Methodological Guide to Develop and Strengthen the Ministry of Health’s Continuous Quality Improvement

Country: Belize

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Introduction

Despite the significant progress achieved by the country in providing care and reducing maternal and neonatal mortality rates, there are still concerns among health authorities and health service providers with regard to further improving access, opportunities and, above all, the quality of care at facilities at all levels within the service networks. As a result of this, Belize has attained important and varied progress in the last few years in regard to developing and strengthening public policies, approaches, tools, and capabilities to apply and take advantage of the approach for continuous quality improvement, by means of various initiatives implemented mainly with the support of external cooperation.

However, the country is currently advancing toward a new stage in its efforts to develop and strengthen a strategy for continuous quality improvement. Thus, it needs a specific, simple, and practical step-by-step guide to implement the methodological approach and the set of criteria and tools to be used by CQI teams at the various operational and directive levels to help them achieve expected outcomes. These important inputs constitute the core contents of this guide, which seeks to streamline the short-term standardized and validated management and use of the continuous quality improvement approach for clinical management, seeking to develop it and expand it to all the health-service networks in the country.

Objectives of the Continuous Quality Improvement Strategy

1. To provide step-by-step guidelines, approaches, and techniques to implement Continuous Quality Improvement (CQI) in facilities within the Ministry of Health’s service networks, following the CQI policy and strategy in the country.
2. To support human-resources development to further continuous health care quality improvement, especially in maternal and neonatal health care institutions.

Methodological Guide to Develop and Strengthen CQI

In order to attain the methodological development that allows effective implementation of continuous quality improvement, it is important to always keep in mind the basic concept of quality, as we understand it, described in the national strategy for continuous quality improvement:

Quality “is the proper performance (according to standards) of interventions that are known to be safe, that are affordable to the society in question, and that have the ability to produce an impact on mortality, morbidity, disability, and malnutrition.”

Based on the concept put forward by WHO’s M. I. Roemer and C. Montoya Aguilar, in 19881.

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Thus, the methodological approach to developing and strengthening continuous quality improvement is based and follows the three great components of the triangle and the various steps of the continuous quality improvement cycle shown below:

**First Component of the Quality Triangle**

**First Step: Planning**

The process should start by establishing the HEALTH CARE SYSTEMS and PROCESSES and/or PROCEDURES that will be addressed as a priority in health facilities with a continuous quality improvement approach. The quantity and variety of systems and processes, both for health care and health management, are generally extensive and complex, so that in order to select truly essential systems and processes in which to concentrate full attention and efforts to ensure adequate quality performance, first, it is important to take into account the “Map of Systems and Processes” of a health-service organization.

According to the systematic approach, there are three types of systems and their processes:

1. Final and Substantive –also called Mission or Clinical Management– Systems and Processes, which constitute the fundamental purpose of the relevant service unit. These include maternal and child care, surgical care, and outpatient care systems and processes, among
others. They also include referrals and counter-referrals from different levels of complexity within health-service networks. Their product is focused and aimed at end-user populations.

2. Intermediate or Support Systems and Processes are those that are not related to the mission or the fundamental purpose of the Health Unit. However, their production is essential and they constitute fundamental inputs to produce final or substantive systems and processes. They are grouped according to three overall types:
   a) Diagnosis-support systems and processes, such as clinical laboratories, medical imaging, electrocardiography, histopathology, and exfoliative cytology, among others.
   b) Therapeutic support systems and processes, such as pharmacies, radiotherapy, ventilation therapy, chemotherapy, blood bank, and nutrition, among others.
   c) Technical support systems and processes, such as solid-waste management, laundry services, medical equipment, cleaning, infrastructure maintenance, and technical equipment, among others.

3. General or management and administrative-financial support systems and processes. Overall, they provide support to all the other organizational systems and processes, such as the financial and budget systems, and the planning, information, control, human-resource development, and supply systems.

![Figure 2: Process Map](image)

It is essential to consider the process map within the systemic approach, as there may be a maternal or neonatal death whose most important causal factors may lie in the Supply System or the Human Resources Department because there were no supplies, medicines, or trained staff available at critical times. There are other instances in which the causes may lie in the admission processes, which are slow and bureaucratic and have considerable impact on the third delay. Perhaps non-compliance with a clinical-practice guide or with safety criteria to provide clinical care, such as using AMTSL or partograms, could be a critical causal factor. Sometimes, causes could stem from the
Transportation System, if there is a lack of appropriate transportation that is needed at the time required to opportunistically and effectively move a patient.

Other causal factors could be unsafe conditions in delivery rooms, the lack of equipment in good conditions, or the clothing needed for emergency surgery. In short, there is a wide variety of causal factors and it may involve several systems and some of their processes. Thus, it is important to apply an integral systemic approach that will allow considering all systems to select and address those in their critical processes that ensure appropriate performance, in accordance to quality standards.

To select and prioritize health care systems and/or health management, integral quality management must be addressed, and efforts to that end should be undertaken. To that end, CQI teams must apply the following criteria:

1. Selecting 20% of those health care systems and processes that constitute 80% of the volume of care provided by the unit. That is, the ones that take up 80% or more of the Unit teams' time and efforts when they provide care to groups of users. They represent 80% or more of the daily care provided by the unit. Consequently, they must be controlled and they must achieve adequate quality performance, in accordance with quality standards.

2. Selecting those processes within the substantive or fundamental health care systems that are critical because when care is provided, they generally compromise and cause significant impact on the life or quality of life of the people who receive care at the unit. That is, those that impact the most on the mortality and morbidity of the population who demand these services, even if there are few cases. For example, those cases which require emergency obstetric care due to hemorrhaging, severe hypertension, or sepsis; care for newborns with respiratory, infectious or other critical complications, among others.

3. Selecting those systems and processes that have the most impact and demand the greatest resources is essential. They must be duly and continuously controlled, and teams must ensure a quality performance in accordance to standards, in order to guarantee that resources will be adequately used and, above all, there is availability to fund proper performance of the other systems and processes within the unit. These processes include the processes to compensate staff, to purchase medical supplies and food, and to operate critical care and very complex units, among others.

The quality teams at units and at different levels must ensure quality performance in at least these systems and processes, ensuring quality, effective, timely, and safe care and services for all the user populations. Then, efforts should be expanded to other systems and processes, according to the needs that are identified and to teams' capabilities.

According to the Continuous Quality Improvement Strategy, the Maternal and Neonatal Care and Family Planning system has been prioritized, including pre-natal care, care during delivery and the post-partum period, and neonatal care, among other critical ones.

Once the systems and processes to be addressed have been selected, it is important to consider that a duplication of efforts could arise in many of these processes and that errors could occur in their execution, placing users at risk. In emergency services, it is important to bear in mind that
speed and timeliness in providing care is critical, and that any delays could result in serious consequences to the life of the individuals receiving care. In addition, there could be excessive waste of resources, which can affect the institution’s productivity, efficiency, and finances and/or the product obtained, which may not be acceptable to groups of users or could fail to meet their needs. Thus, before continuing with Step 2, it is important to ensure that optimal processes are in place. This means processes that are undertaken according to the steps required, in the established order, so that patients are put at the least possible risk and so that they are provided the greatest benefits currently made available by medical science and technology.

Flow charts are the appropriate tools to be used to document the steps or activities for each process. They will clearly show the care or management processes involved, so that they are understandable to everyone. Flow charts are a tool that help staff and actors in the health care unit to carefully track all significant events in the care or management processes, “with the aim of establishing more precisely what is happening, how it is happening, and why it could be happening” (Annie E. Casey Foundation, 2003). The following stages are required in order to design flow charts:

- Clearly defining the beginning of the process
- Defining each step of the process to produce a product or service
- Using symbols adequately
- Ensuring that each step has an exit
- Generally, an arrow comes out of process blocks, it this is not so, the use of a decision block is required.

