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Research Article

Strategizing quality implementation in intensive care unit: a statistically-sound, novel approach using Delphi technique

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ABSTRACT

Background: Ascendancy of Intensive Care Medicine in the realm of healthcare has made Continuous Quality Improvement (CQI) in Intensive Care Units (ICUs) most imperative for hospital administrators worldwide. Perspicuous identification of all clinical and non-clinical drivers warranting contemplation is the most arduous step in achieving the same. This study avers the effectiveness of a statistically-sound, novel approach using Delphi technique in identifying various drivers to be prioritized for strategizing CQI in the postoperative ICU of a premier tertiary care hospital in Asia.

Methods: Three rounds of Delphi survey were initially planned. Mean Rank Scores (MRS) was used to rank the opinions in this study.

Results: Statistically validated consensus was reached among expert participants on five drivers that should galvanize hospital administration vis-à-vis strategizing quality implementation in the post-operative ICU. Foremost among these was adequate staff that is tantamount to desirable staff-patient ratio (MRS: 9.4), and regular medical audit for sustainable quality in healthcare delivery (MRS: 9.1). Experts further concurred that communication skills of ICU staff (MRS: 8.9), continuous medical education and training of these staff (MRS: 7.6) along with perspicuous 'Standard Operating Procedures' (MRS: 7.1) were other points to be considered.

Conclusions: With regard to the process of planning, identification of correct drivers holds the crux in strategizing quality implementation in any setup. Implementing change management is equally imperative. This approach can be used to realize both of these.

Keywords: Strategizing, Delphi technique, Intensive Care Unit (ICU), Continuous Quality Improvement (CQI), Change management

INTRODUCTION

Hospital is an integral part of a social and medical organization, the function of which is to provide complete health care, both curative and preventive, to the population. It is also a centre for training of health workers and for bio-social research.[1] In a hospital setup, ICUs are patient units responsible for a specifically defined, acutely ill, unstable or potentially unstable patients who require constant monitoring.[2] Society for Critical Care Medicine (SCCM) has identified two levels of care units within ICU setups viz. level one for the most critically ill patients and level two that are generally smaller units with limited resources.[3] As these ICUs represent the zenith of the progressive patient care continuum, the margin of error in the healthcare delivery in these units is negligible.[4]

Quality means conformance with standards. Though relevant in every sector, quality is more important in the field of hospital management, for it determines what, when and how much will be the sum effort of care. Quality in service establishments like hospitals has to be ensured more by emphasis on 'processes' rather than on

the final 'output'. Quality Management (QM) therefore, assumes importance as a means of regulating the outcome of hospitalization.[5] In the concept of Continuous Quality Improvement (CQI), the premise is that organizations need to continually seek opportunities to enhance the quality of their products or services, and that application of statistical analysis and control techniques commonly found in the industry would facilitate the assessment and enhancement processes. In contrast to the older theories of quality improvement that aim at identifying and eliminating the 'bad apples', CQI attempts at identifying 'best practices' so that overall quality of care improves.[6]

Michael Porter, Professor of Business at the Harvard Business School, stresses that an entity that seeks superior performance must develop strategic positioning. This involves the identification of those activities that distinguish the entity as particularly results-producing.[7] Performing CQI meaningfully on the activities that most significantly contribute to the desired outcomes is likely to produce the best results. Thus prudent strategizing based on correctly identified drivers should form the crux of CQI implementation in a hospital setting.[8] Besides, the hardest task for CQI teams had to do with the continuous improvement of healthcare processes as such, because this involve necessarily a change in the behavior of the providers themselves. To overcome resistance to change, CQI teams use an array of approaches, including distributing evidence-based technical literature, focused on-the-job training, discussion meetings, and one-on-one conversation. Even so, in some cases, resistance to change is not possible to overcome.[9]

