

What's Important in Maternal and Infant Integrated Healthcare? Identifying Relevant Learning Contents for Medical Students through a Delphi Study

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Abstract

Background: Maternal and infant health is one of the targets of the Millennium Development Goals and this leads to the importance of equipping undergraduate medical students with the knowledge, skills and behaviour to manage problems related to maternal and infant health. In order to identify the most important learning content related to maternal and infant health, a Delphi technique was employed due to its ability to obtain independent responses from a panel of experts.

Methods: The expert panel consisted of primary care physicians, obstetric-gynaecologists and paediatricians who were considered to have the most appropriate knowledge and experience in the field of study. The members of the panel were asked to answer a question and complete a questionnaire in subsequent rounds of the Delphi technique.

Results: The Delphi's first round resulted in 1869 learning topics, which were then categorized and submitted for the second round. In the second round, the respondents determined the level of importance for each learning component and consensus was achieved by having a list of 19 most important learning contents in maternal and infant health in rank order.

Conclusions: The consensus was produced based on perceptions of experts from different fields who work in different healthcare settings. The identification of relevant learning contents for undergraduate medical students, related to maternal and infant health, is influential in designing a curriculum that can fulfil society's needs.

Keywords: Maternal and infant health, Delphi technique, undergraduate medical education

Introduction

Maternal and Infant Health have become two important health status indicators for each nation in the world. Both have also become the main targets of Millennium Development Goals (MDGs) by the United Nations, in addition to resolving starvation and poverty problems, universal education, gender equality, HIV/AIDS, environment sustainability, and global partnership.

Those indicators were expected to be completed before 2015.

Indonesia, as a nation with a population of more than 252 million, still faces a high maternal mortality rate. Maternal Mortality Rate (MMR) data in Indonesia, although showing a reduction from 307 per 100,000 live births in 2002 to 228 per 100,000 live births in 2007, still cannot meet the MDG target for ASEAN (Association of Southeast Asian Nations) Countries, which is 160 per 100,000 live births. The Ministry of Health, Republic of Indonesia targeted a reduction of MMR to 110 per 100,000 live births by 2014 (United Nations, 2012; Ministry of Health, Republic of Indonesia, 2012).

The statistics from Ministry of Health, Republic of Indonesia show that child health indicators are improving, although malnutrition cases are

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often still found. Neonatal Mortality Rate decreased from 32 to 19 per 1,000 live births. Infant Mortality Rate decreased from 68 to 34 per 1,000 live births during the same period. Child Mortality Rate decreased from 44 per 1,000 live births in 2007. However, MDG targets in 2015 are 32 per 1,000 live births for Child Mortality Rate and 23 per 1,000 live births for Infant Mortality Rate (United Nations, 2012; Ministry of Health Republic of Indonesia, 2012). The improved Maternal and Infant Health, indicated by the reduction of Maternal and Infant-Neonate-Child Mortality Rates, requires an integrated effort from all health professions, including primary care physicians and related specialists, and also an integrated healthcare system that reaches out to remote areas.

The Faculty of Medicine Universitas Indonesia (FMUI) has a responsibility to develop primary care physicians who are able to take part in improving integrated maternal and infant healthcare. Although primary care physicians are only part of the overall healthcare system in improving maternal and infant well-being in Indonesia, FMUI needs to pay attention to the achievement of competencies related to maternal and infant health. A competency is a set of intelligent actions consisting of a knowledge component, skills and proper behaviour so that someone is able to perform tasks and function well and independently (Stewart & Hamlin, 1992). The curriculum is a master plan of learning experiences, which students have undergone, in order to attain the defined objectives (Grant, 2010). The curriculum implemented by an educational institution must be in line with the needs of the society and enable the achievement of relevant competencies by students.

Therefore, this current study is aimed at identifying learning contents, as a component of the curriculum (Harden, 2009), related to maternal and infant integrated healthcare, which are required to produce competent medical doctors, specifically at the area of maternal and infant health. It is expected that this research will have some impact, not only for FMUI but also for medical education institutions in Indonesia. The learning contents identified in this study can be used to improve the curriculum of medical education throughout Indonesia.

The Delphi technique

The current study is a part of a research series beginning with systematic literature review and curriculum document analysis reported

elsewhere. This reported study uses the Delphi technique to identify relevant learning content for medical students in relation to maternal and infant health. The Delphi technique is appropriate to be used in this research due to the possibility of collecting various opinions from experts without the need of face-to-face panel discussion. This technique allows experts to express their opinions freely, without the possibility of being affected by other experts' opinions.

