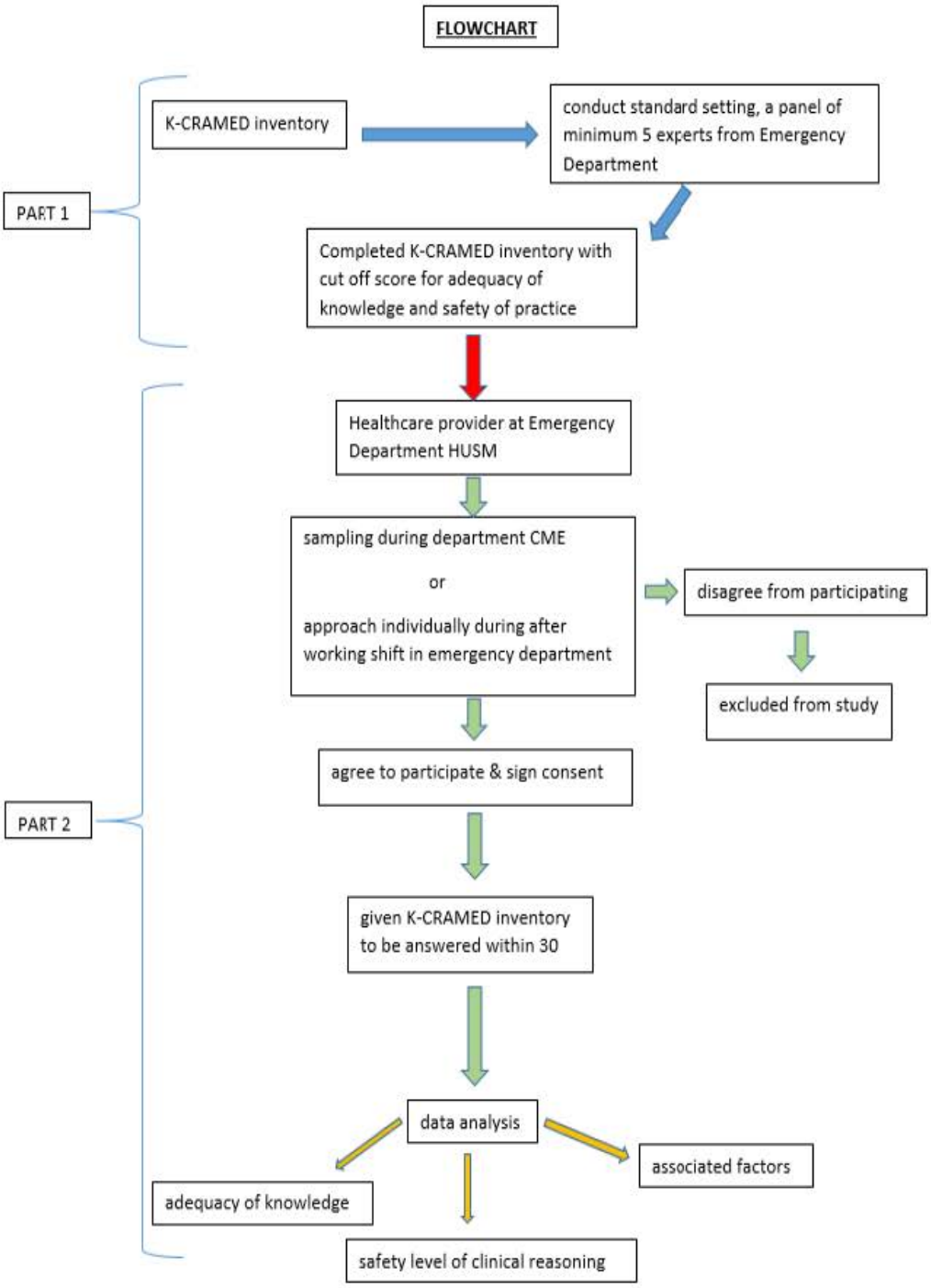
11. Standard setting procedure:

- Using Modified Angoff Method

12. Statistical Analysis:

Data will be entered and analysed using SPSS version *22*. Descriptive statistics will be used to summarise the socio-demographic characteristics of subjects. Numerical data will be presented as mean (SD). Categorical data will be presented as frequency (percentage).

- Objective 1: Descriptive statistics
- Objective 2: Descriptive statistics
- Objective 3: Descriptive statistics
- Objective 4: Descriptive statistics
- Objective 5: Multiple logistic regression


FLOWCHART
PART 1
K-CRAMED inventory
conduct standard setting, a panel of minimum 5 experts from Emergency Department
Completed K-CRAMED inventory with cut off score for adequacy of knowledge and safety of practice
PART 2
Healthcare provider at Emergency Department HUSM
sampling during department CME
or
approach individually during after working shift in emergency department
disagree from participating
excluded from study
agree to participate & sign consent
given K-CRAMED inventory to be answered within 30
data analysis
associated factors
adequacy of knowledge
safety level of clinical reasoning

Expected results/dummy table

PART 1: demographic data

1. Level of occupations among participants

Category	Total (n)	Percent (%)
Postgraduate Students		
Service Medical Officers		
House Officers		
Medical Assisstants		
Staff Nurses		

2. Gender variations of participants

	male		female	
Category	Total (n)	Percent (%)	Total (n)	Percent (%)
Postgraduate Students				
Service Medical Officers				
House Officers				
Medical Assisstants				
Staff Nurses				

3. Age of participants

	Age (years)				
Category	20-30	31-40	41-50	51-60	total (n)
Postgraduate Students					
Service Medical Officers					
House Officers					
Medical Assisstants					
Staff Nurses					

4. Working Experiences

	Working Experience (years)					
Category	<1	1-2	2-5	5-10	>10	total (n)
Postgraduate Students						
Service Medical Officers						
House Officers						
Medical						

Assisstants						
Staff Nurses						

PART 2: cut off score using Modified Angoff Method

1. Cut off score for adequate/inadequate knowledge from standard setting (x5 for each group)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Mean
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

16						
mean						

2. Cut off score for safe/unsafe clinical reasoning from standard setting (x5 for each group)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Mean
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
mean						

PART 3: Scoring by participants

1. Scoring for overall knowledge level in managing asthma patient

Category	Score	
	mean	SD
Postgraduate Students		
Service Medical Officers		
House Officers		
Medical Assisstants		
Staff Nurses		

1.1 Scoring for knowledge in making diagnosis of asthma

Category	Score	
	mean	SD
Postgraduate Students		
Service Medical Officers		
House Officers		
Medical Assisstants		
Staff Nurses		

1.2 Scoring for knowledge in treatment of asthma patient

Category	Score	
	mean	SD
Postgraduate Students		
Service Medical Officers		
House Officers		
Medical Assisstants		
Staff Nurses		

1.3 Scoring for knowledge in disposition of asthma patient

Category	Score	
	mean	SD
Postgraduate Students		
Service Medical Officers		
House Officers		
Medical Assisstants		
Staff Nurses		