

**Barriers and facilitators to research utilization in critical care settings****<sup>1</sup>Anas Ezz, <sup>2</sup>Eman Mohamed Zahran, and <sup>2\*</sup>Azza Hamdi El-Soussi**<sup>1</sup>Ministry of health, Syrian Arab Republic.<sup>2</sup>Emergency and Critical Care Nursing Dept., Faculty of Nursing, University of Alexandria, Egypt  
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**Abstract:** Basing critical care nursing practice on best research evidence is a key issue for the high standard quality care in critical care settings. However, it has been identified that there is a research -practice gap. Thus, the current study aims to identify barriers and facilitators to research utilization (RU) in critical care settings as perceived by the critical care nurses. This study was conducted at eight intensive care units (ICUs), Main University Hospital, University of Alexandria. Two hundred nurses who were working in these ICUs over the period from 6/ 12/ 2009 to 10/ 1/ 2010 were included in the study. Barriers and facilitators to research utilization questionnaire was used to identify barriers and facilitators to RU in critical care settings. Study findings shows that RU is challenged in critical care setting by several barriers. A number of facilitators to RU are suggested by the research findings to overcome these barriers. RU is affected by several factors, such as; nurses' age, experience, residence, and level of English language. Therefore, improving nurses' research related knowledge and skills, and adequate organizational support from the critical care setting to RU are the main to strategies recommended to overcome barriers to RU in ICUs. [Anas Ezz, Eman Mohamed Zahran, and Azza Hamdi El-Soussi. Barriers and facilitators to research utilization in critical care settings. Journal of American Science 2011; 7(7):145-154].(ISSN: 1545-1003).

<http://www.americanscience.org>.**Keywords:** Barriers and facilitators to research utilization, critical care practice, critical care nursing**1. Introduction:**

In critical care practice, where patient's conditions are sophisticated, and are at risk of serious complications and mortality, demonstrating advanced, safe, and effective care is especially important. Thus, interventions based on best research evidence are key issues for critical care nurses <sup>(1)</sup>. RU is the most important piece of the research process. Without such utilization, the research process is simply an exercise in academics. RU is defined as the actual systematic implementation of a scientifically sound, research-based innovation in a setting with an accompanying process to assess the outcomes of change <sup>(2)</sup>. Currently, the number of critical care nursing related researches grows obviously, however, translating research findings into clinical practice still in its infantile stage and ensuring that they are implemented and sustained remains a challenge <sup>(3)</sup>. Research-practice gap phenomenon is not limited to Egypt; it is known as a worldwide phenomenon <sup>(4,5)</sup>. Research-practice gap is attributed to a number of barriers. Funk *et al.*, <sup>(6)</sup> used Rogers' Diffusion of Innovations model for the development of the structure of tool to assess barriers to RU, called BARRIERS to RU Scale. They correlated the elements of the diffusion model into the structure of the BARRIERS scale, resulting in four major Factors; the adopter, nurse; the organization, setting; the innovation, qualities of the research; and communication, the presentation and/or accessibility of the research <sup>(6)</sup>

The four interactive factors influencing RU constitute the theoretical framework of the current study, in which barriers and facilitators to RU were categorized according to it. In the current study, the nurse concept in this framework represents the critical care nurse. Setting represents the critical care settings in which nursing activities occur, a specific social system. Setting embodies the processes, relationships, and structures that are contained within an organization. Research signifies innovation. The concept of research in this study encompasses characteristics such as the context in which research is used, the user of the research, the quality of the research itself, and the presentation of the research. These qualities about research may impede nurses from understanding and using research or not. Finally, communication of the research is the process by which participants create and share information with one another in order to reach a mutual understanding <sup>(7)</sup>. It refers to diffusion of the new research related findings from the researcher to the practitioner who then decides to adopt or reject the new idea <sup>(8)</sup>.

Identifying barriers and facilitators to RU in critical care practice is commonly recommended to bridge the gap between research and practice. In Egypt, little is known about nurses' perceptions regarding barriers and facilitators to RU in critical care settings. This research was conducted to study nurses' perception towards barriers and facilitators to RU in clinical settings. This study included only nurses who have a bachelor degree. In addition, it did

not specify what barriers and facilitators to RU were found in critical care settings<sup>(9)</sup>. Therefore, this study aims to identify barriers and facilitators to RU as perceived by critical care nurses.

## 2. Materials and Methods:

**Research design:** descriptive study design.

**Study aim:** to identify barriers and facilitators to RU in critical care settings as perceived by the critical care nurses.

### Research questions:

What are barriers to RU in critical care settings, as perceived by critical care nurses?

