

Factors hindering critical care nurses' compliance with evidence based guidelines for prevention of secondary brain injury

Azza Hamdy Elssosi, Intessar Mohamed Ahmad, Alaa Mostafa Mohamed

Professor of Critical Care and Emergency Nursing, Critical Care & Emergency Nursing Department, Faculty of Nursing, Alexandria University Egypt.

Lecturer of Critical Care and Emergency Nursing, Critical Care Nursing Department, Faculty of Nursing, Damanhour University Egypt.

Clinical Instructor, Critical Care Nursing Department, Faculty of Nursing, Damanhour, University Egypt.

Abstract

Background: Evidence-based clinical guidelines provide nurses with a method to use critically appraised. But, there are several barriers to their implementation which can be grouped as barriers related to individual nurse characteristics, organizational characteristics, and the nature of research information. **The aim of the study:** was to identify hindering factors for critical care nurses' compliance with evidence based guidelines for prevention of secondary brain injury. **Materials & Method:** Two tools were developed to collect data. "Evidence based guidelines for prevention of secondary brain injury observational checklist tool" and "Factors hindering nurses' compliance with Evidenced based guidelines for prevention of secondary brain injury questionnaire tool" to determine factors hinder nurses' compliance with evidenced based guidelines for prevention of secondary brain injury. **Results:** The study revealed that the overall average compliance with seizure control recommendations was the highest (91.9%) followed by maintaining adequate nutrition and preventing DVT recommendations which were more than two thirds among secondary brain injury prevention recommendations. Moreover, the organizational barriers were the most reported barriers by the majority of the CCNs (84%). **Conclusion:** In conclusion, the barriers to studied nurses' compliance are ranked and categorized as organizational barriers, followed by nature of research information barriers, then personal barriers.

Key words: *Hindering factors, Nursing Compliance, Evidence Based Guidelines & Secondary Brain Injury.*

Introduction

Traumatic brain injury (TBI) is a major cause of death and disability worldwide. The impact of TBI on quality of life is significant, as most suffer some degree of cognitive impairment that may include memory or motor deficits, psychological disorders, or seizures, with an increased risk for developing neurodegenerative diseases or other encephalopathies later in life. Additionally, about 1% of persons with severe TBI survive in a state of persisting unconsciousness (Tagliaferri, 2006). Understanding mechanism, classifications and pathophysiology of TBI with an integration of evidence-based practice approaches to TBI management is critical in optimizing an individual's safety, recovery and functional ability in the acute care environment (Faul, 2010).

Neurological damage does not all occur immediately at the moment of impact but evolves afterwards what is called secondary brain injury. Even though some degree of irreversible damage occurs with the primary injury, TBI is a process in which additional and progressive secondary injury evolves over the minutes, hours, and days following the primary injury. Secondary injuries occur as a complication of

the primary injury and are a devastating consequence of the body's physiologic mechanisms. A significant number of those who die in the hospital have had a secondary insult that worsens the initial injury. (Bahouth, 2013).

The treatment choices for TBI patients often vary depending on the region of the country, hospital facilities, and physician and nurse experience. These various studies showed considerable variations in the care of patients with severe TBI. To improve and standardize neurocritical care management, the American Association of Neuroscience Nurses (AANN), the Brain Trauma Foundation (BTF), American Association of Neurologic Surgeons and other health care agencies have developed evidence-based guidelines (March, 2004).

Evidence-based clinical guidelines provide nurses with a method to use critically appraised and scientifically proven evidence for delivering quality health care to a specific population. Despite the potential benefits of TBI guidelines to patients and clinicians, there are several barriers to their implementation. Barriers to evidence based clinical guidelines can, be grouped as barriers related to

individual nurse characteristics, organizational characteristics, and the nature of research information (Ryan, 2009).

There are several personal barriers obstruct the implementation of evidence based guidelines. Nurses may lack the skill to locate research information, preferring to seek information from a colleague rather than search for a journal article or look in a textbook, the inability to critically appraise or synthesize the research literature, lack of search skills, computer skills, and library and computer access and disagreement with guidelines (Susman, 2002) & (Ghoneim, 2012).

Organizational barriers such as lack of time for nurses to retrieve clinically useful information, inconvenient library location, lack of managerial commitment and available information technology, unavailability of training programs, lack of adequate nursing staff, insufficient resources (e.g., equipment, materials) to implement evidence based guidelines and different goals for practice between administrators and staff nurses play a vital role in hindering compliance with evidence based guidelines (Montaser, 2013). Moreover, a healthcare environment that diminishes nurses' independence, authority, or power over their practice and peer pressure to continue practices because "they have always been done this way." will decrease integration of evidence based practices.