The Delphi technique consists of a number of rounds of granting questions, questionnaires or other methods, followed by controlled regular feedback, in order to achieve the most valid and consistent consensus from a panel of experts (Powell, 2003). Within each round, the panel of experts is asked to provide their opinions on particular issues or problems. The responses are then analysed by the researchers and the results are given back to the panel of experts. The experts are expected to provide feedback or revise their responses based on the previous analysis. Researchers must ensure a valid analysis of the results between each round, to allow the identification of convergence and alteration of respondents' opinions (Hasson *et al.*, 2000). The process will continue until a consensus is attained.

The selected experts must have the appropriate knowledge in the field being researched. Keeney *et al.* (2001) suggest that selected experts need to be as neutral as possible, so that their responses will depict the actual perception or knowledge. The number and variety of the sample are usually determined based on research objective, design, and data collection period (Keeney *et al.*, 2001).

After the sample has been determined, each member in the panel should be provided with information on the research objectives and process, expected feedback, time provided, and how the information from the experts would be beneficial (Hasson *et al.*, 2000). Researchers then need to determine the definition of the consensus used in the Delphi study. There is no strict rule for the definition of a consensus, however it needs to be accurately determined by the researchers (De Villiers *et al.*, 2005). Examples of a consensus is the percentage of approval or saturated or stability of results after passing number of rounds.

Methods

In order to determine the most relevant maternal and infant health learning contents for

medical students, a panel of experts, consist of primary care physicians, paediatricians and obstetric-gynaecologists was formed. These experts were selected due to their expertise and experience in managing maternal and infant health. Since the contents being identified were intended for undergraduate medical students, primary care physicians' perspectives, as healthcare front liners, were considered beneficial. Both clinical educator and non-clinical educator paediatricians and obstetric-gynaecologists were included in the study to obtain richer perspectives. It was expected to have 30 experts in each group to anticipate the possibility of respondents who did not respond to the invitation for participating in the research or who did not give feedback in the subsequent rounds.

The primary care physicians were approached through the community health centers around Jakarta which had joint collaboration with FMUI. The paediatricians and obstetric-gynaecologists specialists were approached through each professional association and also Department of Paediatrics and Department of Obstetrics and Gynaecology, FMUI and Cipto Mangunkusumo Hospital as the main teaching hospital.

A questionnaire was sent to each respondent by mail or electronic mail. The questionnaire contained demographic data the respondents had to fill in and also a question related to the study objectives ("Please determine, according to your perception, the 20 most important ability or knowledge or skills or behaviour related to maternal and infant health to be taught to the undergraduate medical students, to enable graduate medical doctors to provide health services for mothers and infants at the primary health care level"). The questionnaire also included information on research purposes and process.

The Research Ethics Commission of the Faculty of Medicine, Universitas Indonesia granted ethics approval for this study. By completing and returning the questionnaire, respondents had provided their consent to participate in Delphi study.

The results of the Delphi's first round were analysed qualitatively by the researchers and were presented to the respondents in the form of a list containing the 20 most important learning contents. The panel of experts was then required to sort the list based on the level of importance ("For each topic/content item related to maternal and infant health below

(successfully identified from the first questionnaires), please determine the level of importance for undergraduate medical students"). A consensus was obtained when the data, in this case the list of identified learning contents, had reached saturation. The analysis was performed by 2 researchers (DS and AF) in order to obtain valid and reliable results.

Results

A total of 49 primary care physicians, 45 obstetric-gynaecologists and 27 paediatricians agreed to be members of the Delphi panel. Most primary care physicians in the panel of experts were civil servants who work in community health centres in Jakarta area, particularly in municipality of Central Jakarta and East Jakarta. Their average working experience was 8.2 years. Thirty percent of the obstetric-gynaecologists in the panel of experts were non-clinical educators, with an average working experience of 10.7 years. The average working experience of the paediatricians, who were all clinical educators, was 13.8 years.

The Delphi process

Stage 1

The data from the first round questionnaire was screened and categorized into relevant topic/content groups. The grouping was conducted for all responses from the same group of respondents. For example, exclusive breastfeeding and early initiation of breastfeeding were grouped in the same category, which was lactation. Based on the results from 49 primary care physician respondents, 807 responses were obtained and categorized into 57 topic groups. Meanwhile, 485 responses from paediatricians were grouped into 32 categories and 56 categories were produced from 577 responses of the obstetric-gynaecologists group within the expert panel.