Detailed flow charts provide teams with a schematic view of all and each one of the steps undertaken for its development. They identify those steps that are superfluous or do not add any value to the final product or service, those that are missing and must be added, those whose sequence is not adequate and must be modified, those that constitute bottlenecks that must be eliminated if they do not add value or that must be substituted for others that add the value required and, at the same time, eliminate the bottleneck that has been identified. In essence, it is a tool that expedites systematically reflecting, analyzing, and discovering the patterns favoring or hampering change and continuous improvement, with the aim of ensuring quality, expediency, and opportunities in the care and services provided. It is a useful tool to examine how the steps of a process are interrelated. It uses symbols to create a graph or to recognize the type of step or operation that must be undertaken. The most common and basic signs used in a flow chart are the following:
Figure 3: Flow Chart Symbols

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINES THE BEGINNING OR END OF THE PROCESS</td>
<td></td>
</tr>
<tr>
<td>DECISION BLOCK</td>
<td></td>
</tr>
<tr>
<td>PROCESS BLOCK OR BLOCK FOR UNQUESTIONABLE ACTIVITIES ABSOLUTE EVENTS</td>
<td></td>
</tr>
<tr>
<td>CONNECTIONS FOR THE FLOW OF ACTIVITIES AND DECISIONS</td>
<td></td>
</tr>
</tbody>
</table>

Advantages of flow charts include:
- They describe a real process.
- They promote participation by people who have information.
- They provide a general understanding of the process.
- They show possible problems and bottlenecks.
- They help to guide discussions on how to identify gaps, variations, or problems.

Analyzing and Optimizing Processes

In order to analyze and optimize processes, the steps and activities involved in the processes must be documented. In practice, this is accomplished by using a flow chart as described above; having the team review it and answering the following questions for each step:
- Is this step necessary? Does it add any value? If the answer is no, the step should be eliminated.
- Are there delays or bottlenecks? If the answer is yes, the step should be eliminated or substituted by a step that adds equal or more value and eliminates the bottleneck.
- Is the step sequence appropriate? If it is not, steps should be placed in the proper order.
- Is any step missing? If the answer is yes, add the corresponding step.

Instrument No. 01 is recommended to document and optimize processes. It is attached and included in the Toolbox in Excel format.

To develop the flow chart, it is necessary to implement a wide range of qualitative techniques, such as: individual interviews, focus groups, observing the (formal and informal) activities and steps that constitute the process, measuring down-time and up-time, records (by members of the team and/or institutional actors), photographs, and videos, among others.

Once the selected systems and their processes have been addressed through the CQI strategy and each of them has been documented and “optimized”, it is time to continue with the second step of the CQI cycle.
Second Step: Designing / Selecting Quality Standards, Indicators, and Thresholds

This step entails selecting the indicators and thresholds available in the official normative inventory to ensure that the critical processes that have previously been selected and optimized have the set of quality standards that ensure adequate performance and provision of quality services once they have been effectively shared and applied by the teams in charge.

To that end, the set of standards or norms that define the expected quality levels for each of the processes previously selected are identified and defined. “Norm or Standard” is understood as a statement of the expected quality, expressed as execution norms or standards, specifications, clinical-practice guides or protocols, and administrative / managerial procedures. The best evidence-based national and international practices currently existing must be considered and taken into account.

In order to better understand this process, let us imagine that it is a highway or road, and that the norms or standards are the road signs. If drivers (service providers) drive with sufficient regard and compliance with these signs (norms), we can assure that their performance at the wheel will have been good when then arrive at their destination.

According to the systemic approach, norms or standards can be:

1. Entrance or specification standards or norms: statements of the specific requirements of the medical-surgical equipment, buildings, furnishings, materials, and supplies that are necessary to deliver services.
2. Process standards or norms: clinical-practice guides on protocols pertaining to the statements and technical criteria that guide the decisions and the actions to be undertaken by the health team. They can also be included in administrative and managerial processes: written procedures to guide the actions of technical-support and management staff.
3. Outcomes standards or norms: a quantitative statement of the outcomes expected from delivering clinical or support services.

Stages that Must Be Undertaken to Design Health Care and/or Health Management Standards

A proper design of norms or standards is based on the dimensions of quality, defined as the critical factors whose achievement CANNOT be absent from the relevant process, since their non-achievement constitutes a risk and/or the lack of an essential aspect of process performance or operation, which ultimately affects its quality and the quality of the outcome or the service to be provided. Thus, it is essential to consider the best evidence-based practices at the national and international levels that are available and that are feasible in the local context. Non-achievement of one or several of these factors will hamper quality provision in the relevant process, as well as in the quality of its product or the service to be provided to user populations.

Stage 1: It is essential to establish the critical factors that must be controlled in order to achieve quality in every health care or health management process and according to this determination, the dimensions of quality directly related to it must be identified. According to the US Joint Commission on Accreditation of Health Care Organizations, there are eight dimensions of quality for health care, which are named and described below.

a) Technical expertise: The current level of knowledge, skills, capabilities, and performance of clinical, technical-support, and administrative staff.
b) Access to services: The extent to which health service provision is not restricted by geographic, economic, social, cultural, organizational, or linguistic barriers. It includes the celerity and the timeliness in providing required services according to the specific conditions and needs of user populations.

c) Efficacy: The extent to which a procedure that is applied and its expected outcomes are related. These outcomes are expressed in terms of service-provision and guidance norms. Level in which health needs are resolved by service providers.

d) Inter-personal relationships: The quality of the interactions among providers and clients, managers and service providers, and the health team and the community. This includes humane treatment and respect for individuals and for their culture, values, and beliefs.

e) Efficiency: Providing the greatest possible benefits with the resources available. This is very important, since the resources available to provide care are generally very limited. It implies the greatest productivity and the greatest coverage, taking advantage and making the best use of available resources.

f) Continuity: The extent to which clients receive the whole range of services that they need, without any interruptions, suspensions, or unnecessary repetitions of testing, diagnoses or treatment.

g) Safety: The measure in which the set of benefits to be provided and the risks faced by the patient are related. These benefits and risks are expressed in terms of the norms to provide services and clinical guidance. They include evidence-based practices with proven effectiveness, safety, and minimum exposure to risks.

h) Comfort: Health-service characteristics that are not directly related to clinical efficacy, but that add value and increase client satisfaction and clients’ desire to return in the future.

**Stage 2:** Once the dimensions of quality—which constitute the critical factors that must be controlled to ensure the quality of a specific health care or health management process—have been identified, the next step is to describe the desirable condition or situation, by means of a clear, concrete, simple and complete statement, understandable to all, which will constitute the “quality norm or standard”. The official norm must be considered for this step, if it is available. If it is not available, the statement is written according to the recommendations described above.

The “norms or standards” must meet the following criteria. They must be:
- Valid: Whether the outcomes of the health system actually represent the expected levels of quality, within the relevant dimensions.
- Trustworthy: It must consistently render the same outcomes every time it is used.
- Clear: It must not give rise to confusion or ambiguity. It means that it must be perfectly understandable to all the staff who is responsible for its management.
- Realistic: Standards that are too high or unreachable generate frustration for the team. They must be feasible, according to the material, physical, financial, and human resources that are available and the conditions of the local health system. Conversely, standards that are too easy to achieve do not encourage continuous service improvement.
- Dynamic: As improvements are introduced into the processes and new technology is incorporated, the standard is modified.

**Stage 3:** Defining the key indicators to measure desired norms or standards. The norms or standards are generally expressed as a qualitative statement of the situation that is desired, in
terms of the critical factor or dimensions of quality relevant to the process being analyzed. However, if quality is not measured and there are no data pertaining to it, it will not be possible to improve it. Thus, to translate this qualitative language into a quantitative and measurable language, key indicators must be defined and used, based on a detailed description of the technical criteria that must be met, in order to measure each of the desired norms or standards. It is important to bear in mind that some quality norms may require more than one indicator to ensure its complete and comprehensive measurement.

According to the Continuous Quality Improvement Strategy, an indicator is defined as a measurable variable used to track quality. According to its most simple definition, an indicator is a measuring unit that we can use to estimate achievement of quality standards or norms in measurable or quantifiable terms. We can discuss, state, and value quality norms in a quantitative way. Indicators constitute a set of organized data. The most widely used indicators are: rates, percentages, time, hours, days, and costs, among others.

**Stage 4:** Deciding which indicators need thresholds, or a margin established by the team as normal, considering it as the acceptable normal margin for outcomes. Next, achievement of the relevant norm should be monitored within the corresponding process.

Basically, a threshold is a normality range or margin that will be acceptable for performance and outcomes of a process. A threshold is the range between the minimum and maximum limits that determine if the performance and outcomes for the process are accepted as normal or not. Beyond these limits, the team will have to make a decision. Generally, a threshold should be defined for every indicator, although there are some indicators that do not allow setting a normality margin or threshold. Instrument No. 02 is suggested in order to standardize each process. It is included in the Toolbox Annex in Excel format.

**Third Step: Sharing Goals and Norms, Indicators and Thresholds**

This step involves sharing information and training periodically and continually in order to ensure that all team and unit members are aware of, understand, and commit to achieving them. Some norms are so easy to understand that sharing them is simple and easy, but others are complex, and require complete training processes to ensure their comprehension and effective and appropriate management.