Healthcare professionals rarely function alone; therefore, their ability to change a clinical practice cannot be made without the consent and approval of others such as hospital administrators, physicians, or other members of the healthcare team. Although a multidisciplinary focus to change will increase the success of implementation, working across disciplines also brings tension. Changing organizational culture around a practice requires that the change is consistent with organizational philosophy and political agenda and those resources are available to support the change (Sharaf, 1999)

Nature of research information can be also one of the barriers that hinder nurse's compliance with evidence based clinical guidelines. Nurses have identified problems in interpreting research findings and using them because the research is seen as too complicated, too scholarly, excessively statistical, ambiguous, and having limited or no relevance to practice. Although nurses recognize the value of research-based knowledge, they view research as overwhelming in language, volume, and writing style and want more guidance and direction for practice (Lemke, 2007).

The aim of the study

The aim of the study was to identify hindering factors

for critical care nurses' compliance with evidence based guidelines for prevention of secondary brain injury.

The Study questions

- Do critical care nurses comply with evidence based guidelines for prevention of secondary brain injury?
- What are the factors that hinder critical care nurses' compliance with evidence based guidelines for prevention of secondary brain injury?

Materials & Method

Materials

Research design

A descriptive research design was utilized to accomplish this study

Setting

This study was carried out at Alexandria Main University Hospital ICUs namely; casualty care unit (unit I), general ICU (unit III) and triage ICU. Casualty care unit (unit I) consists of two rooms with four beds each. It receives patients mainly from emergency department. Patients admitted to this unit are more acute in their condition than other units. It is mainly designed as an extended emergency or causality room. General ICU (unit III) consists of two main halls with seven to eight beds each. It receives patients who have multiple body system alterations. Triage ICU includes seven beds in the unit. It receives critically ill injured patients.

Subjects

A convenience sample of 60 CCN nurses were included currently in the above mentioned settings and who are involved in providing direct patient care to TBI patients were recruited .

Tool: Two tools were developed and used by the researcher:

Tool One: "Evidence based guidelines for prevention of secondary brain injury observational checklist tool". It is an observational checklist designed by the researcher to gather information from critical care nurses on their compliance with evidence base guidelines for prevention of secondary brain injury. Checklist consists of 9 key items based on reviewing of the pertinent literature (Rosenfeld, 2012), (Cecil, 2011), (Kirkness, 2005) & (Aksoy, 2000) to identify the actual nursing care provided to TBI patients. These items are rated as done correct & complete, done correct & incomplete, done incorrect or not done. Observational checklist includes the following items of nursing care: specific nursing interventions for maintaining adequate CPP and general maintenance nursing care for TBI patients including: (TBI patient's essential monitoring, nursing practices for oxygenation and ventilation management , ICP management, circulation and fluid management, controlling refractory ICH ?,

seizure control, glycemic control, maintaining adequate nutrition and preventing DVT ?).

Tool Two: "Factors hindering nurses' compliance with Evidenced based guidelines for prevention of secondary brain injury questionnaire tool". This tool was developed by the researcher after reviewing the relevant literature **Stein (2010) & Davis (2000)** to determine factors that may hinder nurses' compliance with evidenced based guidelines for prevention of secondary brain injury. It will include three parts:

Part I: "Nurses."

This part was used to identify nurses' related factors. It includes 9 items which are: using more traditional methods, lack of computer skills, searching skills, poor judging ability on the quality of the articles, forgetfulness, lack interest, believing that evidence-based guidelines has only limited utility, seeking information from a colleague, heavy workload .

Part II: "Organizational."

This part was used to identify organizational related factors. It include 9 items which are unavailability of training programs, insufficient resources, a library or computers are not available in the work place, inadequate nursing staff, lack of authority and support from nurse managers, absence of evidence-based guidelines mentors in health-care systems, lack of time at work place to search for , read and to apply evidence based guidelines.

Part III: "type of information."

This part was used to identify factors related to nature of information that hinder nurses compliance. It includes 7 items which are large number of statistical terms, difficult research terms, inadequacy of research information to be applied into clinical practice, evidence based information is highly complicated, too scholarly, has multiple sources and always change and updated. Each item was scored on a 5 point likert scale ranging from strongly disagree (1) to strongly agree (5).

In addition, this tool also includes Nurses' characteristics such as age, sex, level of education, and years of experience in nursing field and in ICU were assessed.

Method

- An official letter from the faculty of nursing was delivered to the hospital authorities in the Main University Hospital and approval to conduct this study was obtained after providing explanation of the aim of the study.
- Secondary brain injury prevention guidelines were developed by the researcher after determining the need and scope of guidelines. The need and scope were identified through observation of the current nursing practices performed in the clinical settings. It was found that there were no nursing contribution in the plan of management of TBI

patients and there were no nursing guidelines or protocol for the management of TBI patients available in the clinical settings.