CQI is even more relevant in a post operative ICU setup as nowadays aggressive and high-end surgeries are made safer by monitoring the patients in closed environment of the surgical ICU during the post-operative period. Quality of services provided in the post operative ICU can actually make a difference between life and death.[10] Perspicuous identification of all the clinical and non-clinical drivers in the postoperative ICU warranting contemplation, and methods that can foster team spirit among various healthcare providers and abate resistance to change in this setup are thus the most crucial steps in strategizing CQI in ICUs. This study, undertaken by the department of hospital administration at Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow, India avers the effectiveness of a statistically-sound, novel approach using Delphi technique in identifying various drivers to be prioritized for strategizing CQI in the postoperative ICU setup at SGPGIMS.

Review of Literature

Various tools most often reported to be used in CQI include Brainstorming, Cause and Effect diagrams, Delphi technique, Flow charts, Histograms, Control charts, Pareto diagrams, Run charts, Scatter diagrams, Checklists, Tables, and Counts. Out of these, Delphi technique is unique in many ways. Delphi technique is a process that can be used to collect, group, sort and rank data, and reach consensus from a group of people without requiring face to face contact. Actually, it is a structured communication technique, originally developed as a systematic, interactive forecasting method which relies on a panel of experts. In the standard version, the experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer. Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, stability of results etc.) and the mean or median scores of the final rounds determine the results.[11] The technique can also be adapted for use in face-to-face meetings, and is then called mini-Delphi or Estimate-Talk-Estimate (ETE). The Delphi method has also been used as a tool to implement multi-stakeholder approaches for participative policy-making in developing countries. The governments of Latin America and the Caribbean have successfully used the Delphi method as an open-ended public-private sector approach to identify the most urgent challenges for their regional action plans.[12] In this sense, the Delphi method can contribute to a general appreciation of participative policy-making. Traditionally, the Delphi method has aimed at a consensus of the most probable future by iteration. The Policy Delphi, launched by Murray Turoff, is instead a decision support method aiming at structuring and discussing the diverse views of the preferred future. The Argument Delphi, developed by Osmo Kuusi, focuses on ongoing discussion and finding relevant arguments rather than focusing on the output. The disaggregative Policy Delphi, developed by Petri Tapio, uses cluster analysis as a systematic tool to construct various scenarios of the future in the latest Delphi round. The respondent's view on the probable and the preferable future are dealt with as separate cases.[13]

In most of the scenarios, questionnaires are distributed to different participants. Responses to the first questionnaire are summarized and used to develop the second questionnaire which seeks agreement, disagreement and insights from the same pool of participants. The process goes on to third and subsequent questionnaires until no new opinion emerges. The process typically builds consensus or agreement by participants altering their views between successive questionnaires to align with responses from others, or by establishing a new common view. However, currently there are no universally accepted requirements for using the Delphi technique.[14] Considerable confusion, disagreement, and uncertainty exist concerning the parameters of the Delphi technique such as the definition of group consensus, Delphi technique variants, expert selection, number of rounds, and reporting of the methods and results.[15] Thus, Delphi

can be modified in a number of ways so as to use it in different case scenarios.

In Delphi, the psychological process in connection with communication and less in the sense of mathematical models, have to be stressed. The Delphi method is mainly used when long-term issues have to be assessed. As it is a procedure to identify statements (topics) that are relevant for the future, it reduces the tacit and complex knowledge to a single statement and makes it possible to judge upon. It is also suitable if there is an attempt to involve many persons in processes.[16] Delphi method can be used to foster team spirit and implement change management.[17]

METHODS

A prospective study was conducted in the post-operative ICU at SGPGIMS, India; a premier tertiary care hospital in Asia. The study was carried out in the months of October and November 2013 over a period of approximately two months. SPSS 15 software was used for statistical impetus.

Three rounds of Delphi were initially planned. Possibility of more rounds was kept open till statistically proven consensus would be achieved.