What are facilitators to RU in critical care settings, as perceived by critical care nurses?

### Materials

**Setting:** This study was conducted in the intensive care units (ICUs) at the Alexandria Main University Hospital, in Alexandria University which includes; Casualty care unit (unit I), General (unit III), Triage, Post-operative Cardiothoracic, Chest, Post neurosurgery, Coronary, and Anesthesia intensive care units (ICUs).

**Subjects:** Two hundred nurses representing all nurses who were working in the previously mentioned ICUs, over the period from 6/ 12/ 2009 to 10/ 1/ 2010, were included in the current study.

**Tool: Barriers and facilitators to research utilization questionnaire:** it was developed by the researchers based on Funk *et al.*, tool<sup>(6,10,11)</sup> after reviewing the related literature<sup>(12,13)</sup>. It was used to identify barriers and facilitators to RU in critical care settings, as perceived by the critical care nurses. It includes two parts; Part (I) involves nurses' related characteristics such as; nurses' age, experience, and education. Part (II) consists of two sections; one of them is for barriers (35 statements) and the other is for facilitators (26 statements) to RU. Each barrier or facilitator statement included in these sections was measured on a five point Likert scale representing the extent to which the item is a barrier or a facilitator to RU (1 = to no extent, 2 = to a little extent, 3 = to a moderate extent, 4 = to a great extent).

Barriers and facilitators included in each section are classified into the main four categories; nurse, setting, research, and communication related barriers and facilitators. Nurses related barriers/facilitators involve items regarding capability of evaluating the research, appreciating needs to research for change practice, willing to change new ideas, awareness of the value of research for practice ..... etc. Setting related items covers topics

such as, availability of researches, facilities, and time and motivation offered by the organization..... etc. The quality of the research includes items reflecting the strength or weaknesses and applicability of available researches. Communication items focus on the understandability of statistical analyses, clarity of implications for practice, clarity and readiness of the research, availability of research reports/articles readiness, and language of research ....etc.

### Method:

An official letter was directed from the Faculty of Nursing, Alexandria University to the hospital administrative authorities in order to obtain their acceptance to collect necessary data from the selected settings. Then, the permission was obtained from the hospital administrative authority The study tool was developed based on Funk *et al.* (1991) tool<sup>(6,10,11)</sup> after reviewing the related literature<sup>(12,13)</sup> and translated into Arabic by the researcher. A pilot study was carried out on 10 nurses who were selected to evaluate the clarity and applicability of the research tool. They were excluded from the total sample, and necessary modifications were done based on their responses. Validation of the tool was assessed by presenting it to five experts from the critical nursing field. Internal consistency reliability (coefficient alpha) was applied ( = 0.82).

Informed consent was obtained from each nurse included in the study. The anonymity and confidentiality of responses, voluntary participation and right to refuse to participate in the study were emphasized. The researcher explained to the nurses the objectives of the study orally, in addition, to the written explanations on the covering letter of the questionnaire. The questionnaire was distributed. Nurses were informed to answer it and to bring it back to the administrative office of their respective department. Data were collected by the researcher during the period from: 6 /12 /2009 to 10 /1 /2010. Barriers and facilitators to RU as perceived by critical care nurses were identified using the study tool.

### Statistical analysis:

Data were analyzed using Statistical Package for Social Sciences (SPSS) Software Package Version 18.0 (SPSS, Chicago, IL, USA). Quantitative data were expressed using range, mean and standard deviation, while qualitative data was expressed in frequency and percent. Quantitative data was analyzed using student t-test to compare between two categories while F-test (ANOVA) was used to compare three categories or more. P value was assumed to be significant at 0.05

### 3. Results

Table (I) shows the distribution of the studied nurses according to their characteristics. In relation to studied nurse's age, more than half of studied nurses (62.5%) are between 21 to 30 years old. Ninety-one percent of the studied nurses are living in the city. As

regards the educational level, more than half of the studied nurses (57.5%) are graduated from the faculty of nursing, and 63.5% of the studied nurses are average in English language level. It is found that more than two thirds of the studied nurses (67.5%) have an experience of less than 10 years in ICU.