- The tool of the present study was developed after reviewing the related literature. The tools were submitted to a Jury of 7 experts in Critical Care Nursing, Medical Surgical Nursing and Anesthesia to assess clarity and content validity of the tools and all necessary modifications were done accordingly.
- Reliability of tool I and tool II were tested using Cronbach's Alpha test and results were 0.78 and 0.85 respectively.
- A pilot study was carried out on 6 nurses (10 % from the study sample) to test the clarity and applicability of the research tools and they were excluded from the study. Pilot study revealed that further modifications are not needed.

Data collection

The researcher observed nurses' practice of evidence based guidelines for prevention of secondary brain injury in the intended ICUs during morning and evening shifts over a period of four consecutive months (from October 2014 to January 2015).

The performance of specific nursing interventions for maintaining adequate CPP included TBI patient's essential monitoring, nursing practices for oxygenation and ventilation management, ICP management, circulation and fluid management, controlling refractory ICH and seizure control and general maintenance nursing care for TBI patients such as glycemic control, maintaining adequate nutrition and Preventing DVT were assessed by the researcher using observational checklists (Tool I) in which interventions were measured using a likert type scale of three points. A score for each item was assigned as follow: done correct & complete was scored as 2, done correct & incomplete was scored as 1 and done incorrect or not done was scored as zero.

The data regarding the factors hindering CCNS' compliance with evidence based guidelines for prevention of secondary brain injury were collected by the researcher using structured questionnaire during nurses' break time using Tool II. The researcher provided verbal explanation for the CCNS about the purposes of the study.

At first nurses demographic data were documented in the developed tool (Tool II) then nurses' related factors, organizational related factors and nature of research information related factors were recorded by CCNS using 5 point likert scale ranging from strongly disagree (1) to strongly agree (5).

Statistical Analysis

The raw data were coded and transformed into coding sheets. The results were checked. Then, the data were entered into the Statistical Package for Social

Sciences (SPSS) version 18 using personal computer. Output drafts were checked against the revised coded data for typing and spelling mistakes. Finally, analysis and interpretation of data were conducted. The following statistical measures were used:

- Descriptive statistics including frequency and distribution were used to describe different characteristics.
- Kolmogorov – Smirnov test was used to examine the normality of data distribution.

Results

Table (I): Demographic characteristics work related data of nursing staff working in the intended ICUs.

Socio-demographic and work related data	No. of nurses (n = 60)	%
Nurses' gender		
Male	15	25
Female	45	75
Nurses' age (in years)		
20-25 yrs.	27	45
>25-30 yrs.	19	31.7
> 30 yrs.	14	23.3
Level of education		
Technical school of nursing	13	21.7
Nursing Institute technician	12	20
Bachelor of Nursing	35	58.3
Nurses' experience in nursing field(in years)		
≤ 5 yrs.	21	35
5-10 yrs.	18	30
≥10 years.	21	35
Nurses' experience in ICU(in years)		
≤5 yrs.	32	53.33
5-10 yrs.	11	18.33
≥10 yrs.	17	28.33

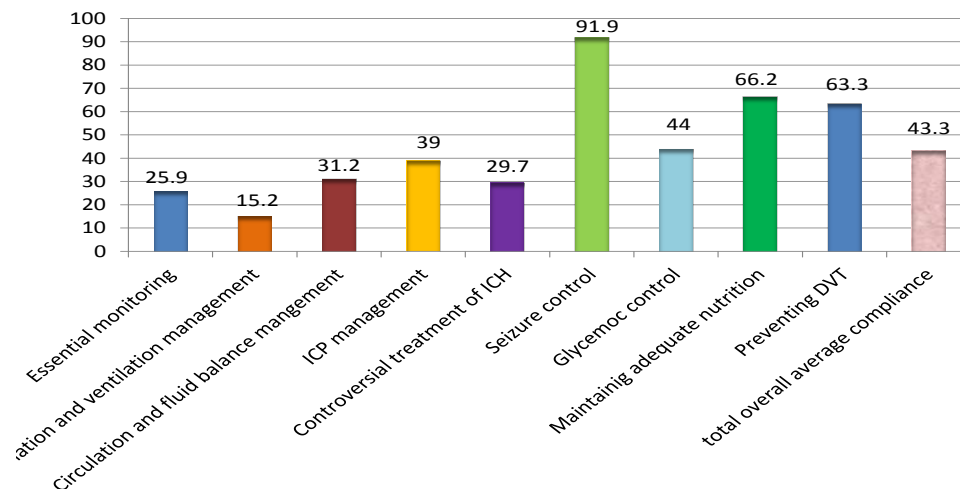


Figure (1): Nurses' compliance with evidence based guidelines recommendations for prevention of secondary brain injury.