1. A Purposive sampling technique was applied to identify 41 experts across the fraternities of Surgeons, Anesthetists, Nurses and Hospital Administrators as follows:

   a. 14 Surgeons
   b. 14 Anesthetists
   c. 10 Nurses
   d. 3 Hospital Administrator

   Their consent was taken to participate in the Delphi process. Both experience and knowledge was taken into consideration while selecting these experts.

2. The first round involved face to face separate interviews with all the experts. During the interviews, the experts were encouraged to identify the potential drivers to attain quality improvement in the post-op ICU setup. No minimal or maximal cap was put on the number of drivers to be identified by each individual. Giving reasons for identifying a particular driver was left optional in order to encourage radical thinking. Finally, a master list of all the potential drivers was made by incorporating the 47 drivers identified by the individual experts. The main aim of this round was not to downplay any potential drivers for CQI. All these individual drivers were arranged into seven major domains to make the communication perspicuous in the second round. These seven domains were:

   a) Staff Related
   b) Materials Management
   c) Organizational Behavior
   d) Related to Asepsis
   e) Instruments and Equipments
   f) Administrative Perspective
   g) Miscellaneous Drivers

3. In the second round, these 47 drivers, divided into seven major domains, were presented to each of the 41 experts. Each expert was asked to rank his top ten drivers independent of the respective domains (by giving ranks from one to ten) and was also asked to identify all other potential drivers, if any which they deem important for CQI though in lesser intensity than the top ten (by giving all these 0 rank). No rank was to be given by an expert to a driver not considered significant vis-à-vis the process of CQI. All the experts were asked to give reasons to support their rankings (including for those drivers ranked zero). The main aim of this round was to generate feedback for the third round so as to enable various experts to reach informed consensus. This round was culminated by making a ranked list of all the drivers included by different experts (drivers not ranked 0-10 by any of the experts were excluded). The ranking of each of these 31 drivers were based on the following criteria:

   a. Mean Rank Score (MRS) (a driver with first rank was given a score of 10, second rank 9 and so on; all drivers ranked 0 or not ranked by an expert were given 0 score).
   b. In case of a tie in ‘a’, a driver with less number of 0 scores was ranked higher.
   c. In case of a tie in ‘b’, for all drivers getting an average score of 0, the same were ranked according to the % of experts including them.
   d. Otherwise, in case of a tie in ‘b’, a driver deemed more important by the coordinator was ranked higher vis-à-vis reasons given by various experts to support their rankings.
   e. In case of a tie in ‘c’, a driver deemed more important by the coordinator was ranked higher vis-à-vis reasons given by various experts to support their inclusions.

4. In third round, a list of 31 drivers ranked as per the above criteria was shared with all the experts. The reasons for their inclusion by various experts were also shared. In this round, the experts were asked to rank their top ten drivers (by giving ranks from one to ten). All the experts were again asked to give reasons to support their rankings in order to gauze any creativity in their thought process. The same was planned to be used in the subsequent rounds, if needed to facilitate informed consensus. Finally, at the end of the third round, a ranked list of all the drivers included by different experts (drivers not ranked 1-10 by any of the experts were excluded) was generated. The ranking of each of these drivers were based on the following criteria:

   a. Mean Rank Score (MRS) (a driver with first rank was given a score of 10, second rank 9 and so on till the tenth rank getting a score of 1;

drivers not included by an expert in top ten were given a score of 0).

b. In case of equal MRS, a driver included in top ten by higher percentage of experts was ranked higher.
c. In case of a tie in 'b', a driver deemed more important by the coordinator was ranked higher vis-à-vis reasons given by various experts to support their rankings

5. The top ten drivers as per the ranking of the third round of the Delphi process were analyzed in detail using various statistical parameters. The corresponding MRS and other data for these drivers, wherever applicable were also considered from the earlier two rounds. The main motive of this statistical analysis was to find out the following:

a. Whether optimal informed consensus had been reached on the most vital drivers vis-à-vis strategizing CQI in the post operative ICU.
b. Whether subsequent rounds of Delphi would contribute significantly towards greater consensus among various experts with regard to the prioritization of drivers for attaining CQI.
c. Whether outliers (extreme values) were confounding the overall analysis.
d. Whether Delphi technique had been advantageous over other traditional methods with regard to the identification of most significant drivers necessary to strategize CQI.