Then, the frequency of each topic/content item in each group of respondents was calculated to determine ten categories with the highest frequencies (except for obstetric physician respondents, 11 topics with the highest frequencies were obtained since there are three topics with the same frequency). This process is important to determine the significance of each topic/content item (Namey et al., 2008). The frequency of each category may exceed the total number of respondents since there was a possibility that a respondent may give two or more responses in one category. The

categories with the highest frequency in each group of respondents (primary care physicians, obstetric-gynaecologists, and paediatricians) are shown in Tables 1 and 2.

The integration process began by combining the same categories from each group of respondents and calculating the frequency, so that the total frequency of each category was obtained. Each category was sorted from the one with highest to lowest frequency (Table 3). The learning topic with the highest frequency

was clinical skills related to mother and infant, which was considered as the most significant.

The 19 most important contents, obtained from the categorization and integration of results from the 3 groups of respondent in stage 1, were randomly arranged in a questionnaire and the respondents in the second round of Delphi were required to determine the level of importance for each content, based on the knowledge and perceptions of each respondent.

Table 1: Categories with the highest frequency based on responses of primary care physician group

	Ability/Knowledge/Skills/Behaviour	Frequency
1	Lactation	50
2	Family planning	48
3	ANC (<i>Antenatal Care</i>)	47
4	Aspects of public health and community medicine	44
5	Immunization for infants	40
6	Growth and development and early detection	39
7	Nutrition for infant and children	37
8	Nutrition for pregnant and lactating mothers	36
9	Clinical skills related to maternal and infant health	25
10	Emergency cases in maternal and infant health	32

Table 2: Categories with the highest frequency based on the responses of obstetric-gynaecologist and paediatricians groups

	Ability/Knowledge/Skills/Behaviour	Frequency
Obstetric-gynaecologist group		
1	Clinical skills (history taking, examination and management) related to pregnancy	56
2	Ethics and professionalism	38
3	Family planning	27
4	Normal delivery	26
5	Emergency	31
6	Physiology and anatomy of pregnancy	17
7	Preeclampsia and eclampsia	17
8	Bleeding during pregnancy	16
9	ANC (<i>Antenatal Care</i>)	14
10	Post-partum bleeding	14
11	Neonatal resuscitation	14
Paediatricians group		
1	Normal growth	39
2	Immunization for infant	32
3	Clinical skills related to infant and children	26
4	Nutrition for infant and normal children	24
5	Resuscitation for new-born infant	20
6	Diarrhoea in infant and children	18
7	Lactation	17
8	Signs and management of emergency cases	16
9	Professionalism	16
10	Congenital abnormalities	14

Table 3: Categories of contents/topics related to maternal and infant health with the highest frequencies based on combined group of respondents

	Ability/Knowledge/Skills/Behaviour	Frequency
1	Clinical skills (history, examination, and management) related to mother/infant	107
2	Emergency cases in pregnant mother and infant	79
3	Infants and child growth and development	78
4	Family planning	75
5	Immunization for infant	72
6	Lactation	67
7	ANC (<i>Antenatal Care</i>)	61
8	Nutrition for infants and children	60
9	Professionalism	54
10	Aspects of public health or community medicine	44
11	Nutrition for pregnant and lactating mothers	36
12	Resuscitation for new-born infant	34
13	Normal delivery	26
14	Diarrhoea in infants and children	18
15	Physiology and anatomy of pregnancy	17
16	Preeclampsia and eclampsia	17
17	Bleeding during pregnancy	16
18	Congenital abnormalities	14
19	Post-partum bleeding	14

The total respondents who completed the second questionnaire were 30, 28 and 23 for obstetric-gynaecologists, paediatricians and primary care physicians respectively. For the obstetric-gynaecologists and primary care physician groups, all respondents in the second round were similar to the ones in the first round. However, for paediatrician group, since there were no non-clinical educators of paediatricians involved in the first round, the distribution of questionnaire was expanded to obtain perspectives from non-clinical educator

paediatricians. The data of each completed questionnaire were transferred to the SPSS statistical software (IBM SPSS statistics version 19). The analysis was conducted by calculating the cumulative percentage of each topic that was listed as rank 1 to 5. The final results were a list of topics/contents obtained by sorting them from the highest to the lowest cumulative percentage, as shown in Table 4 below. Figure 1 summarizes the complete Delphi rounds both from the researchers and expert panel point of views.