Subsequently, the work teams at health units must implement and undertake optimized health care processes with their user populations, achieving the quality norms previously established, which include the official Ministry of Health’s health care and health management practices in every level of care.

**Second Component of the Quality Triangle**

Achievement of established norms to provide quality care must be monitored or verified, recording the information of their achievement in the Ministry of Health’s forms and instruments currently available or in those that are designed for this purpose.
Fourth Step: Performing Surveillance of Health-Care and/or Health-Management Processes

This surveillance entails periodically and continuously verifying the achievement of the quality standards established for each one of the critical processes that have been previously selected. Surveillance is comparing situations that have previously been defined as desirable (quality standards and norms) and reality or performance in daily practice of the selected critical care and/or management processes. This comparison will enable subsequently identifying and analyzing gaps, variations, or improvement opportunities to then propose interventions to prevent, minimize, correct, or update them.

In order to do this surveillance, a system must be implemented to provide streamlined, concrete, complete, and timely information about the performance of health care and health management processes and their outcomes, thus enabling proper verification of their performance and determining whether their performance is adequate; that is, if it consistent with the set of quality norms and if it complies with them, thus assuring due quality in health performance and outcomes. In order to implement such a system, the following must be undertaken:

- Information plan to record and measure quality
- Reviewing, adjusting and/or designing recording / process instruments
- Reviewing, adjusting and/or designing measurement / process instruments
- Reviewing and adjusting dashboards to be used for information / process

**Figure 4**: Stages of Surveillance of Process Performance

**Stage I**: Planning to determine what information is required to document the achievement of each one of the indicators with their previously-defined criteria, based on evidence. This stage implies foreseeing the following for every indicator pertaining to each process, in order to verify its performance:

- What basic information is required to identify where—in what region, district, unit, or process—there could be a variation in achieving said indicator and who is responsible for its management.
- Defining the formula that must be measured for each indicator, clearly specifying its numerator and its denominator.
- Identifying the source from which to obtain the information required for each selected indicator, in order to verify objectively and quantitatively the degree or level of its achievement. In general, the source varies according to the numerator and the denominator of the indicator that is being measured. Furthermore, it will also depend on
whether or not there are primary records and in case they do exist, whether or not there is a report integrating them. If they do not exist, and depending on the dimension of quality that is being measured, the primary source could be the patient. We will understand this better if we analyze the following figure of the systemic approach, which is essential for the quality management approach:

![Quality-Management Systemic Approach](image)

**Figure 5:** Quality-Management Systemic Approach

For example, in those cases in which the dimension of quality is *humane treatment and personal inter-relations*, the source for the numerator is the users themselves, since there are no instruments to record their habitual perception of the way in which they were treated and the services provided to them. On the other hand, when the dimensions of quality are *technical safety and technical expertise*, the most frequent source for the numerator is the clinical file or the records kept of the services involved in the development of the relevant process, such as the logs kept in delivery rooms, recovery rooms, and operating rooms, among others. In the case of dimensions such as speed and time spent in care, the source for the numerator can be the data recorded in special registries that must be generated to measure time or in modified clinical files. As far as efficacy is concerned, the reports on morbidity and mortality or on the production of services provided by the units could be the sources. Thus, sources vary according to each case. In most cases, the source to obtain data on denominators corresponds to records of monthly production of the services that are available in the Statistics Unit, aimed at identifying the total of cases that have been covered.

- **Selecting the technique to be used to obtain said information.** During this stage, it is important to remember that, within the quality approach there is a considerable number of different techniques than can be used to gather information, and that it must be selected according to the source and the sample established by the specific indicators. Let us examine some examples. Whenever the patients themselves are the source, such as for the dimension of user satisfaction for which there are no habitual records of their perceptions, some methods that may be considered are guided exit interviews, complaint books or boxes, focus groups, mystery client techniques, among others. In other cases, such as
measuring timeliness and speed of care, timekeeping techniques could be used. Other techniques include medical auditing for those cases in which the efficacy dimension is to be measured when providing care to patients. Other techniques include direct observation, in the case of managing certain specific practices (technical safety) such as habitual neonatal care, AMTSL or others. Other dimensions can be supported by cameras placed in special services, which can be used to film clinical staff’s management and compliance with certain criteria, especially during weekend and night shifts. These recordings can then be discussed at a video forum with quality teams and relevant providers, among others.

- **Establishing a sample to consider.** In cases in which reviewing clinical files is warranted, various authors suggest a sample of 16 to 19 files, if there is a significant volume of care. The Lot Quality Acceptance Sampling (LQAS) methodology, used in research on the coverage of various health programs, establishes that 19 files provide a 95 percent confidence interval in each lot of 19 clinical files\(^2\). CLAP recommends 20 clinical files, which provide a significant sample. Whenever there is a smaller caseload handled by the unit, it is recommended that 100% of cases handled during the measuring period be reviewed, as is usual in handling complications in those units where demand is not too high. As for focus groups, mystery clients, medical audits, among others, the cases can be few or even very few, but their results are always very valuable to assess quality and continuous improvement, since the technique is more important than the sample itself.

- **Deciding how frequently data must be gathered.** Short data-gathering cycles are critical. The period must be no more than 4 to 6 weeks in order to see immediate results. In certain cases, frequency will depend on team and human-resources limitations, as well as on a very busy work load and multiple responsibilities. Another factor that must be considered is the volume of the demand for services. In cases of external measuring, it is recommended that the measurement frequency is no greater than every three months, so that there is a proper level of data-validity auditing and proper management of the appropriate recording / measuring techniques and instruments.

- **Persons in charge of gathering information.** Generally, the persons in charge of gathering information to measure quality are the members of the CQI teams, but a second external and independent measurement is always recommended. In addition to providing certainty of data, and measurement and continuous improvement of health care systems, external measuring teams must include the following as part of their activities:
  - Provide in-service training for new members of CQI teams, since there is continuous staff turnover in these teams.
  - Provide continuous support to CQI teams in their measuring and designing processes, as well as in following up to ensure that improvement plans are actually implemented and expected results are achieved.
  - Transfer requests and undertake procedures at relevant levels and departments for critical and indispensable policies, norms, instruments, supplies, equipment, and resources to provide quality care and that are NOT available or cannot be resolved at the local level.

- Disseminate successful and innovative experiences, lessons learned, and challenges faced.
- Periodically promote and coordinate Collaboratives with the teams from the various levels of the service networks for which they are responsible, in order to facilitate quick learning and replication of these experiences to other services and units that also need them, among other important roles.

The purpose of the external measuring team is to prevent data mistakes, not find individuals responsible for them or punish them in any way. A team-development, preventive approach must prevail, and small victories must be celebrated systematically.

Excel instrument No. 03 included in the Toolbox is used for this stage. It describes each of the indicators that have been defined, their formulas, source, basic and complementary information to be gathered and used, techniques, samples, gathering frequency, and those responsible for gathering said data.

**Stage II**: Designing information-gathering instruments. Whenever the information required is not available in electronic format in the Ministry of Health’s official databases or registries, an instrument must be identified or designed to periodically and continuously acquire, record, and gather relevant information, starting with basic and complementary information previously identified in the first step described above.

This technique ensures forms to capture data are developed, aimed at recording and gathering only the information that is important and useful, eliminating redundancies and time-wasters, as well as the valuable resources of the health unit. These forms eliminate duplications in records and they also become working instruments and reports. They also simplify standardization and uniformity of the information to be recorded / stored. Lastly, they constitute a complete database of the performance and outcomes of each quality indicator that must be complied with, thus expediting and enabling the development of all kinds of specific complementary reports that may be achieved by the quality teams, supervisors, technical and executive staff and authorities of the Ministry of Health.

A critical factor that must be subjected to continuous improvement is the proper organization of registries, whether they are clinical files, logbooks of the care that has been provided. Organized registries not only enable correct and systematic recording by service providers, but also by measuring teams, reducing times and expediting measurements based on evident and consistent data, duly registered and ordered by sources. Very frequently, CQI teams can undertake or suggest improvements to recording instruments in order to simplify their use and appropriate recording by those in charge.