Table (II-a): Relation between CCNs' compliance with secondary brain injury recommendations and studied nurses' age

Recommendations		CCNs' age						χ^2 p
		20-25 years		25-29 Years		More than 30 Years		
		No	%	No	%	No	%	
I- Essential monitoring	Done	118	23.4	108	29.8	68	25.2	4.50
	Not done	386	76.6	225	70.2	202	74.8	0.10
II- Oxygenation and ventilation management	Done	337	34.1	226	33.2	169	33.7	0.49
	Not done	630	65.9	454	66.8	332	66.3	0.78
III- Circulation and fluid balance management	Done	4	1.8	0	0	0	0	4.90
	Not done	213	98.2	152	100	112	100	0.08
IV- ICP management	Done	349	38.4	281	41.6	180	36.5	3.36
	Not done	559	61.6	394	58.4	313	63.5	0.18
V- Controversial treatment of refractory ICH	Done	86	28.8	67	30.6	49	30.4	0.25
	Not done	213	71.2	152	69.4	112	69.6	0.88
VI- Seizure control	Done	108	89.3	91	96.8	62	89.9	4.56
	Not done	13	10.7	3	3.2	7	10.1	0.10
VII- Glycemic control	Done	165	39.3	139	46.3	111	49.6	7.25
	Not done	255	60.7	161	53.7	113	50.4	0.06
VIII- Maintaining adequate nutrition	Done	295	76.6	220	77.5	144	69.9	4.30
	Not done	90	23.4	64	22.5	62	30.1	0.11
IX- Preventing DVT	Done	129	61.4	99	65.1	72	64.3	0.58
	Not done	81	38.6	53	34.9	40	35.7	0.74

χ^2 : Chi square test

*: Statistically significant at $p \leq 0.05$

Table (II-b): Relation between CCNs' compliance with secondary brain injury recommendations and studied nurses' level of education.

Recommendations		CCNs' level of education						χ^2 p
		Technical school of nursing		Nursing Institute technician		Bachelor of Nursing		
		No	%	No	%	No	%	
I- Essential monitoring	Done	76	27.4	56	23.6	162	24.9	3.73
	Not done	201	72.6	181	76.4	488	75.1	0.44
II- Oxygenation and ventilation management	Done	157	33.7	142	33.2	433	34.5	0.32
	Not done	309	66.3	286	66.8	821	65.5	0.98
III- Circulation and fluid balance management	Done	0	0	1	1	3	1	1.22
	Not done	104	100	96	99	304	99	0.87
IV- ICP management	Done	181	39.7	155	36.8	474	39.5	2.42
	Not done	275	60.3	266	63.2	725	60.5	0.65
V- Controversial treatment of refractory ICH	Done	53	33.7	34	26.2	110	28.4	2.68
	Not done	104	66.3	96	73.8	277	71.6	0.61
VI- Seizure control	Done	63	98.4	51	86.4	147	91.3	6.78
	Not done	1	1.6	8	13.6	14	8.7	0.14
VII- Glycemic control	Done	95	46.6	94	49	226	41.2	2.86
	Not done	109	53.4	98	51	322	58.8	0.07
VIII- Maintaining adequate nutrition	Done	135	73.4	139	79	385	74.7	5.22
	Not done	49	26.6	37	21	130	25.3	0.26
IX- Preventing DVT	Done	67	64.5	58	60.4	175	63.8	3.57
	Not done	37	35.5	38	39.6	99	36.2	0.46

χ^2 : Chi square test

*: Statistically significant at $p \leq 0.05$

Table (II-c): Relation between CCNs' compliance with secondary brain injury recommendation and studied nurses' experience in nursing field.

Recommendations		CCNs' Experience in nursing field						χ^2 p
		< 5 years		5-10 years		More than 10 years		
		No	%	No	%	No	%	
I- Essential monitoring	Done	99	24.6	90	27.5	105	25.7	0.79
	Not done	303	75.4	237	72.5	303	74.3	0.67
II- Oxygenation and ventilation management	Done	266	35.2	211	33	255	33.9	0.81
	Not done	489	64.8	429	67	498	66.1	0.66
III- Circulation and fluid balance management	Done	1	0.6	3	2.1	0	0	4.26
	Not done	168	99.4	141	97.9	168	100	0.11
IV- ICP management	Done	285	39.4	246	40	279	37.8	0.75
	Not done	438	60.6	369	60	459	62.2	0.68
V- Controversial treatment of refractory ICH	Done	68	28.8	52	26.9	82	32.8	1.93
	Not done	168	71.2	141	73.1	168	67.2	0.37
VI- Seizure control	Done	92	90.2	73	94.8	96	91.4	1.30
	Not done	10	9.8	4	5.2	9	8.6	0.52
VII- Glycemic control	Done	133	39.6	120	44.1	162	48.2	5.08
	Not done	203	60.4	152	55.9	174	51.8	0.07
VIII- Maintaining adequate nutrition	Done	235	76.8	202	77.1	222	72.3	2.29
	Not done	71	23.2	60	22.9	85	27.7	0.31
IX- Preventing DVT	Done	106	63.1	87	63	107	63.7	0.99
	Not done	62	36.9	51	37	61	36.3	0.06