**Table (I): Distribution of the studied nurses according to their characteristics.**

Demographic characteristics		Studied nurses	
		No. (200)	%
Age / years	> 18- < 20	18	9.0
	21 – 30	125	62.5
	31 – 40	33	16.5
	> 41	24	12.0
Place of residence	City	182	91.0
	Countryside	18	9.0
Education level	Secondary nursing school	68	34.0
	Technical nursing institute	13	6.5
	Faculty of nursing	114	57.5
	Post graduate	5	2.5
English language level	Don't speak	14	7.0
	Weak	20	10.0
	Average	127	63.5
	Excellent	39	19.5
Duration of experience in ICU /years	No experience	5	2.5
	10	135	67.5
	11-20	43	21.5
	>20	17	8.5

Table (II) demonstrates distribution of studied nurses according to barriers and facilitators to RU. It reveals that the highest barriers scores is related to the setting barriers with mean percent = 79.56% (Mean  $35.80 \pm 6.89$ ), while the highest facilitators score are in communication and accessibility of the research with mean percent = 81.66% (Mean  $28.58 \pm 4.97$ ). Studied nurses have a total mean percentage for the barriers equal 76.69% (Mean  $130.38 \pm 21.36$ ), while for the facilitators are 61.37% (Mean  $104.33 \pm 16.15$ ).

Table (III) shows the relationship between age and barriers/facilitators to RU. It illustrates that there is no statistical significant difference between age and barriers/facilitators to RU, except for setting and communication and accessibility related facilitators.

**Table (II): Distribution of the studied nurses according to barriers and facilitators to RU.**

Factor characteristics	Barriers			Facilitators		
	Mean $\pm$ SD	Mean (%)	Maxi Score	Mean $\pm$ SD	Mean (%)	Maxi Score
Nurses	$29.87 \pm 6.73$	74.68	40	$23.78 \pm 4.56$	79.27	30
Setting	$35.80 \pm 6.89$	79.56	45	$16.09 \pm 3.25$	80.45	20
Quality of research	$34.11 \pm 5.92$	75.80	45	$35.89 \pm 5.77$	79.76	45
Communication & accessibility of research	$30.60 \pm 5.39$	76.50	40	$28.58 \pm 4.97$	81.66	35
<b>Total</b>	<b><math>130.38 \pm 21.36</math></b>	<b>76.69</b>	<b>170</b>	<b><math>104.33 \pm 16.15</math></b>	<b>80.25</b>	<b>130</b>

The studied nurses who are less than 20 years have facilitators more than other age groups (Mean  $17.89 \pm 1.81$  years). Communication and accessibility of research regarding the studied nurses who are less than 20 years have facilitators more than other age groups (Mean  $31.50 \pm 2.98$  years).

Table (IV) shows the relationship between place of residence and barriers / facilitators to RU. It is found that nurses who live in countryside have statistically significant barriers more than whom live in the city. Barriers related to nurses and setting are statistically significant higher in nurses who live in countryside (Mean  $33.50 \pm 3.97$ ), (Mean  $38.44 \pm 3.31$ ) than who live in city (Mean  $29.51 \pm 6.85$ ), (Mean  $35.54 \pm 7.10$ ) respectively.

**Table (III): Relationship between nurses' age and barriers / facilitators to RU.**

Factor characteristics		Age					Test of significant F (p)
		Less than 20 years	20 – 30 years	31 – 40 years	41 – 50 years	More than 50 years	
Nurses	Barriers	27.83 ± 6.03	30.16 ± 6.81	31.85 ± 4.21	27.06 ± 9.16	27.43 ± 7.48	2.208 (0.070)
	Facilitators	25.67 ± 1.68	23.39 ± 4.84	24.48 ± 1.99	22.94 ± 7.58	24.43 ± 1.72	1.384 (0.241)
Setting	Barriers	33.83 ± 8.33	35.78 ± 6.34	37.36 ± 6.87	35.65 ± 7.53	34.14 ± 10.76	0.893 (0.469)
	Facilitators	17.89 ± 1.81	15.83 ± 3.33	16.61 ± 3.07	14.71 ± 3.90	16.86 ± 1.46	2.751* (0.029)
Quality of research	Barriers	33.33 ± 7.10	34.34 ± 5.86	34.61 ± 6.22	31.94 ± 5.27	35.00 ± 3.51	0.787 (0.535)
	Facilitators	38.44 ± 2.20	35.28 ± 6.15	36.45 ± 4.67	35.65 ± 7.56	38.00 ± 1.91	1.571 (0.184)
Communication & accessibility of research	Barriers	30.06 ± 8.23	30.68 ± 4.89	31.06 ± 4.35	29.65 ± 7.76	30.71 ± 3.40	0.243 (0.914)
	Facilitators	31.50 ± 2.98	27.96 ± 5.02	28.52 ± 5.17	29.41 ± 5.71	30.43 ± 2.64	2.468* (0.046)
Total	Barriers	125.06 ± 27.97	130.96 ± 20.19	134.88 ± 17.75	124.29 ± 27.86	127.29 ± 20.61	1.051 (0.382)
	Facilitators	113.50 ± 5.75	102.46 ± 17.00	106.06 ± 13.21	102.71 ± 21.85	109.71 ± 4.57	2.257 (0.064)