**Stage III**: Designing / adjusting the measurement instruments required to verify achievement of standards, by means of its indicators with their corresponding essential criteria. These measurement instruments can be printed instruments that are available and being used by the Ministry of Health, or they can be electronic data duly incorporated into a database used electronically by means of tablets. In this case, it will be necessary to review / update them, and to ensure that the criteria that have been defined for each indicator are duly described in said instruments. If they do not exist, teams must design, validate, and adjust them.
**Stage IV:** Designing the instrument to verify outcome achievement (dashboard or control board). Dashboards help to organize measurement results and show them graphically so that improvement teams can analyze them in a participative and objective manner. This instrument must:

- Be simple, practical, and easy to apply.
- Show achievement of expected results graphically and quickly.
- Be objective, eliminating any possibility of different interpretations by team members.
- Be precise in its identification of indicators that are not being achieved and their degree of variation.
- Be easy to interpret, facilitating opportune corrective measures.
- Enable follow-up over time, keeping a standardized historical record of the progress achieved.
- Expedite comparative analysis among various units, with technical purposes and to stimulate competition for incentives.

It is important to remember that CQI teams need the following essential information for their analyses. This information ranges from a general level to a detailed level of analysis:

a. There can be no quality without a systemic or process approach. Therefore, in order to visualize the results of quality measurements, it is essential that CQI teams see the results of all the *care processes* that have been measured in their health care system, as the starting point for their analysis.

b. Next, they must be able to visualize the results obtained by all the indicators of each process being measured.

c. Afterwards, the results for the achievements of all the criteria of each indicator must be further analyzed and viewed.

d. Then, teams must consider the trend in achievements comprehensively and throughout time, both for processes and for their indicators and criteria, by indicator being measured.

e. Lastly, they must examine the various intersections of critical variables, for example the results of achievements in one indicator and their impact on the immediate health outcomes of their unit, as well as the results and impacts on morbidity, mortality, disability, or malnutrition, according to the user population being provided services: mothers or newborns, in our case.

This approach that goes from general to detailed considerations, undertaken systematically, progressively, and sequentially, will help teams identify and select the most critical gap(s) to be addressed by their improvement plans.

The analysis requires various types of graphs, including bar graphs using the colors of traffic lights: green for the percentage of achievements and red for the gap that has been identified and is hampering 100% achievement and achieving the quality performance in each one of these processes. It might also be helpful to show the percentage of achievement in these processes and indicators for each one of the processes being measured (levels a and b of result analysis). Please see an example below.
**Figure 6:** Example Dashboard: average achievement for overall hospital processes, with the level of achievement for one of its indicators per measurement.

The dashboard could be complemented with bar graphs to show the results for achievement of each criteria by measured indicator (level C analysis).

**Graph 1:** Behavior and Performance at Different Measuring Periods.
Another very important graph shows the behavior or performance, over one or several years, in different measuring periods (levels d and e), as can be seen in the example below, which shows the trend in compliance and the gaps in various processes of maternal and neonatal health care and family planning, complemented by a trend in compliance or performance of their respective indicators in various measuring periods.

**Figure 7:** Example: other performance trends by process and their respective indicators over time

Other graphs, such as heat maps, can be used by CQI teams to organize dashboards or control boards at the local level, even though their use is most important and beneficial at the strategic or higher level. These heat maps can be used to show the level of performance for various criteria to be applied in each indicator of the health care processes being measured throughout time: not met in red and met in green (100% compliance). Please see an example below.

<table>
<thead>
<tr>
<th>% of newborns with ASPHYXIA managed according to the norm</th>
<th>Assessed by a physician</th>
<th>Pre-term or meconium aspiration or hypotonic or does not breathe or does not cry</th>
<th>Warm chain (warm sheets, radiant warmers or incubators)</th>
<th>Heart rate</th>
<th>Respiratory rate</th>
<th>APGAR</th>
<th>Oxygen mask or hood/cone, headbox, nasal cannula or mechanical ventilator or oxygen tank or Ambu bag (CPPV)</th>
<th>Referral to higher level for resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of newborns that receive immediate attention according to official protocols</td>
<td>% of newborns with asphyxia complications that are managed according to official norms</td>
<td>% of newborns with sepsis complications that are managed according to official norms</td>
<td>% of underweight and premature newborns that are managed according to official norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate care from the nurse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1:** Example: heat map for trends in compliance with criteria, by indicator and process.
Lastly, it is very important to use system modelling techniques to help CQI teams show in a quick, objective, and comprehensive manner, the way in which the various processes and their respective quality norms (better practices) are operating within the overall health care system and, initially, in the maternal and neonatal health care and family planning system to generate specific immediate outcomes regarding morbidity, mortality, disability, and/or malnutrition among the population being served at the relevant EONC operating level.

This technique lets teams identify the efficacy / effectiveness generated by the appropriate use of the various practices or norms with their quality indicators and criteria and the effect on direct immediate outcomes (products or services), which can originate direct medium-term effects for those who use them (for example, change in habits, attitudes and use of good practices) and more indirect long-term results (for example, reducing prevalence of pre-term births / low birth weight or reducing the rates of maternal and neonatal mortality) in the user population and the benefitted community in general.

Generally, the medium-term observable and measurable outcomes in the changes of behavior, attitudes and practices of the population being served and long-term observable and measurable outcomes impacting the levels of health and life of the population being served usually create other factors that may directly or indirectly contribute to their achievement, such as education levels, income, culture, and access to employment, among others. In order to measure them, specific medium- and long-term studies and research are usually required. However, in the very short term, it is possible to establish some hypotheses and to identify some immediate outcomes that may, in some measure, be directly attributable to the proper management of the good practices pertaining to the processes that constitute a health care system—in our case, maternal and neonatal health care and family planning.

It is possible, for example, to observe the relations and the impact created by using the partogram and making decisions based on it in a timely and appropriate manner (timeliness, efficacy, effectiveness) on the immediate outcomes, represented by the number and severity of neonatal asphyxia cases in the same obstetric-care, basic EONC and complete EONC facility. Using this technique requires a participative team exercise and posing questions such as:

What IMPACTS does adequate / inadequate handling of this practice have on the immediate outcomes for mothers and newborns?

This exercise helps to develop and strengthen a systemic, holistic, and comprehensive vision of all processes and their good practices, as a whole, identifying their inter-relations and immediate results, which can somehow be attributed directly and as an immediate consequence of the opportune and/or effective management of said practices on the health of the user population. Thus, the dashboard or control board could also include some trend graphs that intersect two or more variables. On the one hand, the quality indicators for the health care process and on the other, indicators with their immediate products or outcomes (to be obtained from traditional programmatic information systems or service-production statistics), enabling CQI teams to undertake analyses that will help them to continuously and systematically identify the impact, in
terms of immediate outcomes, of appropriate or inappropriate handling of good health care practices and to take the corrective measures opportune and continuously, if necessary, to provide quality services that guarantee the greatest benefits from medical science and technology with the least risk to user populations.

Below are examples of trend graphs resulting from applying the **system modelling** quality technique:

![Example of the Effect of Reducing Neonatal Asphyxia as a Result of Adequate Partogram Management](image1)

![Example of the Effect of Reducing Hemorrhage Complications at the Intra-Hospital Level as a Result of Appropriately Using AMSTL](image2)

**Figure 8:** Examples: immediate direct effect of the efficacy of achieving the standard for the level of health of the population being served

Consolidated information from various health care units also allows analyzing the results of measuring efforts by the technical staff in charge of quality in the various regional levels and service networks, or at the national level. It is important to always show and analyze the SAME PROCESSES, INDICATORS AND CRITERIA used by CQI teams in health care units. The difference is that at this higher level, it is necessary to show compliance by the set of health care units under the relevant Region, Network, or District. The use of **heat maps** is especially recommended, since they allow the higher Ministry of Health authorities to:

- Identify the AVERAGE percentage of compliance with each and every one of the service units in each one of maternal and neonatal health care and family planning PROCESSES that are being addressed, as well as the percentage of compliance with their respective indicators and criteria, by indicator.
- Identify the quality in the various health care units under it in a quick, simple, and comprehensive manner and to identify those health care units in their region or district that have the most problems with compliance of those processes, indicators and/or criteria in which there is poor compliance and thus require greater attention and support, so that the CQI teams in charge can improve their quality performance. By using these graphs, higher authorities can
identify where, in what unit, or in what process there was a variation in compliance with said indicator, and which criteria are not being met. Following are some examples:
## Heat Map on Compliance with Processes by Region / District

<table>
<thead>
<tr>
<th>Health Unit</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Care of labor and delivery</td>
</tr>
<tr>
<td>Reg. H. Orange Walk (Northern Reg.)</td>
<td>63%</td>
</tr>
<tr>
<td>Urban HC. Orange Walk</td>
<td>80%</td>
</tr>
<tr>
<td>Urban HC. Corozal</td>
<td>65%</td>
</tr>
<tr>
<td>Com. H. Corozal</td>
<td>91%</td>
</tr>
</tbody>
</table>