Table 4: Most important topics/contents related to maternal and infant health based on the perceptions of 3 respondent groups

	Ability/Knowledge/Skills/Behaviour	Total frequency for rank 1-5	Cumulative percentage
1	Clinical skills (history, examination, and management) related to mothers/infants	45	55.6
2	ANC (<i>Antenatal Care</i>)	43	53.1
3	Physiology and anatomy of pregnancy	36	44.4
4	Normal delivery	35	43.2
5	Resuscitation for new-born infant	35	43.1
6	Emergency cases in pregnant mothers and infants	31	38.2
7	Professionalism	28	34.6
8	Nutrition for infants and children	26	32.1
9	Infants and children growth and development	19	23.5

Ability/Knowledge/Skills/Behaviour	Total frequency for rank 1-5	Cumulative percentage
10 Preeclampsia and eclampsia	17	20.9
11 Immunization for infant	16	19.8
12 Bleeding during pregnancy	16	19.7
13 Family planning	15	18.5
14 Nutrition for pregnant and lactating mothers	14	17.3
15 Diarrhoea in infants and children	14	17.3
16 Lactation	11	13.6
17 Post-partum bleeding	10	12.3
18 Aspects of public health or community medicine	10	12.3
19 Congenital abnormalities	5	6.2

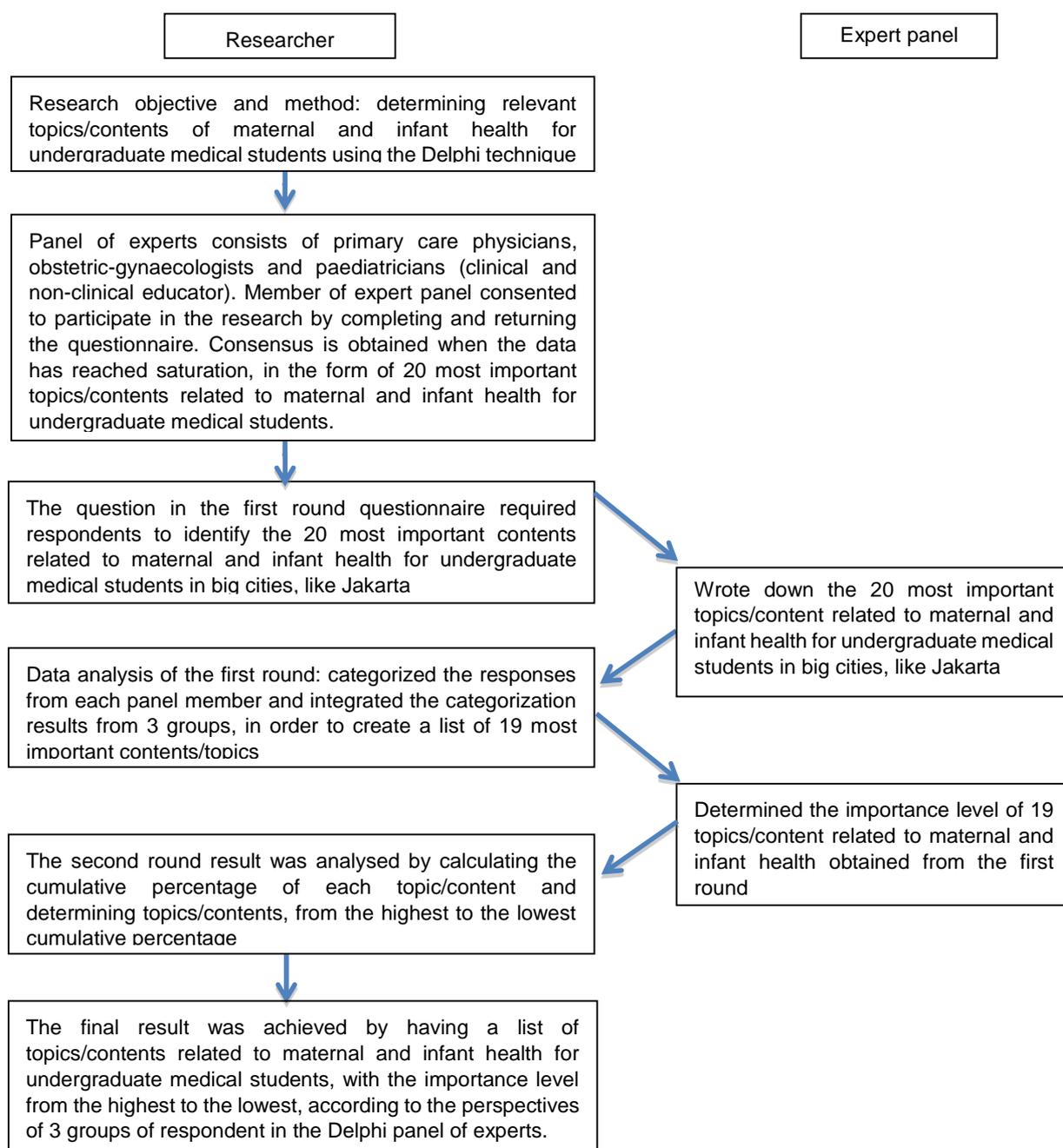


Figure 1: Diagram of complete Delphi rounds

Discussion

The current study produced 19 most important contents/topics related to maternal and infant health for undergraduate medical students, based on the Delphi technique. The Delphi technique is a commonly used method to determine a curriculum. Several studies using this method to determine specific contents in their curriculum have been published (Mirsadraee *et al.*, 2012; Almoollim, 2011; Rohan *et al.*, 2009; Deepthi *et al.*, 2012; Clayton *et al.*, 2006).

The Delphi stages in this study have been conducted following the basic theory of Delphi technique, starting from the establishment of a panel of experts, continued with two rounds of administering questionnaires to respondents. One advantage of a Delphi is that members of the expert panel do not interact with each other, thus avoiding domination or enforcement in expressing opinion. The main limitation of this study is the total number of expert panel members which was below the initial target of 30 members in each respondent group. However, Powell (2003) states that the quality of a panel of experts is more important than the total number of members in a panel. Since the panel consists of representatives from three different groups of physicians, then it is expected that the study findings reflect the actual situations in healthcare settings, including in the primary healthcare level where graduated medical students will work.