F: F test (ANOVA), \*: Statistically significant at p = 0.05

**Table (IV): Relationship between place of nurses' residence and barriers/facilitators to RU.**

Factor characteristics		Place of residence		Test of significance t (p)
		City	Countryside	
Nurses	Barrier	29.51 ± 6.85	33.50 ± 3.97	3.744* (0.001)
	Facilitators	23.73 ± 4.60	24.28 ± 4.20	0.490 (0.625)
Setting	Barrier	35.54 ± 7.10	38.44 ± 3.31	3.087* (0.004)
	Facilitators	16.03 ± 3.38	16.67 ± 1.28	1.628 (0.110)
Qualities of research	Barrier	33.97 ± 6.07	35.56 ± 3.97	1.529 (0.139)
	Facilitators	35.82 ± 5.96	36.56 ± 3.24	0.516 (0.606)
Communication and accessibility of research	Barrier	30.54 ± 5.53	31.17 ± 3.84	0.466 (0.641)
	Facilitators	28.43 ± 5.14	30.06 ± 2.36	1.322 (0.188)
Total	Barrier	129.56 ± 21.90	138.67 ± 12.46	2.713* (0.011)
	Facilitators	104.00 ± 16.63	107.56 ± 9.81	0.889 (0.375)

t: Student t-test \*: Statistically significant at p = 0.05

**Table (V)** presents the relationship between nurses' educational levels and barriers/ facilitators to RU. It shows that there is no statistical significant difference between educational level and barriers / facilitators to RU, except for nurses & setting related barriers. There are statistical significant difference between

education and barriers to RU, in which nurses graduated from health institute have higher nurses and setting related barriers (Mean 33.62±2.47) and (Mean 37.08±4.37) than others.

**Table (V): Relationship between nurses' educational level and barriers/facilitators to RU in ICUs.**

Factor characteristics		Level of Education				Test of significance F (p)
		Diploma	Health institute	Bachelors Degree	Post graduate	
Nurses	Barriers	28.24 ± 7.30	33.62 ± 2.47	30.49 ± 6.51	28.20 ± 6.26	3.210* (0.024)
	Facilitators	23.41 ± 4.99	24.85 ± 3.26	23.89 ± 4.52	23.40 ± 1.14	0.413 (0.744)
Setting	Barriers	34.46 ± 6.97	37.08 ± 4.37	36.75 ± 6.68	29.00 ± 10.56	3.488* (0.017)
	Facilitators	16.38 ± 3.33	15.92 ± 3.73	15.95 ± 3.11	15.60 ± 4.51	0.303 (0.823)
Qualities of research	Barriers	32.97 ± 6.17	33.77 ± 4.95	34.77 ± 5.88	35.40 ± 4.39	1.416 (0.239)
	Facilitators	35.69 ± 5.99	36.69 ± 4.33	35.87 ± 5.90	36.80 ± 3.35	0.151 (0.929)
Communication and accessibility of research	Barriers	30.15 ± 6.01	31.15 ± 4.38	30.85 ± 5.21	29.60 ± 3.29	0.342 (0.795)
	Facilitators	28.96 ± 4.46	27.77 ± 6.14	28.34 ± 5.21	31.00 ± 2.00	0.723 (0.539)
Total	Barriers	125.81 ± 23.35	135.62 ± 10.87	132.87 ± 20.60	122.20 ± 23.09	2.092 (0.103)
	Facilitators	104.44 ± 16.49	105.23 ± 15.55	104.04 ± 16.42	106.80 ± 7.85	0.065 (0.979)

F: F test (ANOVA) \*: Statistically significant at p = 0.05.

Table (VI) shows the relationship between level of English language and barriers /facilitators to RU. There are statistically significant differences between level of English language and barriers,

except for the qualities of research related barriers. In addition, there is no statistical significant difference between English language and facilitators, except the qualities of research related facilitators.