Table 2: Example: heat map for process compliance by region / district

## Heat Map on Compliance of Criteria by Indicator of Units of a Region / District

<table>
<thead>
<tr>
<th>Health Unit</th>
<th>Compliance of Indicator Criteria: Perinatal Asphyxia Care according to Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assessed by a physician</td>
</tr>
<tr>
<td>Reg. H. Orange Walk (Northern Reg.)</td>
<td>66%</td>
</tr>
<tr>
<td>Urban HC. Orange Walk</td>
<td>88%</td>
</tr>
<tr>
<td>Urban HC. Corozal</td>
<td>56%</td>
</tr>
<tr>
<td>Com. H. Corozal</td>
<td>97%</td>
</tr>
</tbody>
</table>

Table 3: Example: heat map for criteria compliance by indicator and region / district
Another example of a heat map is shown below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indicators</td>
<td>Indicators</td>
<td>Indicators</td>
<td>Indicators</td>
<td>Indicators</td>
</tr>
<tr>
<td>Unit / District</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>1. XXXXXXXXX</td>
<td>25%</td>
<td>60%</td>
<td>71%</td>
<td>88%</td>
<td>1</td>
</tr>
<tr>
<td>2. XXXXXXXXX</td>
<td>32%</td>
<td>67%</td>
<td>78%</td>
<td>95%</td>
<td>1</td>
</tr>
<tr>
<td>3. XXXXXXXXX</td>
<td>20%</td>
<td>61%</td>
<td>72%</td>
<td>89%</td>
<td>1</td>
</tr>
<tr>
<td>4. XXXXXXXXX</td>
<td>18%</td>
<td>59%</td>
<td>71%</td>
<td>88%</td>
<td>1</td>
</tr>
<tr>
<td>5. XXXXXXXXX</td>
<td>16%</td>
<td>58%</td>
<td>70%</td>
<td>87%</td>
<td>1</td>
</tr>
<tr>
<td>6. XXXXXXXXX</td>
<td>14%</td>
<td>57%</td>
<td>69%</td>
<td>86%</td>
<td>1</td>
</tr>
<tr>
<td>7. XXXXXXXXX</td>
<td>12%</td>
<td>56%</td>
<td>68%</td>
<td>85%</td>
<td>1</td>
</tr>
<tr>
<td>8. XXXXXXXXX</td>
<td>10%</td>
<td>55%</td>
<td>67%</td>
<td>84%</td>
<td>1</td>
</tr>
<tr>
<td>9. XXXXXXXXX</td>
<td>8%</td>
<td>54%</td>
<td>66%</td>
<td>83%</td>
<td>1</td>
</tr>
<tr>
<td>Average</td>
<td>18%</td>
<td>63%</td>
<td>74%</td>
<td>91%</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4: Example: compliance with indicators by coverage network / health care unit/ process

Whenever a higher-level authority identifies a process, indicator or specific criteria of interest, he/she must be able to access the trend graphs corresponding to the relevant health care unit, in order to complement the analysis and determine if the level of compliance is improving or deteriorating. This is essential for the decision-making process.

This analysis also identifies whether or not there is a gap or variation in achieving quality standards, also known as a problem or improvement opportunity. If there are any, the third component will be undertaken.

**Third Component of the Quality Triangle**

The gap, variation, or program is analyzed and its most important causes are identified and prioritized. In addition, the less costly and more feasible and effective interventions are defined and/or prioritized, and a plan to reduce them or eliminate them or a plan to improve or update them is developed. After implementing this plan, its evolution should continue to be monitored and systematically recorded. If there are continuous and permanent improvements, a new cycle begins, and so forth for each gap, variation, or improvement opportunity identified by teams during their continuous and systematic quality monitoring of the maternal and neonatal health care processes. This is also applicable to any other health care and/or health management process in the Ministry of Health’s service networks. During its development the following steps must be undertaken:

**Fifth Step: Identifying Gaps, Variations, Problems or Improvement Opportunities**

When quality standards and indicators of a health care or health management process are achieved, there is appropriate performance, according to the norms, and there is certainty that quality care is
being provided. Conversely, when the performance of a process in day-to-day practice shows that one or more of the quality indicators are not achieved, there is a gap, variation, or improvement opportunity. This becomes evident when reviewing the Dashboard or the Control Board, which compares the desired situation or norm against the actual performance that has been observed, by means of achieving the relevant quantity indicator(s). Let us examine the following example:

The desired quality norm or situation: In every patient’s delivery caregivers apply AMTSL to prevent and reduce maternal mortality as a result of hemorrhaging.

![Diagram](image)

**Figure 9: Identifying Gaps**

In other words, identifying gaps or variations is a comparative analysis of the situation desired or the quality norm and the performance that has been observed; that is, the result of complying with said norm. This is measured objectively by using one or more previously-defined indicators.

At this time, it is important to consider the **different scenarios** that could arise for the CQI team, which will determine whether or not the next steps should be undertaken:

1. During Phase 1 of the continuous improvement cycle, when optimization criteria are being applied and after documenting a particular health care process, a CQI team could identify important and obvious changes that must be implemented immediately; for example, eliminating several repetitive steps that do not add any value, generate more delays, or place the user at risk; or eliminating a bottleneck or adding a very important step that could help save lives or decrease the risks to the population being served, such as implementing a Triage. These cases constitute **quick improvement cycles** and do not warrant continuing to Step II.

2. Another possible scenario is that after the corresponding measurement, the CQI team identifies different criteria that are relatively easy to comply with and do not require significant time investment or analysis, such as making copies of an instrument,
providing guidance or increased supervision to professionals in charge of their compliance, among others. Then changes can be implemented immediately, without undertaking Step II. They are also considered quick improvement cycles.

3. Additionally, it is important to bear in mind that sometimes, a CQI team from another unit within the network or another similar service network has executed a successful, effective and/or innovative intervention that could be discussed, be the subject of a quick learning process by a collaborative team, and be implemented in a short period of time, without the need to engage in a cause-effect analysis for a gap that is common to other units.

4. If none of the previously-described scenarios arises and the CQI team has identified one or more important and significant gaps whose solution is not as immediate or as obvious, it must go on to Step II to analyze, identify, and prioritize their causes. These constitute complete quality improvement cycles.

Faced with this scenario, the dilemma for the CQI team is which gap or gaps will be selected in order to address their essential causes. To select which gap or gaps to address, the team might wish to answer the following question:

Which of the gaps identified in this step contribute the most or have the most impact on the health of the population being served?

Sometimes, teams will identify significant and/or frequent gaps, but there may also be a few whose percentage of non-compliance is not significant, but whose non-compliance is critical, as it can significantly contribute to performance of the relevant process that can generate considerable risk and contribute to the death or morbidity and/or severe disability of the population being served. Consequently, these gaps are a priority that must be addressed and improved as soon as possible. For example, teams sometimes identify inconsequential criteria that have not been complied with, such as recording normal delivery data in the patients’ clinical history or in a laboratory logbook, but perhaps in the process of providing emergency obstetric care to a patient with severe hypertension / severe eclampsia, important criteria are not being complied with and its immediate management is not being performed according to the norm. This generates frequent deaths or complications, such as neonatal and maternal disabilities. Thus, even if gaps do not constitute a very significant percentage of non-compliance, they can be crucial, and it is urgent that the CQI team address them and solve them, due to the imminent danger posed by them.

In other words, the criteria that must prevail for CQI teams to select the process, indicator, and criteria that represent the gap or gaps to be addressed and to identify / prioritize its causes in the subsequent step is the extent to which it contributes to placing the life of the user populations at risk. Once this gap has been selected, the team goes on to step II.

In some cases, depending on the seriousness of gaps or the number of staff and teams that are available at the particular health care unit, several gaps could be addressed simultaneously. For example, national or referral hospitals that have teams for specific processes—such as a labor and delivery team, an obstetric-emergency team, a neonatal ward team, among others—could create several CQI teams that address several gaps within those processes simultaneously. In other cases,
though, limited staff and their multiple responsibilities hamper their capabilities and it is only possible for them to address one gap at a time, in which case they should select the most important one.

Another aspect to bear in mind during this stage is how the gap, variation, problem, or improvement opportunity should be expressed in writing. It should be precise, concise, and very clear, so that the members of the team are completely certain of the priority issue to be addressed. In general, it will describe the “identified gap” exactly; for example: 50% of non-compliance with the criteria to apply Oxytocin according to the official norm. This provides a clear guide for team members and those responsible for providing care during delivery on what must be corrected to close that gap.