χ^2 : Chi square test

*: Statistically significant at $p \leq 0.05$

Table (II-d): Relation between CCNs' compliance with secondary brain injury recommendations and studied nurses' ICU experience

Recommendations		CCNs' ICU Experience						χ^2 p
		< 5 years		5-10 years		More than 10 years		
		No	%	No	%	No	%	
I- Essential monitoring	Done	150	25.1	51	25	93	27.8	0.89
	Not done	448	74.9	153	75	242	72.2	0.63
II- Oxygenation and ventilation management	Done	395	34.5	131	33.2	206	33.8	0.22
	Not done	750	65.5	263	66.8	403	66.2	0.89
III- Circulation and fluid balance management	Done	4	1.6	0	0	0	0	3.51
	Not done	253	98.4	88	100	136	100	0.17
IV- ICP management	Done	438	40.3	150	38.4	222	37.2	1.61
	Not done	650	59.7	241	61.6	375	62.8	0.44
V- Controversial treatment of refractory ICH	Done	93	26.9	43	32.8	66	32.7	2.78
	Not done	253	73.1	88	67.2	136	67.3	0.24
VI- Seizure control	Done	133	91.1	46	92	82	93.2	0.32
	Not done	13	8.9	4	8	6	6.8	0.85
VII- Glycemic control	Done	201	40.2	80	46.5	134	49.3	6.43
	Not done	299	59.8	92	53.5	138	50.7	0.08
VIII- Maintaining adequate nutrition	Done	359	77	124	76.5	176	71.3	3.06
	Not done	107	23	38	23.5	71	28.7	0.21
IX- Preventing DVT	Done	161	64.4	54	61.4	85	62.5	0.31
	Not done	89	35.6	34	38.6	51	37.5	0.85

χ^2 : Chi square test

*: Statistically significant at $p \leq 0.05$

Table (III): CCNs ' self-reported factors hindering their compliance with evidence based guidelines for prevention of secondary brain injury

Hindering factors	Disagree		Neutral		Agree	
	No	%	No	%	No	%
Personal factors						
Too high workload to keep up to date.	9	15	6	10	45	75
Difficulty in judging the quality of the articles	10	16.7	11	18.3	39	65
Limited utility of evidence-based guidelines	10	16.7	19	31.7	31	51.6
Lack of computer skills	23	38.3	11	18.3	26	43.3
Lack of websites searching skills	23	38.3	11	18.3	26	43.3
Seeking information from a colleague	24	40	10	16.7	26	43.3
Using more traditional methods	30	50	6	10	24	40
Forgetfulness	30	50	11	18.3	19	31.6
Lack of interest	40	66.7	8	13.3	12	20
Nature of research information factors						
Continuous changing and updating	4	6.7	6	10	50	83.3
Not complied in one place	5	8.3	11	18.3	44	73.4
Too complicated	6	10	17	28.3	37	61.7
Inadequate to be applied into practice	8	13.3	16	26.7	36	60
Excessively statistical	9	15	16	26.7	35	58.3
Too scholarly and not applicable	6	10	22	36.7	32	53.3
Difficult research terms	18	30	12	20	30	50
Organizational factors						
Lack of time at work place to search for or read evidence based guidelines	1	1.7	1	1.7	58	96.6
Lack of a library or computers in the work place	1	1.7	2	3.3	57	95
Shortages of nursing staff	1	1.7	3	5	56	93.3
Unavailability of training programs	3	5	3	5	54	90
lack of evidence-based guidelines mentors	2	3.3	8	13.3	50	83.3
Insufficient resources	8	13.3	6	10	46	76.7
lack of nurse managers' support	9	15	8	13.3	43	71.7
Lack of authority	8	13.3	11	18.3	41	68.3