RESULTS

SGPGI, Lucknow is an 868 bed tertiary care super specialty hospital. It is a premier public medical research institute in Asia. The institute is dedicated to quality tertiary care at an affordable cost. The institute caters to approximately 3,00,000 outpatients and 35,000 inpatients per year. More than 20,00,000 investigations are performed on these patients annually. On an average, in a year, about 7,000 surgical procedures are performed including more than 80 renal transplants. This is made possible by a team of highly dexterous doctors using state of the art technology and high-end sophisticated equipments.

The capacious Modular Operation Theatre (MOT) complex is located in the first floor covering a lavish space of 5000 sq meter (53820 sq feet). Out of twelve MOTs, Gastro-surgery has three, Endo-surgery has two, Urology has three and CVTS has four MOTs. Routine surgeries are done from Monday to Friday between 8:00 a.m. to 4:00 p.m., and 8:00 a.m. to 1:30 p.m. on Saturdays. 15 bedded post operative ICU, located within the MOT complex, is responsible for rendering high quality medical care to the post operative patients.

Table 1 shows the ranking result of drivers for strategizing CQI in post operative ICU after the third round of Delphi. These drivers have been ranked as per the criteria outlined in the methodology.

Table 2 shows other parameters of these top ten ranked drivers.

As means are greatly influenced by extreme values/outliers, Median Rank Score was calculated for each of these ten drivers.[11] Moreover, as means or medians are simply measures of central tendency and don't measure variation, standard deviation (SD; in conjugation with mean) and inter-quartile range (IQR; in conjugation with median) were calculated for each of these drivers so as to measure variation and thus consensus, if any among the experts.

Table 3 shows ranking result of these ten drivers after the second round of Delphi (figures in bracket correspond to third round of Delphi).

Table 1: Ranking result of drivers for strategizing CQI in post operative ICU after third round of Delphi.

Drivers for CQI	Experts (In %) Mentioning in Top Ten	Mean Rank Score (MRS)	Rank (After Third Round)
Adequate Staff Patient Ratio	100	9.4	1
Regular Medical Audit	100	9.1	2
All-round Communication Skills	91	8.9	3
Continuous Medical Education (CME) & Training of Staff	82	7.6	4
Perspicuous 'Standard Operating Procedures (SOPs)'	82	7.1	5
Sterilization Practices	91	4.4	6
Synergy between hospital administration and healthcare providers	91	4.0	7
Adequate Supervision by Consultants	82	4.0	8
Timely Transportation of Patients	45	3.7	9
Sound 'Admission Policy'	45	3.5	10

Table 2: Other parameters of top ten ranked drivers for strategizing CQI in post operative ICU after third round of Delphi.

Drivers	Experts (In %) Mentioning in Top Ten	Mean Rank Score (MRS)	Standard Deviation	Median	Inter Quartile Range (IQR)	Rank
Adequate Staff Patient Ratio	100	9.4	0.81	10	1	1
Regular Medical Audit	100	9.1	0.94	9	2	2
All-round Communication Skills	91	8.9	2.98	10	1	3
Continuous Medical Education (CME) & Training of Staff	82	7.6	3.83	9	2	4
Perspicuous 'Standard Operating Procedures'	82	7.1	3.59	9	2	5
Sterilization Practices	91	4.4	1.75	4	1	6
Synergy between hospital administration and healthcare providers	91	4.0	1.67	4	1	7
Adequate Supervision by Consultants	82	4.0	2.0	5	1	8
Timely Transportation of Patients	45	3.7	4.29	0	8	9
Sound 'Admission Policy'	45	3.5	4.10	0	8	10

Table 3: Ranking result of the same drivers after second round of Delphi (figures in bracket correspond to third Delphi round).