**Table (VI): Relationship between nurses' English language level and barriers/facilitators to RU in ICUs**

Factor characteristics		Level of English language				Test of significance
		Do not speak	Weak	Average	Excellent	F (p)
Nurses	Barriers	29.21 ± 5.85	26.30 ± 9.31	30.72 ± 60.10	29.18 ± 7.00	2.802* (0.041)
	Facilitators	24.57 ± 1.95	22.00 ± 6.40	24.08 ± 4.16	23.41 ± 5.21	1.434 (0.234)
Setting	Barriers	33.71 ± 7.60	32.85 ± 10.05	36.72 ± 5.32	35.08 ± 8.66	2.602* (0.053)
	Facilitators	17.71 ± 1.82	15.40 ± 3.47	16.06 ± 3.28	15.92 ± 3.35	1.518 (0.211)
Qualities of research	Barriers	35.29 ± 5.73	32.80 ± 6.83	34.43 ± 5.50	33.31 ± 6.81	0.873 (0.456)
	Facilitators	37.93 ± 4.43	32.25 ± 6.94	35.99 ± 5.16	36.67 ± 6.77	3.625* (0.014)
Communication and accessibility of research	Barriers	30.79 ± 4.81	27.45 ± 8.94	31.39 ± 4.54	29.56 ± 5.26	3.835* (0.011)
	Facilitators	30.50 ± 2.82	29.80 ± 4.53	27.91 ± 5.27	29.44 ± 4.48	2.284 (0.080)
Total	Barriers	<b>129.00 ± 18.30</b>	<b>119.40 ± 33.14</b>	<b>133.26 ± 17.14</b>	<b>127.13 ± 25.50</b>	<b>2.934* (0.035)</b>
	Facilitators	<b>110.71 ± 9.06</b>	<b>99.45 ± 19.71</b>	<b>104.05 ± 15.83</b>	<b>105.44 ± 16.81</b>	<b>1.422 (0.238)</b>

F: F test (ANOVA) \*: Statistically significant at p = 0.05

Table (VII) the relationship between nurse's experience in ICUs and barriers / facilitators to RU. It shows that there is no statistical significant difference

between nurse's experience in ICUs and barriers to RU, except quality of research related barriers. There are nurses no experience have higher barriers (Mean and SD =38.00 ± 3.46) than others.

**Table (VII): Relationship between nurse's experience and barriers /facilitators to RU in ICUs**

Factor characteristics		Nurse's experience in ICUs / years				Test of significant
		No experience	10	>10 - 20	>20	F (p)
Nurses	Barriers	29.20 ± 1.79	30.38 ± 7.23	28.72 ± 5.69	28.94 ± 5.78	2.320 (0.058)
	Facilitators	25.40 ± 1.82	23.21 ± 5.26	24.70 ± 1.28	25.41 ± 3.62	1.304 (0.270)
Setting	Barriers	37.20 ± 2.95	36.16 ± 6.28	34.42 ± 8.43	36.00 ± 8.06	0.772 (0.511)
	Facilitators	17.00 ± 1.87	15.88 ± 3.58	16.47 ± 2.63	16.47 ± 1.91	0.582 (0.628)
Quality of research	Barriers	38.00 ± 3.46	34.53 ± 5.79	31.88 ± 6.85	35.24 ± 2.93	3.288* (0.022)
	Facilitators	37.60 ± 1.67	35.59 ± 6.43	36.40 ± 4.26	36.47 ± 4.02	0.436 (0.728)
Communication and accessibility of research	Barriers	33.60 ± 5.22	30.81 ± 5.68	29.14 ± 4.77	31.71 ± 3.80	1.903 (0.130)
	Facilitators	28.20 ± 4.15	28.33 ± 5.29	28.91 ± 4.31	29.82 ± 4.17	0.533 (0.660)
Total	Barriers	<b>138.00 ± 8.92</b>	<b>131.89 ± 21.54</b>	<b>124.16 ± 22.95</b>	<b>131.88 ± 15.64</b>	<b>1.696 (0.169)</b>
	Facilitators	<b>108.20 ± 4.21</b>	<b>103.01 ± 18.30</b>	<b>106.47 ± 10.20</b>	<b>108.18 ± 10.65</b>	<b>0.966 (0.410)</b>

F: F test (ANOVA) \*: Statistically significant at p = 0.05

Table (VIII) shows the top ten barriers to RU. It demonstrates that most of barriers are related to the setting. In addition, the highest barrier is "administration will not allow implementation and members of the staff are not supportive of implementation in setting related barriers with mean percent equal 82.70%, 82.20 %. While the lowest barriers were the research is not reported clearly and readably with mean percent equal 79.70%.

F C: Factor characteristics, N:Nurse, S:Setting, Q:Quality of research, C:Communication & accessibility of research.

Table (IX) shows the top ten facilitators to RU. It illustrates that the highest values are presented for strengthening higher education and increasing the base to knowledge research in communication and accessibility of research related facilitators with mean percent equal 82.90%. While the lowest values are strengthening of administrative support and encouragement for the use of scientific research in nurses related factor with mean percent equal 80.90%.