Sixth Step: Analyzing and Identifying the Key Causes of Gaps, Variations, Problems or Improvement Opportunities

This is the step in which CQI teams must engage in participative analysis of causes and effects that will allow generating and classifying various hypotheses on the possible causes of the gaps identified. Team members must identify all possible causes of the problem, gap, or improvement opportunity they have selected. Through this participatory analysis undertaken by the team, a great deal of information showing the links among gaps and their potential or actual causes can be properly organized. Furthermore, this process can provide an excellent means of generating ideas for the reason why the gap is occurring and the possible impacts it may have. This exercise also enables CQI teams to expand their ideas and their vision by means of a systemic, comprehensive, and inter-related perspective of one or several gaps or problems.

There are two ways to organize ideas graphically to perform a cause and effect analysis. They vary in the way they organize potential causes, that is: (a) by category, using a fishbone diagram (named after it shape) or an Ishikawa diagram (named after the individual who invented it), and (b) by a causal chain, called a tree diagram.

For this analysis, we mainly used cause-effect diagrams (fishbone or Ishikawa diagrams), which is a graphic representation of a gap, variation, problem, or effect with important branching that reflects the cause categories and the individual causes determining them. This type of analysis is used to explore or show all possible CAUSES for a gap, variation, or problem. It is useful because it identifies the root cause of the gap. It allows all members of the team to contribute and participate, integrating everybody’s ideas and seeking consensus on them.

However, it is important to remember that a cause-effect diagram is a structure used to express hypotheses on the causes of the gap. It cannot replace an empirical test of these hypotheses; it does not determine the root cause based on evidence, but rather, it determines potential causes. To analyze, identify, and prioritize the key causes that are generating the problem, gap, or variation, we use several tools, among them, the ones below:

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- A cause-effect diagram –Ishikawa–
- A tree diagram
- A cause prioritization matrix
- An integrated matrix of cause analysis and prioritization

**Cause and effect diagram (fishbone or Ishikawa):** A graphic representation of a gap, variation, problem or effect, and the causes that determine it. These diagrams are used to explore or show all the possible CAUSES originating a gap, variation, or problem. These diagrams are very useful because they show the root cause of the gap, variation, or problem.

**Stages to Develop a Cause and Effect Diagram**

**Stage 1: Identifying the Gap, Variation, or Problem**
- Identify and select an indicator from the dashboard that shows a gap, variation, or problem in its expected or planned achievement.
- In the box at the right, write a short phrase to identify and specify the gap, variation, or problem to be analyzed.
- Draw an arrow from left to right.

![Figure 11: Cause and effect diagram](image)

**Stage 2: Identifying Categories or Groups of Major Causes**
- Identify the most important causes for the problem.
- Group these causes by categories (groups of causes stemming from the same source).
- Draw secondary arrows from categories to the main arrow.

In order to perform this analysis, we can use the four categories proposed by Edwards Deming, which help to identify most of the gaps, variations, or problems. They are called “Deming’s Four Ms”:
- Materials and supplies: aspects that may be the cause due to lack of availability, timeliness, and/or quality.
- Machinery, technology, and equipment: their existence or non-existence, and their conditions of use and safety, their suitability, and their effectiveness.
- Working methods: whether or not there are policies, norms, manuals, procedures, and technical tools, among others, and whether they are in force, coherent and practical.
- Labor: availability of qualified, trained, and committed staff.

In matters of health, there could also be other categories, such as the user populations, their education level, the responsibility for their self-care, and their congenital or biological conditions, among others.
In general terms, four to six major-cause categories or groups should be identified.

**Stage 3: Identifying minor causes**
- Consider the answers to why questions as minor causes. It is important to underscore that each cause or cause category has some measure of influence on generating a gap, variation, or problem.
- Write down and graph these answers as minor arrows, thus obtaining smaller branches.
- By doing this, you build the network or fishbone.
- Lastly, verify that all possible factors are included.

**Stage 4: Selecting the Fundamental Cause or Causes**
- Identify the causes that are repeated in several categories
- Identify other causes that are key or fundamental to producing a gap or variation, even if they appear only once in the cause-effect diagram.
- Determine the difference between the causes that cannot be changed and the causes that can be changed and between those in which influence can be exerted or in which changes can be made, in accordance with their reality.

A second type of cause and effect analysis can be performed using a tree diagram, which highlights the chain of causes. It starts with the effect of the main groups of causes, and then asks the questions “Why is this happening?” and “What is causing it?” for every branch of the diagram. The tree diagram is a graphic representation of a simpler method known as the “five why’s”. It shows

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the levels of causes, carefully analyzing the root cause. This tool can be used alone or in conjunction with any type of cause and effect diagram. Following are the stages for its development:

**Stage 1: Identifying effects: The Gap, Variation, or Problem**
- From the dashboard, identify and select an indicator with a gap, variation, or problem that has not been achieved as expected or planned.
- Write a short phrase identifying the gap, variation, or problem to be analyzed. The phrase must be very clear, so that the most pertinent hypothesis on its causes can be developed. If it is too general or if it is not well defined, it will be difficult for the CQI team to focus on the effect, and the diagram will be too broad and complex.

**Stage 2: Identifying “Major Categories or Groups of Causes”.**
- Identify from four to six major causes for the problem, asking: “Why is this happening?” “What is causing it?”
- Write each one of these major causes in one of the boxes located immediately above the effect: gap, variation, or problem.

**Stage 3: Identifying “Minor Causes”.**
- Identify the minor causes for each one of the four to six branches of the major causes defined by the team during the second stage, again asking the questions: “Why is this happening?” “What is causing it?”
- Write each one of the minor causes in the boxes located immediately above each major-cause branch.

**Stage 4: Identifying other “Minor Causes”.**
- Identify the next categories of minor causes for each one of the minor causes previously identified during Stage 3, again asking the questions: “Why is this happening?” “What is causing it?”
• Write each one of these other minor causes in the boxes located immediately above each minor-cause previously identified during Stage 3.

**Stage 5: Identifying the last “Minor Causes”**

• Identify the last category of minor causes for each one of the minor causes previously identified during Stage 4, again asking “Why is this happening?” “What is causing it?”
• Write each one of these minor causes in one of the boxes located immediately above each minor cause previously identified during Stage 4.

The tree diagram is a graphic representation of a simpler method known as the “five why's”. It shows the various levels of causes, whose root causes are to be analyzed by the team in a participative manner. This tool can be used alone or it can be complemented with a fishbone diagram. Its use depends on how easy it is for a CQI team to handle it.

**Cause Prioritization Matrix**

The Cause Prioritization Matrix is the best tool to select and prioritize the causes that will constitute the focus of the quality team’s improvement efforts and interventions. It helps quality teams to select the fundamental cause or causes, applying each one of the criteria that have been previously described in Step 4, that is, those that are repeated in several categories, those that are key or that
are essential to produce the gap or variation, and those that the team can address effectively. The Excel version of instrument No. 04 is included in the toolbox. This instrument uses a scale from 1 to 5 to be used for assessments by the team. Number 1 is the lowest score, and 5 is the highest score to assess each one of the variables described in said instrument. The most important causes, easily selected by the team from the cause-effect matrix, are then written down in the first right-hand column.

The total score is added up and placed in the second right-hand column. The cause or causes with the highest scores will be the ones that the team must address by means of the steps mentioned below.

**Integrated Analysis Matrix and Cause Prioritization**

Some teams are reluctant to apply some of the matrices that have been proposed to analyze and identify the root causes of the gaps that they find and select as the ones to be addressed. That is why this matrix has been designed and is placed at their disposal as an alternative to reduce the time they will have to invest in prioritizing the basic causes. It requires that they perform a quick but valid analysis to identify and prioritize the most important causes to be addressed. The advantage of this matrix is that it combines criteria to perform a quick and participative team exercise to analyze the causes with the criteria or the prioritization matrix.