Drivers	Experts (In %) Mentioning in Top Ten	Mean Rank Score (MRS)	Rank
Adequate Staff Patient Ratio	100 (100)	9.4 (9.4)	1 (1)
Regular Medical Audit	100 (100)	8.8 (9.1)	2 (2)
All-round Communication Skills	73 (91)	6.7 (8.9)	5 (3)
Continuous Medical Education (CME) & Training of Staff	82 (82)	7.9 (7.6)	3 (4)
Perspicuous 'Standard Operating Procedures'	73 (82)	6.8 (7.1)	4 (5)
Sterilization Practices	100 (91)	4.6 (4.4)	7 (6)
Synergy between hospital administration and healthcare providers	82 (91)	4.3 (4.0)	9 (7)
Adequate Supervision by Consultants	91 (82)	4.5 (4.0)	8 (8)
Timely Transportation of Patients	64 (45)	4.7 (3.7)	6 (9)
Sound 'Admission Policy'	45 (45)	3.2 (3.5)	11 (10)

Table 4: Percentage of experts in the first round mentioning the same drivers.

Drivers for CQI	Experts (In %) Mentioning in Top Ten in Third Round	Rank (After Third Round)	Experts (In %) Mentioning in First Round
Adequate Staff Patient Ratio	100	1	100
Regular Medical Audit	100	2	100
All-round Communication Skills	91	3	27
Continuous Medical Education (CME) & Training of Staff	82	4	73
Perspicuous 'Standard Operating Procedures'	82	5	73
Sterilization Practices	91	6	73

Synergy between hospital administration and healthcare providers	91	7	64
Adequate Supervision by Consultants	82	8	82
Timely Transportation of Patients	45	9	91
Sound 'Admission Policy'	45	10	55

This was analyzed in order to gauge the thinking process of the experts during the Delphi process with regard to the various drivers.

Table 4 shows the percentage of experts mentioning these drivers during the first round of Delphi.

This was assiduously analyzed in order to interpret whether Delphi technique had been advantageous over other traditional methods with regard to the identification of the most significant drivers necessary to strategize CQI.

DISCUSSION

As is clearly depicted in table 1, adequate staff patient ratio, with a MRS of 9.4, was deemed most vital driver for strategizing CQI, with all the experts mentioning it in their top ten choices. Most of the experts felt that all other drivers would lose their significance until and unless an adequate staff patient ratio is maintained. Experts further avowed that all the stakeholders should remain reasonably sensitized towards this aspect. They further concurred that the actual staff patient ratio to be maintained during different hours of the day should be decided by the Operation Theatre Committee (OTC) based on the internationally acceptable guidelines, and the same should be strictly adhered to. Regular Medical Audit (MRS: 9.1) was also mentioned by all the experts. Though all the experts were unanimous on the profound significance of the medical audit in maintaining quality care in the long run, most of them felt that in order to maximize its contribution towards CQI, the exact procedure and frequency of the medical audit should be decided by the OTC.