**Table (VIII): Top ten barriers to RU in ICUs:**

Rank	F C	Top ten Barriers	Mean $\pm$ SD	Mean (%)
1	S	Administration will not allow implementation	4.14 $\pm$ 0.96	82.70
2	S	Other staff are not supportive of implementation	4.11 $\pm$ 1.06	82.20
3	S	Does not have support from immediate superiors in the work	3.90 $\pm$ 1.03	82.20
4	S	There is insufficient time to read research and implement new ideas	4.03 $\pm$ 1.04	80.50
5	S	Lack of financial incentives for the application of scientific research	4.09 $\pm$ 0.94	80.50
6	S	Physicians will not cooperate with implementation	4.02 $\pm$ 0.95	80.40
7	Q	The conclusions drawn from the research are not justified	3.82 $\pm$ 0.93	80.40
8	Q	The literature reports conflicting results	3.90 $\pm$ 0.92	80.30
9	N	The nurse is isolated from knowledgeable colleagues with whom to discuss research	3.99 $\pm$ 1.09	79.80
10	C	The research is not reported clearly and readably	3.99 $\pm$ 0.92	79.70

F C: Factor characteristics, N:Nurse, S:Setting, Q:Quality of research, C:Communication & accessibility of research.

**Table (IX): Top ten facilitators to RU in ICUs.**

Rank	F C	Facilitators	Mean $\pm$ SD	Mean (%)
1	C	Increase the base to knowledge research	4.15 $\pm$ 0.80	82.90
2	C	Translating articles and scientific research of the Arabic language easy to read and benefit from the results	4.14 $\pm$ 0.83	82.70
3	C	Sessions to increase awareness of nurses to research methods	4.13 $\pm$ 0.84	82.60
4	S	Provide incentives for creativity and new ideas based on scientific research	4.11 $\pm$ 0.90	82.10
5	S	Translations of articles and research findings to read and study	4.09 $\pm$ 0.87	81.80
6	C	To hold regular meetings where the exposure of nursing research and utilization of the results	4.07 $\pm$ 0.98	81.40
7	C	Providing workplace libraries containing the most important research in nursing to develop skills	4.06 $\pm$ 1.04	81.20
8	N	Encourage the medical team to apply the results of scientific research	4.06 $\pm$ 0.98	81.20
9	Q	Justify the conclusions in the end of the search in an appropriate manner and understandable	4.06 $\pm$ 0.83	81.10
10	Q	Strengthening of administrative support and encouragement for the use of scientific research	4.05 $\pm$ 0.74	80.90

F C: Factor characteristics, N: Nurse, S: Setting, Q: Quality of research, C: Communication and accessibility of research.

#### 4. Discussion:

In order to keep nursing professional skills and competencies up to date, critical care nurses are required to follow the latest research evidence and apply the knowledge generated to develop their own work. A strategy commonly recommended for bridging the gap between research and practice is to identify barriers to RU and identify strategies that account for barriers<sup>(14)</sup>. Therefore, this study was conducted to assess barriers and facilitators to RU as perceived by the critical care units' nurses.

The study results discussed in the following section are composed of the detected top barriers and facilitators to RU in ICUs and their relationships with nurses' socio-demographic characteristics as perceived by critical care nurses.

Regarding barriers and facilitators to RU, it was found that critical care nurses perceived that they are challenged by a large number of barriers to RU in critical care settings which in turn needs a lot of facilitators to overcome. This may be because the culture of integrating research evidence into the

clinical practice in our hospitals is at the infancy stage, and actually most of nursing practices are based on their experiences and not on research findings. On the other hand, Oh's study<sup>(1)</sup> in Korea found that nurses perceived that there are few barriers to RU. This might be because nurses in Korea have more positive culture towards RU and their hospitals have facilities that support the integration of nursing research into practice, evaluate them within the real clinical environment, provide nurses with the consultation and support regarding research methods and statistics, and set guidelines to follow in clinical areas. Consequently, the great support to RU in health care settings, where Oh's study was conducted, resulted in few barriers to RU.

Regarding the top ten barriers to RU, it was found that the first six barriers are related to the setting. These results are in line with a study conducted in Egypt which it was found that setting related barriers were ranked as the top barriers to RU<sup>(9)</sup>. Furthermore, Yava *et al.*,<sup>(15)</sup> Fink *et al.*,<sup>(16)</sup> and Glacken and Chaney,<sup>(17)</sup> reported the same results in

which nurses perceived setting related barriers as the highest cited barriers to RU. Among setting related barriers that come at the top ranking are; the administration do not allow the implementation of research findings, health team members are not supportive and cooperative to nurses to implement research results, nurses have no support from immediate superiors, time is insufficient to read research and implement new ideas, and financial incentives for the application of the scientific research are lacking. These findings may be because the setting in the current study has limited financial and human resources. First, the limitation of the financial resources leads to a difficulty in applying the study findings which may need extra- equipment and materials, an absence of incentives for the application of researches, and an absence of financial support to fund accessing full-text nursing articles or even a library containing up-to-date textbooks. Second, the shortage of the staff members may limit nursing staff time to read and apply research findings and hinder the administrative authorities and other health team members to support nurses to utilize research evidence. This is in alignment with a number of other studies in which nurses perceived the limitation of nursing time to read and integrate research evidence into practice among the most important barriers to RU<sup>(9, 15, 18)</sup>.