According to the order of the columns in this matrix, from left to right, teams must describe the process, in first instance, followed by the norm, and then the name of the indicator to be addressed. In the next column (fourth) they must describe the SELECTED CRITERIA. This must correspond to the one that is most important due to its potential to generate risks / danger to the health of the user populations. Next, the matrix requires that the CQI teams reflect and answer, by consensus, to the GROUPS OF MOST IMPORTANT CAUSES, according to Edward Deming’s 4 Ms, organized in four large columns:

- The first large column at the left corresponds to the MATERIALS, MEDICATIONS, AND MEDICAL-SURGICAL SUPPLIES. It is organized into three sub-columns. Teams must analyze and answer the following questions, in each of the sub-columns from left to right:
  - Are they available or not when they are needed?
  - Are they enough?
  - Are they safe?
- The second large column of the matrix, from left to right, includes MACHINERY, TECHNOLOGY, AND EQUIPMENT. It is composed of three sub-columns in which teams must answer and then discuss and analyze from left to right:
  - Are they enough?
  - Are they adequate?
  - Are they safe?
- In the third large column, from left to right, the matrix requires that CQI teams reflect on the METHODS, NORMS, PROTOCOLS, and CLINICAL-PRACTICE GUIDES and, by consensus, answer the questions included in its three sub-columns, which are in order:
  - Are they available, accessible, and known?
  - Are they consistent and updated?
Lastly, the fourth large column in the matrix encourages teams to respond questions on HUMAN TALENT / STAFF, with the following questions contained in the next three sub-columns:

- Are they available and sufficient, all the time?
- Are they trained? Are they competent / qualified?
- Are they committed and have a positive attitude?

The answers to these questions must be written by the team into the column corresponding to each selected criteria, indicator, norm, and process, in accordance to the degree of importance of its non-compliance, determined by the previous measuring stage.

Next, the team must analyze and establish the priority of the causes that have been identified and select those that they will address in their improvement plan. In order to do so, they apply the criteria contained in the prioritization matrix described above. They must answer and identify those that:

1. Are the most frequent ones; the ones that are repeated the most.
2. Are key; the ones that have most impact on generating the identified gap.
3. Can be modified or eliminated locally.

Once this last analysis has been completed, CQI teams select, by consensus, the cause(s) that will be addressed in the improvement plans, following the steps of the CQI cycle described below. If the CQI team chooses to apply this matrix and not to apply any other previously-mentioned cause analysis and prioritization matrices for the selected gaps, they can perform this exercise applying Excel instrument No. 05 included in the Toolbox.

**Seventh Step: The Improvement Plan**

This step entails electing and defining solutions and actions, the timeline, and the persons in charge, in order to implement them. The following stages make up this step:

**Stage I:** Writing into Instrument No. 06 each one of the key causes identified / selected by the team as those that are the most important and must be addressed to reduce or eliminate the gap, variation, or problem identified in the cause-effect analysis.

**Stage II:** Establishing solutions, that is, identifying and listing the actions that will be undertaken to eliminate, correct, or minimize the major causes generating the selected gaps or variations. This is where the quality team must take advantage of and exploit its creative potential.

**Stage III:** Analyzing and prioritizing the interventions, applying the criteria described below so that the interventions are:

- The most effective.
- The most feasible for implementation, both from the technical and financial perspectives.
- Supported by the user community.
- Supported by authorities, to ensure their implementation.
**Stage IV:** Programming instrument No. 07 (included in the Toolbox) is used to expedite the development and recording of the corrective or improvement action plan, which will contain:

- Selected priority causes of the gaps and variations found.
- The intervention(s) that have been identified for their improvement.
- The activities to undertake each intervention prioritized or defined for implementation.
- The detail of resources required for their implementation.
- The persons in charge and the timeline for implementation, with the starting date and the foreseen completion date.
- Lastly, the team’s name and signature.

The following suggestions should be considered when proposing quality-improvement interventions and activities:

- Analyze strategies and solutions used by other people or by other units to improve similar problems
- Seek solutions that require no additional in-service work.
- Seek solutions that generate savings or a minimum cost in relation to benefit.
- Involve the staff with the greatest knowledge and interest in solving the problem.
- Obtain enough ideas and then explore all of them thoroughly.
- Think outside the box.
- All the suggested solutions must be clear enough and duly understood by all the members of the team and the health unit.

It is important to consider the multiple and varied range of quality-improvement approaches that could be required, depending on improvement needs. All of the approaches are based on similar quality-improvement principles and methodological approaches. Some authors⁵ have defined four groups of solutions or interventions, depending on their level of complexity, and the time and level of effort they require, including:

- **a)** Individual solutions / interventions; that is, improvements that can be achieved by a single individual.
- **b)** Quick solutions, to be achieved with the team’s contribution, by identifying and eliminating all those steps that are not essential and that do not provide added value, including bottlenecks.
  These first two types of solutions are addressed by CQI teams without requiring a cause analysis, since their causes and solutions are obvious and do not require too much time or analysis. Generally, they are performed in the initial process-optimization stage or when the criteria not being complied with, after measurements, stem from causes that teams can easily correct, so that they correspond to quick quality continuous-improvement cycles.
- **c)** Systemic solutions by the team, which require deeper and more rigorous analysis of the root causes imply analysis and prioritization of the causes of selected gaps.
- **d)** Solutions that imply continuous improvement and follow-up of the health-care and health-management processes, themselves, and the application of various quality approaches and

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quality tools, in addition to the possibility of having permanent quality teams for their continuous and systematic follow-up.

These groups of solutions are shown in the diagram below:

![Diagram of Improvement Activities and Interventions](image)

**Figure 13:** Diagram of Improvement Activities and Interventions

**Eighth Step: Implementing Improvement Plans**

This step is the implementation and compliance with the plan within the planned timeline and conditions.

Designing an improvement plan does not necessarily imply that it is executed or applied, so it must be transformed into practical actions. The objective of implementation is to ensure that proposed activities are executed and that the elements expediting or hampering their effective and correct implementation are considered and monitored.

Implementation must be shaped or adapted according to the particular and specific circumstances of the health service in question, and the type of specific population that will be served, which is why it is very important to take into account that each health unit has its peculiarities that must be considered at the time of implementation. These differences are conditioned by the units’ capabilities for resolution, characteristics, type, number of people who work at the unit, available equipment, and technology, even the space needed for the population being served.

Essentially, it must be understood that process implementation must be accomplished from within. One way of determining if there was change in improving performance or quality is using and reviewing the achievement of indicators. Remember that an indicator is a measurable variable (or characteristic); in other words, it is a measuring unit that can be used to determine the level of achievement or performance of a system or a process, its level of adhesion to or compliance with a norm or the achievement of a quality goal (threshold) (Miller Franco and et al, 1997). According to our approach, CQI teams have established a set of indicators to monitor / measure compliance with the norms of selected processes within the maternal and neonatal health care and family planning system in the various health facilities, depending on their level of resolution and agreement with the EONC strategy. That is how indicators are used to identify the weaknesses of the processes of said health care system, establish implemented changes / improvements, and measure success.
Once the improvement plan has been implemented, the CQI team will again engage in systematically measuring performance by verifying the degree in which the indicator previously identified with a variation or gap, has been achieved, along with the other indicators for each key process to be monitored, and establish the impact achieved by eliminating or minimizing its key causes and the impact achieved in its performance.

At this time, CQI teams will review the results they have obtained and decide which interventions will be kept, modified, or discarded, and then act in accordance with these decisions.

This decision is determined by two questions: Did the intervention generate improvement? If it did, was the improvement sufficient? It is considered that improvements are sufficient if they reach the established normality threshold; that is, the level of performance that is satisfactory for the standard and indicator whose compliance is being improved.

Based on the responses to these questions, the team will then do the following: If the intervention does not generate improvement, or if this improvement is not significant, the CQI team must adapt the intervention(s) and repeat the measure of the modified intervention(s) to determine their efficacy, or to establish that the gap, variation, or problem has multiple causes and that it requires prioritizing / addressing other causes, implementing it again and undertaking a new measurement of the performance of the relevant process.

If the intervention generates sufficient improvement, the intervention(s) must be implemented as a permanent part of the system.

At this point, it is important to consider different levels of analysis, depending on the degree of improvement being achieved and observed by the CQI team, as well as the development being achieved with a holistic, systemic, and integral vision, starting with the simplest levels and progressing to more complex and ample levels, which demand increased efforts and requirements but also expedite progressive development of a holistic vision and increasingly higher integral and systemic thinking that result in improvements of immediate and long-term results that generate higher impacts. Those levels are shown on the following page.
1. Analyses of basic or initial measurements, applying only a **minimum or basic set of criteria for a selected number of indicators to be measured** in each maternal and neonatal health care and family planning process being addressed. This is the initial CQI scenario for the Ministry of Health’s process. In general terms, the strategy proposes starting prioritization of norms and indicators with their explicit criteria and normality thresholds to be measured and to ensure their compliance, based on the following dimensions of quality: “celerity, timeliness, and access to services”, “technical expertise” of health-service providers, and “technical safety” in order to guarantee service provision and practices that are safe, that pose the least risk and that are based on evidence.