All-round communication skills of the staff (MRS: 8.9), CME and training of the staff (MRS: 7.6) and well laid down SOPs (MRS: 7.1) were also considered significant by the experts. They were mentioned by 91%, 82% and 82% of the experts respectively in top ten drivers after the third round of Delphi. Experts felt that both oral as well as written communication skills are important for all the categories of the staff. This was deemed even more vital in case of inter-fraternity communication. It was also affirmed that CME and training of different categories of staff is imperative for CQI in ICU. The minimum requirements of the same, it was felt, should be decided by the OTC. Experts also emphasized that mere formulation of SOPs is not enough to ensure quality improvement in any setting. These SOPs should be perspicuous and should be internalized in the work culture by all the stakeholders. Furthermore, periodic revisions in these SOPs were advocated by the experts to ensure that the quality of healthcare rendered is at par with the international standards. Sterilization practices (MRS: 4.4), synergy between hospital administration & healthcare providers (MRS: 4.0) and adequate supervision by consultants (MRS: 4), though judged important by 91%, 91% and 82% of the experts respectively, were rated low vis-à-vis aforementioned drivers. Timely transportation of patients in and out of the post operative ICU, and sound admission policy were mentioned only by 45% experts with a relatively low MRS of 3.7 and 3.5 respectively. Many experts expressed that both these drivers are policy based bottlenecks that require one time consideration and may not be as vital as the other drivers for strategizing CQI.

It can be easily inferred from table 2 that outliers are not confounding the overall analysis. Even if the ranking of the drivers is based on the Median Rank Score rather than the MRS, there is no difference of opinion as to which all drivers should be included in the top tier of the table. In other words, median rank score, to a limited extent, only influences the relative importance of the top tier drivers. Likewise, a low SD for top two drivers corroborates the consensus among experts on their significance in CQI. A higher SD in next three drivers (2.98, 3.83 and 3.59 respectively) is mainly due to outliers i.e. small percentage of experts that have not included these drivers in their ratings. This fact is further validated by a low IQR in these drivers (1, 2 & 2 respectively), thus affirming that consensus has actually been reached on these drivers. A low SD in drivers ranked 6th, 7th and 8th simply shows that majority of the experts are of the opinion that these drivers, though important for CQI, don't warrant mention in the top tier. The last two drivers have abysmal scores both in terms of mean and median.

As is clear from the fourth column of table 3, the same five drivers occupied the top slot even after the round two. The only difference was in their relative ranking within this top tier. Moreover, barring CME and training of the staff, all other top notch drivers have shown increase in MRS or percentage of experts mentioning them in the top ten or both from round two to round three. The decrease in MRS of CME and training of staff from 7.9 to 7.6 is too insignificant to raise any alarm. Furthermore, except 'Sound' admission policy that was still ranked a lowly tenth after third round, the rest of the drivers in the lower tier have shown decline in their MRS between the second round and the third round of Delphi.

Thus, the gap between the top five drivers and the rest of the drivers has increased after round three as compared to round two. This can be further validated in numerical terms by calculating the difference in MRS of the driver ranked 5th and 6th after each of these rounds. This difference has increased from 2.0 after round two to 2.7 after round three. Thus, it can be safely inferred that any subsequent rounds of Delphi will lead to further strengthening of the consensus on these top tier drivers rather than adding any new driver in this list.

The importance of using Delphi technique in identification of these drivers can be best exemplified by studying the driver ranked third (All-round communication skills) and ninth (Timely transportation of patients). Though the former was mentioned by only 27% of the experts in round one, it was supported by 73% after the round two and a phenomenal 91% after the round three. In contrast, the latter was mentioned by 91% of experts after round one, but it tumbled to 64% after the round two and a mere 45% after the round three. In other words, instead of using Delphi, if we would have based our strategizing of CQI on the drivers identified by the interviews conducted in round one itself, we might have ended with at least two defaulters in the top tier drivers' list.

Here it should be further emphasized that Delphi method also facilitates change management. As opined by experts, in many cases, CQI simply fails because due importance is not given to change management.[9] In fact, the hardest task for CQI teams in a hospital setting had to do with the continuous improvement of healthcare processes as such, because this involves necessarily a change in behavior of the providers themselves.[16] As Delphi technique inherently fosters team spirit among various participants, it will automatically ensure better coordination among different stakeholders in order to achieve the CQI in the post operative ICU setup.