On the other hand, a research finding indicated that the nurses' lack of interest and their inadequate reading habits are seen sometimes more important issues than the lack of time. In other words, lack of time may be an accepted excuse, when there is no lack of interest, lack of need, or lack of knowledge<sup>(11)</sup>. Another cause that may place setting related barriers among the top barriers to RU may be the absence of a policy for RU in these settings. The current study shows that there are many suggested facilitators to RU. Critical care nurses might suggest a large number of setting related facilitators among the top suggested facilitators to RU because they perceive that setting related barriers are placed at the top ten barriers to RU. Among the suggested facilitators are organizational support through providing translations to the articles and research findings written in English, and offering incentives for creativity and new ideas based on scientific research are cited among the top ten facilitators to RU.

Following setting related barriers to RU is the quality of research related barriers which include; the conclusions drawn from the research are not justified, and the literature reports conflicting results. These perceptions of the nurses regarding research related barriers may be attributed to the lack of research-related nurses' knowledge as practical

nurses do not receive any research related studies while they are studying at their schools. Even, nurses with bachelor degrees do not receive research related courses after their graduation except for, those who register for post-graduate studies. Lack of research related knowledge makes nurses unable to understand research findings or evaluate their quality, even, if those researches are written in a good quality<sup>(10, 19-21)</sup>. To overcome these barriers, nurses in this study suggested a number of research quality related facilitators that come at the top ten facilitators to RU, including; justifying the conclusions in the end of the search in an appropriate and understandable manner.

One of the ten highly ranked barriers to RU, in this study, is a nurse related barrier. This barrier is that the nurse is isolated from knowledgeable colleagues with whom to discuss the research findings, which was marked as a great barrier to RU by the majority of the critical care nurses. This item can be interpreted in various ways. Firstly, it may reflect nurse's need of knowledge and guidance while attempting to interpret research findings. Secondly, it may indicate that nurses do not have a negative attitude regarding RU; they just need the educational support. One of the ten highly ranked barriers to RU, in this study, is related to research communication; the research is not reported clearly. Unfortunately, most of the critical care nursing researches are conducted by the academic staff at the nursing faculties, and the communication between those researchers and the nursing practitioners is lacking. This lack of effective communication may occur because there are dissimilar beliefs, and education<sup>(7)</sup>. They do not see each other or speak the same language<sup>(22)</sup>. So, the research may appear difficult to understand by nurses or the study results may not meet the real needs of the clinical practice. The lack of nurses' knowledge regarding scientific research also widen the gap exists between the practical nurses and the scientific researches, additionally to the absence of translated researches from English to Arabic as about half of the nurses in this study stated that the English language in research articles is considered as a great barrier to RU. This is in line with another publication in Turkey (2009)<sup>(15)</sup> which stated that the nurses' English language skills are relatively low. However, most of the high-quality nursing studies are published in English language.

Therefore, half of the highly ranked facilitators to RU as perceived by nurses were related to research communication, including; increase the knowledge base to research, conducting sessions to increase nurses' awareness to research methods, translating articles and scientific researches to the Arabic language, holding regular meetings to expose nursing research and the utilization of the results,

providing libraries at the workplace containing the most important and updated researches in critical care nursing necessary to develop nurses' skills<sup>(23, 19, 21)</sup>.

Furthermore, the proposals to produce scientific journals especially for nurses expose an unawareness of what is available. The fact that many nursing journals in the field of nursing research have been available for many years is still unknown to some nurses participating in this study. This evidence agrees with their opinion that research is not readily available and it reveals that these nurses are unaware of the resources in their educational institutions where they received their education. Regarding barriers related to research access, about half of the sample doesn't have a well command of English language or computer skills and most of the nurses said they do not have a computer in the unit, where they work. So, it is difficult for them to reach published updated researches.