Clayton *et al.*, (2006) conducted two rounds of Delphi to determine the core content of dermatology for undergraduate medical students. The panel of experts consisted of 66 members, not only dermatologists, but also primary care physicians. Meanwhile Rohan, *et al.* (2009) successfully determined 74 most important contents in anesthesia for undergraduate medical students, based on the inputs from 31 anaesthetic consultants. They had 3 rounds of Delphi with decreasing response rate starting from 100%, 67%, and 59% in the third round.

Based on 2 rounds of Delphi, Almoollim (2011) determined the most important competencies in internal medicine for undergraduate medical students. However, the Delphi technique used is slightly different because the groups of respondent used in the first and second round are different. The group in the first round consists of 20 clinicians, meanwhile 5 internists are involved as the member of expert panel in the second round. Mirsadraee *et al.*, (2012)

also implemented the Delphi technique to determine the important radiology curriculum for undergraduate medical students. The total number of respondents for each round were 20 (25%), 23 (22%), 41 (31%) and 25 (61%) respectively.

The Delphi process conducted in this research is valid and comparable to similar studies, as described above. The expert panel was selected based on criteria developed from the research objectives and adequately represents various healthcare units. The total number of respondents is between 23 – 49 for each group and the number is comparable to other expert panels in similar studies for undergraduate medical students. Two rounds are the minimum number in a Delphi process and at the end of the second round, 19 most important contents were identified with cumulative percentage distribution ranging from 55.6% - 6.2%. The top 5 maternal and infant health contents (clinical skills, antenatal care, physiology and anatomy of pregnancy, normal delivery and newborn resuscitation) identified in this study reflect the real problems that medical doctors will encounter in the primary healthcare services.

Conclusion

The current Delphi study has enabled the obtainment of a list of most important ability/knowledge/skills/behaviour related to maternal and infant health for undergraduate medical students. It is expected that the results will reflect the needs of the community which will be served by the graduating medical students. Consensus achieved in this study is useful for curriculum developers to determine maternal and infant health contents necessary for undergraduate medical students. It is a good practice to always combine the results of the Delphi study with other approaches in determining learning contents such as literature review and curriculum evaluation to enable the implementation of a curriculum that can answer society's problems.

Competing interests

The authors declare no competing interests

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