CONCLUSION

To conclude, apart from identifying the most significant drivers for CQI in a more perspicacious manner vis-à-vis the traditional methods, Delphi method also assuages resistance to change. This is all the more important in case of setups like post operative ICU where multiple stakeholders with different aspirations are involved. Delphi process will build team spirit among ICU staff drawn from different fraternities, thus ensuring minimal resistance to strategization and implementation of CQI. Though this scientific paper affirmed the effectiveness of a statistically driven Delphi based approach in strategizing quality implementation in an ICU setup, the same can be used as a prototype by healthcare administrators worldwide, after situation specific customizations, to augment quality implementation in different settings.

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REFERENCES

1. Park K. Preventive and Social Medicine. 21st Ed. Jabalpur, India: M/s Banarsidas Bhanot Publishers, 2011, pp.13.
2. Davies RL and Macaulay HMC. Hospital Planning and Administration: World Health Organization, Geneva. New Delhi: Jaypee Brothers Medical Publishers Ltd, 1995, pp.9.
3. Sakharkar BM. Principles of Hospital Administration and Planning. 1st Ed. New. Delhi: Jaypee Brothers Medical Publishers Ltd, 2006, pp.71.
4. Bekes C. Recommendations for Categorization of Services for the critically ill Patients. Chicago: Society of Critical Care Medicine Guidelines, 1990, pp.34-48.
5. Gupta S. and Kant S. Quality and Hospital Housekeeping: Emerging Issues and Future Dimensions. JK Science, 3(2), 2001, pp.94-97
6. Francis CM and De Souza MC. Hospital Administration. 3rd Ed New Delhi: Jaypee Brothers Medical Publishers Ltd, 2004, pp.318.
7. Porter M. What is strategy? Harvard Business Review, Boston, MA, 1996. Available at: http:// www.ipocongress.ru/download/guide/article/what_is_strategy.pdf [Accessed: 25/07/13].
8. Carey M. Continuous Quality Improvement. Published for the U.S. Department of Justice by the Centre for Effective Public Policy (CEPP), 2010 Available from: http:// http://www.cepp.com/ documents/Continuous%20Quality%20Improvement.pdf [Accessed: 20/07/13].
9. Hermida J. Scaling Up and Institutionalizing Continuous Quality Improvement in the Free Maternity and Child Care Program in Ecuador. Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project, Latin America and Caribbean Regional Health Sector Reform Initiative (LACHSR), Report Number 65, 2005, pp.20.
10. Goldhill DR. Preventing Surgical Deaths: Critical Care and Intensive Care Outreach Services in the Postoperative Period. British Journal of Anaesthesia, 95(1), 2005, pp.88-94.
11. Rowe G. and Wright G. The Delphi Technique as a Forecasting Tool: Issues and Analysis. International Journal of Forecasting, 15 (4), 1999, pp.353-75.
12. Hilbert M., Miles I. and Othmer J. Foresight Tools for Participative Policy-making in Inter-governmental Processes in Developing Countries: Lessons Learned from the eLAC Policy Priorities Delphi. Technological Forecasting and Social Change, 76 (7), 2009, pp.880-96.
13. Tapio P. Disaggregative Policy Delphi: Using Cluster Analysis as a Tool for Systematic Scenario Formation. Technological Forecasting and Social Change, 70(1), 2003, pp.83-101.
14. Hasson F., Keeney S. and McKenna H. Research Guidelines for the Delphi Survey Technique.

Journal of Advanced Nursing, 32(4), 2000, pp.1008-15.
15. Keeney S., Hasson F. and McKenna H. Consulting the Oracle: Ten Lessons from Using the Delphi Technique in Nursing Research. Journal of Advanced Nursing, 53(2), 2006, pp.205-12.
16. Eto H. The Suitability of Technology Forecasting/ Foresight Methods for Decision Systems and Strategy: a Japanese view. Technological Forecasting and Social Change, 70, 2003, pp. 231-249.
17. Mullen PM. Delphi: myths and reality. Journal of Health Organization and Management, 17 (1), 2003, pp.37-52.

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