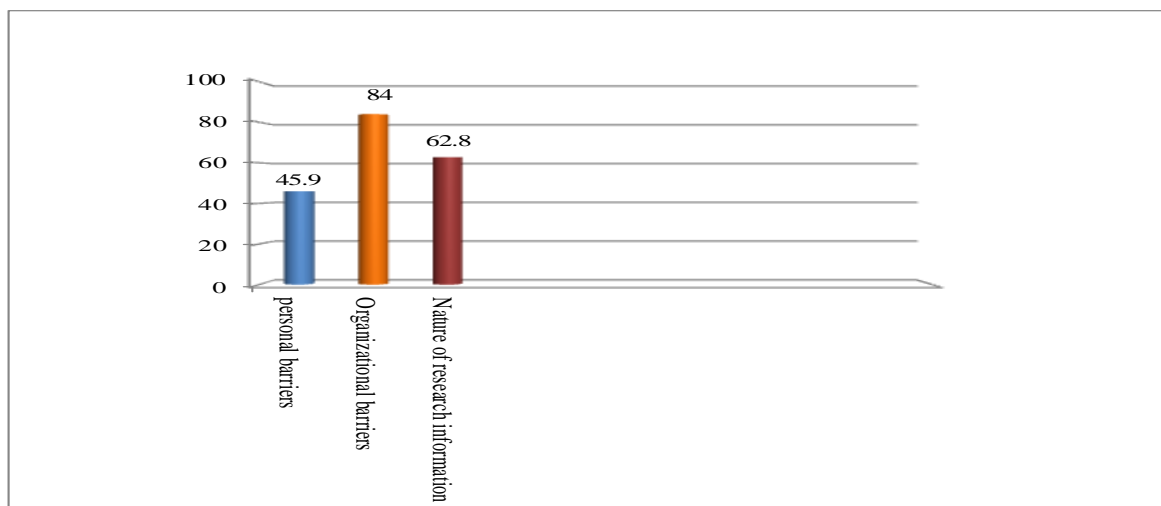
**Figure (2): distribution of barriers to CCNs compliance with secondary brain injury preventions guidelines.**

Table (I): Illustrates socio-demographic characteristics of nursing staff working in the intended ICUs. The total number of nursing staff who provide direct care for TBI patient in the intended ICUs was 60 nurses. Concerning nurses' gender, this table shows that three fourths of studied nurses (75%) were females. The age of the studied nurses ranged between 21 and 38 years with 45% of them had 25 years or less. Regarding the level of education, it can be noted from this table that more than one half of studied nurses (58.3%) holds a baccalaureate degree. As regards the studied nurses' years of experience in ICU, this table depicts that more than half of studied nurses (53.33) had experience less than or equal 5 years.

Figure (1): Shows nurses' compliance with evidence based guidelines recommendations for prevention of secondary brain injury. It can be noted from this figure that the lowest overall average compliance (15.2%) was for oxygenation and ventilation management recommendations followed by the overall compliance with essential monitoring recommendations and controversial treatment of ICH recommendations which represents 25.9% and 29.7% respectively. It can also be noted from this figure that the overall average compliance with seizure control recommendations was the highest (91.9%) among secondary brain injury prevention recommendations.

Table (II a-d): Reveal that there is no relation between CCNs' compliance with secondary brain injury recommendations and the characteristics of the studied nurses'

Table (III): Reveals that the most frequently reported three personal barriers were; too high nurses' workload to keep up to date with all new evidence (75%); difficulty in judging the quality of the research articles by the nurses (65%); and nurses' perception that evidence based guidelines have only limited utility (51.6%). It can be noted from this table that the most frequently (96.6%) reported organizational barrier by the CCNs was lack of time at workplace to search for or read research articles, followed by lack of a library or computers at the workplace which was reported by 95% of the studied nurses. Moreover, it can also be noted from the same table that the third organizational barrier reported by 93.3% of the studied nurses was shortages of nursing staff.

This table illustrates that continuous updating and changing of research information was the first reported barrier by the majority of the studied nurses (83.3%). It can also be noted from this table that near three quarters (73.4%) of the CCNs ranked research information not complied in one place as the second barriers. Additionally, this table also shows that the third barriers related to nature of research information

was that research information is too complicated, this barrier was reported by more than two thirds (61.7%) of the studied nurses.

Figure (2): shows distribution of barriers to CCNs compliance with secondary brain injury preventions guidelines. It can be detected from this figure that the organizational barriers were the most reported barriers by the majority of the CCNs (84%). While, less than one half of the CCNs (45.9%) reported that; personal barriers hindering their compliance with secondary brain injury preventions guidelines.