The following section will discuss the identified nursing characteristics and their relations to barriers and facilitators to RU. Regarding nurses' age, there are statistical significant differences between nurses' age and the facilitators related to settings, communication and accessibility of research. It is found that younger nurses have perceived that there are a lot of facilitators needed to RU rather than older ones. This may be because younger nurses are more overloaded than older. Older nurses usually carry out only the administrative tasks, or even do not carry out several tasks, and may not take evening or night shifts. Work overload and limited time may prevent younger nurses from accessing research or finding time to contact academic researches. In addition, most of setting support such as attending scientific meetings is for older nurses who have managerial position. These results are opposed by Yava *et al.*,<sup>(15)</sup> study conducted in Turkey. This study showed that the perception of Turkish nurses is not influenced by their age. This may be attributed to the difference between tasks assigned to the nurses in both settings of the two studies, furthermore, in our ICUs, older nurses are usually the nursing managers which may be not the case in other countries where nurses with higher educational and research related activities are usually the managers<sup>(15)</sup>.

In relation to the place of residence, the present study reveals that the majority of the studied sample includes nurses who are living in the city. Moreover, nurses who live in countryside have a statistically significant perception that they have more barriers to RU than those who live in the city. This may be because nurses who live in the rural areas have higher number of obstacles for the application of research results than others, where it is difficult for them to access the internet and research

articles, and their time and efforts may be consumed each day in transportation to reach their work place in Alexandria where the hospital is present. Therefore, they do not have the time or the effort to apply research findings into practice and perceive a higher number of barriers to RU than others. In relation to the level of English language, the present study reveals that most of the studied nurses either do not speak, speak weak, or average speak English. Moreover, there is a statistical significant difference between the level of English language and barriers to RU. This may be because accepted level of English language is important to the nurses' ability to search the internet and understand the published researches which are always in English. These results are supported by the studies conducted by Yava *et al.*,<sup>(15)</sup> and Kajermo<sup>(11)</sup>, in which, nurses perceived the English language in research articles as a great barrier to RU.

In relation to the level of education, the present study reveals that more than half of the critical care nurses have bachelor degrees and/or post graduate studies. Moreover, there are statistical significant differences between educational level and nurses and setting related barriers to RU, in which nurses graduated from health institutions have more nurses and setting related barriers and suggest a lot of facilitators to RU than nurses who are receiving post-graduate studies. This may be because nurses graduated from the health institutions have no adequate knowledge and skills about scientific research, how to access research and research critique. In addition, ICU settings in the current study do not provide research related education for those nurses. So they perceive that they have more barriers than other nurses in present study. These results are supported by Kajermo,<sup>(11)</sup> in which more than half of the nurses had their basic nursing education before the introduction of research related issues into their curriculum.

Regarding the nurse's experience, the present study reveals that there is no statistical significant difference between nurse's experience in ICUs and barriers and facilitators to RU, except for the quality of research related barriers. Nurses who have no experience have higher barriers to RU than others. This is may be because a large portion of the study sample is young aged nurses. Younger nurses are usually more involved in bedside nursing care than older. They may be faced by many clinical queries and questions that need answers from research articles. Consequently, they may be challenged with more research related barriers than older nurses. In addition, they may not receive any research related education after their employment. These results are opposed by Yava *et al.*,<sup>(15)</sup> study, in

which the perception of nurses is not influenced by factors such as years of professional experience, because the majority of studied nurses in their study have high professional experience in nursing care compared with our study sample.

### 5. Conclusion and recommendations:

In brief, despite the move towards RU, the current study shows that critical care nurses are challenged by several barriers hindering RU and a large number of facilitators to RU are suggested also by the research findings to overcome these barriers. The majority of the highly ranked barriers to RU are categorized as setting related barriers, followed by quality, nurses, and communication and accessibility related barriers, while, the majority of the suggested facilitators to RU are related to communication and accessibility of the research, followed by setting, nurse, and quality of research related facilitators. Moreover, barriers and facilitators to RU are affected by a number of factors, such as; nurses age, experience, residence, and level of English language.

So the current study recommends conducting trainings and workshops raising nurses' awareness on the importance of RU and the research process and methodology. The critical care settings have to give adequate support to RU through providing libraries at the workplace containing the most important and updated researches in critical care nursing. Significant recent research articles have to be translated into Arabic. Moreover, conducting scientific meetings between nurses and researchers will foster communication, motivate nurses to utilize research and assist researchers to define their future questions based on the real clinical queries in critical care settings. Finally, further researches have to be conducted in order to develop and test various strategies fostering RU.

### Implication of the research:

Detecting barriers to RU and applying strategies facilitating it will participate in bridging the gap between research and practice. Moving nursing practices in critical care settings from basing them on nurses' experiences, knowledge and skills, which are usually outdated, to basing them on recent research evidence. Consequently, high standards of quality care will be enhanced, patients' safety will be ensured and their outcomes will be improved.

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