Discussion

Secondary brain injury is associated with a significant increase in morbidity, mortality, length of stay, medical cost, and it is the leading cause of in-hospital deaths after traumatic brain injury. Although the rates of secondary brain injury are high, they can be prevented and reduced as most secondary brain injuries are often the result of events that occur in the ICU (**Ladanyi, 2008**). Clinical practice guidelines for prevention of secondary brain injury help CCNs in decision making, improve standards of nursing care, and reduce inappropriate variations in care provided to TBI patients.

About three fourths of nurses in this study were females; middle aged less than thirty years old. The results revealed that more than a half of CCNs hold a baccalaureate degree while others have either diploma or technical degree (table I). It was recommended previously by both the Australian Health Advisory Committee and the Australian College of Critical Care Nurses that a minimum of 50% of nursing staff employed within in ICU should hold postgraduate qualification in their area of practices (**Morton, 2009**).

American Association of Neurological Surgeons Guidelines (2007), Brighton & Sussex University Hospitals guideline (2009) & Thompson guideline (2011) emphasized the role of the CCNs in the management of TBI patients and prevention of secondary brain injury through compliance with prevention of secondary brain injury guidelines that encompass compliance with recommendations for essential monitoring, oxygenation and ventilation management, circulation and fluid balance management, ICP management, controversial treatment of refractory ICH, seizure control, glycem control, maintaining adequate nutrition, and preventing DVT.

The overall level of CCNs' compliance with prevention of secondary brain injury guidelines in the present study was less than one half, which is considered low. Low level of CCNs' compliance with prevention of secondary brain injury guidelines may

be attributed to lack of formal standards and guidelines for prevention of secondary brain injury, lack of knowledge about poor patients' outcome associated with secondary brain injury as a result of lack of in service training programs in the intended ICUs. It may be also attributed to lack of nurses' technical skills, lack of nurses' experience, lack of educational opportunities available for CCNs including up-to-date scientific journals and books, scientific meetings, and expert nurses' supervisors for help and guidance. (Selassie, 2008) & (Hesdorffer 2007).

It was found in previous study that the overall level of CCNs' compliance with prevention of secondary brain injury guidelines was less than one half, which is considered low Thompson (2011). Causer (2011), McNett (2010) & Holleman (2006) emphasized the role of the CCNs in the management of TBI patients and prevention of secondary brain injury through compliance with prevention of secondary brain injury guidelines that encompass compliance with recommendations for essential monitoring, oxygenation and ventilation management, circulation and fluid balance management, ICP management, controversial treatment of refractory ICH, seizure control, glycemic control, maintaining adequate nutrition, and preventing DVT. Therefore, the current study was conducted to identify obstructive barriers for their compliance with these guidelines.

The findings of the present study are higher than reported by McNett (2010). Who found that the percentage of the nurses' compliance with prevention of secondary brain injury guidelines was nearly less than one third and higher than this percentages reported by Hesdorffer (2002) who found that the overall level of compliance of 433 participating trauma centers admitted patients with severe TBI to their hospital in-patient units was slightly more than one third. In contrast, the percentage in the present study is lower than those reported by Wang (2013), Selassie (2008) & Damkliang, (2013) who conducted a prospective observational study to compare Thai emergency nurses' clinical management of patients with severe TBI with best available evidence. They reported that the overall compliance of the CCNs was approximately two thirds. Similarly, Hesdorffer, (2007) found that the overall level of compliance of 413 trauma centers in the United States was more than two thirds.

It was found that the top 3 personal barriers indicated by the respondents are: too high workload to keep up to date with all new evidence, difficulty in judging the quality of articles, and feeling that evidence based guidelines has only limited utility (table II). Concerning too high workload to keep up to date

with all new evidence, it was reported by approximately three quarters of the CCNs and it is the most frequent reported personal barrier. This finding is supported by McCaughan, (2002) it was found that high nurses' workload is a great barrier blocks on research use. Lower percentage reported by Majid, (2011) it was cited that approximately one fifth of the nurses reported their high workload as a personal barrier that prevents them from being up to date with the new evidence.

Regarding difficulty in judging the quality of articles, the present study revealed that more than two thirds of the subjects reported their inability to judge the quality of articles. In accordance to that, Glacken, (2004) it was cited that approximately three quarters of the nurses do not feel capable of evaluating the quality of the research. In contrast, Tan, (2012) it was concluded that only less than one fifth of the study subjects do not feel capable of evaluating the quality of the research.

Additionally, the present study revealed that more than one half of the CCNs believe that evidence based guidelines has only limited utility. This finding is similar to, Oh, (2008) who reported that more than one half of the CCNs feel the benefits of changing practice will be minimal. On the contrary, the result of the current study is dissimilar to Majid, (2011) who cited that less than one quarter of the CCN 's believe that evidence based guidelines has only limited utility.

The finding of this study regarding personal barriers may be attributed to poor time management, lack of knowledge regarding the importance of translating evidence based guidelines into practice, and poor critical thinking. These are also may be related to another barrier which is shortage of staff nurses that hinder the implementation of new evidences.

The current study recorded that the top 3 organizational barriers indicated by the respondents are lack of time at work place to search for or read evidence based guidelines, lack of a library or computers in the work place, and inadequate nursing staff (table II). It was found that lack of time at work place to search for or read evidence based guidelines is the most frequent reported organizational barrier by the majority of the CCNs. This result is in the same line with Mehrdad, (2008) who found that lack of time at work place to or read research was the most frequent reported barrier to research utilization by the majority of the Iranian nurses. In the contrary to the finding of Chan, (2011) who cited that only one third of the emergency nurses reported the lack of time to read research at the work place as an organizational barrier.

As regards lack of library or internet access in the work place, Our finding is supported by

Al- Ghabeesh (2014) it was found that unavailability of internet access in the unit where the nurses work is a major organizational barrier reported by the majority of the study subjects. The present study ranked lack of nursing staff as the third organizational barrier reported by more than ninety percent of the study subjects. This finding is in line with **Al- Ghabeesh (2014)** who ranked shortage of staff nurses as fifth organizational barrier that reported by the majority of nurses in Jordan. In contrast, the percentage in the present study is higher than those reported by two previous studies **Gale (2009)** in United States and **Tsai (2000)** in China found that lack of staff reported as an organizational barrier by slightly more than one half of the nurses.

The findings of this study can be explained as the sitting in the current study has limited financial and human resources. First, the limitation of the financial resources lead to absence of financial support to fund accessing full-text articles or even a library containing up to dates textbooks. Second, the shortage of the staff members may limit nursing staff time to read research findings.

The present study revealed that the top 3 barriers related to nature of research information reported by the CCNs were: always updated and changed, not complied in one place, and too complicated and overwhelming. The current study revealed that approximately three quarters of the respondents cited that research information is not complied in one place. This finding is consistent to **Uysal (2010)** it found that more than three quarters of the nurses accepted that research information is not complied in one place as a barrier to research utilization. But, in opposition to **Tan (2012)** who cited that only less than one quarter of nurses in Eastern Turkey reported it as a barrier to their research utilization.

The third barrier related to nature of research information is that the research information is too complicated and overwhelming. It was cited by about two thirds of the study subjects. Near percentage was reported by **Uysal (2010)** who concluded that more than one half of the nurses reported that the amount of research information is overwhelming. In contrast, **Chan (2011)** cited that only one third of emergency nurses considered the research information is too complicated and overwhelming.

The finding of this study can be explained by lack of research knowledge among the CCNs in the intended ICUs and that their years of work and experience were without any evidence of participation in research activities or training programs concerning with translating evidence based guidelines into practice. In addition, the inclusion of old nurses who did not receive research courses during their education.

Conclusion

It can be concluded that the majority of the highly ranked barriers to studied nurses' compliance with these guidelines are categorized as organizational barriers, followed by nature of research information barriers, then personal barriers. The greatest perceived barriers by CCNs are lack of time at work place to read research, absence of a library or computer at the work place, and shortages of nursing staff.

Recommendations

Based on the results of the present study, the following recommendations are suggested:

Recommendations regarding clinical practice

- Nursing management protocol for TBI should be applied in clinical practice as a routine of unit care.
- Strategies for updating nurses' knowledge and enhancing their practice should be developed.
- Strategies to overcome nursing shortage and increased nursing workload including part time, partial shifts, and other strategies should be developed.
- Evidence-based strategies to facilitate nurses' adherence to evidence based guidelines including using checklists should be implemented.

Recommendations regarding education & training

- Nursing students' curriculum should be focused on the vital role of the nurses who caring for TBI patients in the prevention of secondary brain injury using the best available evidence based guidelines.
- The teaching and training programs about secondary brain injury prevention guidelines should be performed through workshop, seminars, conferences, group discussion, up to date scientific journals, books, and posters.

Recommendations regarding administration

- Hospital budget should be directed to provide the needed equipment and supplies for application of secondary brain injury prevention guidelines.
- Administrators should check regularly the adherence of CCNs regarding implementation of the secondary brain injury prevention guidelines.
- Evidence based guidelines mentors should be present in health-care systems

Recommendations regarding research

- Further studies are needed to evaluate the cost effectiveness of implementation of secondary brain injury prevention guidelines.
- Studies with large sample size are needed to test the effect of implementing secondary brain injury prevention guidelines.
- Further researches are recommended to evaluate which teaching method and curriculum content are most effective to educate nurses caring for TBI

patients and to identify barriers to incorporating this knowledge in practice.

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