2. Level two analyses are undertaken when the better-practice **basic or minimum criteria** defined for each selected indicator at the beginning are totally achieved or reach a very satisfactory level. This is the proper time for the CQI team to advance and incorporate other more-complex criteria, which require increased effort and are more stringent, to the indicators of those health care processes being addressed.

3. When all the criteria or good practices initially established for indicators of the selected health care processes have been complied with, it is time to **incorporate indicators for other dimensions**, which will allow for quality health care with increased multi-dimensional and comprehensive characteristics. For example, if most of the indicators that were measured initially, pertaining mostly to the **speed, timeliness, and access to services**, **technical expertise and technical safety dimensions of quality** were achieved satisfactorily, maybe this is the moment in which CQI teams should incorporate other critical dimensions.
to measure quality improvements, such as: **efficiency** in the use of resources, especially insofar as incorporating efficiency norms and indicators for one of the most costly and most important health care resources, which is the use / occupation of **hospital beds**, also known as the “bed turnover rate”, which lets teams establish if these resources are being appropriately and effectively used; that is, the number of times per month in which the most expensive resource is being used. If the levels are low, this could mean that safe care is being provided with the best and safest practices but with no efficiency or a very low level of efficiency for health care’s most complex, necessary and costly resource.

Additionally, at this time, it is also very important to incorporate other dimensions of quality, such as **continuity** or the extent to which beneficiary population is ensured continued provision of the set of benefits expected from health care, as well as **comfort**, amenities, privacy of the quarters where health care is provided, and **inter-personal relationships**, reflected in the level of satisfaction and amiable and respectful treatment of patients, the information provided to the user population about their diseases, desired behaviors, and the medical treatment that must be applied, and prognoses, among others.

From the time in which the indicators for both the **basic dimension of technical safety** and the **other dimensions of quality incorporated into this level** start to show a satisfactory level of compliance, it is essential that CQI teams advance to a **more systemic and integral level of analysis** that shows the IMPACTS that the degree of compliance with the processes of the whole SYSTEM of maternal and neonatal health care and family planning is having on the **immediate health results of the maternal and neonatal population receiving services**.

4. At this level, it is time for CQI teams to verify and ensure that all the indicators have already achieved a satisfactory level, that they comply with the **efficacy** dimension, verifying whether processes with adequate performance quality are or are not **efficacious** because they are effectively achieving a direct and immediate impact on the morbidity, mortality, disability, and/or malnutrition of the population being served through the processes of the maternal and neonatal health care and family planning system at the same level of resolution; that is, the type of EONC corresponding to the relevant health facility. This is where the analysis requires using the mapping or **SYSTEM MODELING** technique.

Teams must undertake a systemic analysis. System modeling allows analyzing the way in which the different processes of the system should be operating and the impacts that their performance should have on the system. It allows examining the way in which the various System norms and indicators—with their better-practice criteria—work together to produce one or several specific results on the health of the population being served. Several variables must be intersected; for example, identifying and verifying the impact generated by complying with one or several norms and their indicators and criteria with the results that are being achieved by maternal and neonatal health. The table below shows the intersection of variables that we can analyze systemically and integrally with some of the quality standards and indicators to be measured in the various processes of maternal and neonatal health care and family planning processes and their potential immediate
results on the maternal and neonatal populations being served\textsuperscript{6} at the same level of resolution or at the same type of EONC, whether it is Complete, Basic, or Outpatient.

\textbf{If the indicator complies with criteria related to:}

\begin{itemize}
  \item \textbf{Active Management of the Third Stage of Labor (AMTSL)}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing: Post-partum hemorrhage
        \item Newborn anemia
      \end{itemize}
  \item \textbf{Managing obstetric complications according to the official norm}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing: Maternal deaths
        \item Disabilities due to obstetric hemorrhage, hypertension disorders during pregnancy and post-partum sepsis / infection
      \end{itemize}
  \item \textbf{Managing newborn complications according to the official norm}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing: Newborn deaths and Disabilities due to asphyxia/pre-maturity/low birth weight
      \end{itemize}
  \item \textbf{Monitoring labor, using a partogram with every patient being provided care}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing: Severe and moderate perinatal asphyxia cases
        \item Unnecessary Caesarean sections
      \end{itemize}
  \item \textbf{Distributing and using ORS for children under 5 years with diarrhea, according to the official norm}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing: Severe and moderate dehydration
        \item Severe diarrhea and its complications
      \end{itemize}
  \item \textbf{Distributing and using zinc in Children under 5 years, according to the official norm}
    - it should have IMPACT on:
      \begin{itemize}
        \item Reducing the effects of: Children’s morbidity and mortality as a result of acute infections and repetitive diarrhea episodes
      \end{itemize}
\end{itemize}

\textbf{Figure 15: System Modeling Diagram}

5. In this last level, CQI teams must verify and ensure the efficacy / effectiveness of quality performance of those processes undertaken by facilities at the various levels of resolution on the health care outcomes of maternal and neonatal populations. \textbf{This corresponds to a higher level of analysis by HEALTH-SERVICE NETWORK teams}, which promotes cooperative

\textsuperscript{6} Contributions shared with the author by his colleague and teacher, Dr. Urbina, Luis., June 2016.
and complementary work among all the network facilities and levels of care. To that end, there is need for all its members to develop a practical culture of quality and the appropriate level of visualization, thinking, and systemic, comprehensive, and holistic analysis. Applying the mapping or SYSTEM MODELING technique, CQI teams must identify the IMPACTS, in terms of results (efficacy / effectiveness), that the adequate performance of quality health care processes is having on the user population. This is a true exercise of systemic analysis, which assesses the integral health performance and the outcomes of the whole maternal and neonatal health care and family planning system on its target population, and enables teams to undertake corrective actions, improvements and innovations, whose effectiveness is evident, in order to improve the health of the populations being served.

As with the previous level of analysis, teams must intersect various variables, identifying and verifying the impact that compliance with one or several norms, with their indicators and criteria, is having on maternal and/or neonatal health care outcomes at another level of resolution within the service network. The following diagram shows some examples of variable intersections that we can analyze systemically and integrally:

**If the indicator complies with criteria related to:**

![Diagram](image)

Figure 16: System Modeling Diagram
If it is determined that expected results are not satisfactory despite compliance with quality norms at the corresponding level (fourth and fifth levels of analysis), it is necessary for CQI teams to identify the gaps and to perform an analysis and prioritize its causes, as well as proposing interventions and improvement plans, following the previously-described techniques, criteria, and instruments. When results are positive and the gaps and variations are reduced or eliminated, teams must continue to permanently monitor / measure the development of these processes and their results.

At this time, there might be another one or several variations and opportunities for improvement in any of the processes at this level or among the levels of the network, and the cycle is repeated once again, and so on, with the purpose of ensuring systematic quality performance in the health care provided to the user population.

**Figure 17:** Network Levels and Cycle Diagram

**The Collaboratives Approach**

The CQI strategy is complemented by the Collaboratives approach, which intends to **quickly improve quality and to expand better practices.** It is a shared-learning system that brings together a number of teams to work together to achieve significant improvements in processes, and the quality and efficiency of another specific health care area, with the aim of disseminating these methods, tools, and practices to other units and networks.

The collaboratives approach combines many of the basic elements of traditional health programming (norms, training, work aids, supplies) with modern CQI elements (team work, process analysis and improvement, result monitoring, and client satisfaction, among others). This approach generates a dynamic learning environment in which teams from various units and levels work together intensively to share, adapt, agree on and quickly expand, for example, practices based on evidence and proven processes, so that they are used by other teams and units of the country’s service networks that need them.
Short and intensive collaborative events are undertaken periodically and systematically. They should last one or two days at the most, and should take place at health facilities where it is possible to bring together several CQI teams from other units from different resolution levels within health services.

Consider the following steps when planning and developing the collaboratives approach:

1. It would be preferable for external measuring levels, usually regional or district quality-management or supervision teams, to be in charge of its promotion, programming, and coordination, due to their strategic level within the organization.
2. External measuring teams can identify those units that still have important and common problems or gaps in critical processes and indicators that have not yet been resolved.
3. External measuring teams can also determine which teams from their own network and other networks in the region / district have been able to implement effective and innovative measures to remedy these gaps, and they can share them by means of a collaborative.
4. At this point in time, external measuring teams, with support from authorities in their region or district and by mutual agreement, must program a collaborative event with CQI teams and the various units in their network in order to share these successful experiences and to seek ways in which the rest of the teams in their network can implement them effectively in the short term.
5. Collaborative events should last from 4 to 6 hours whenever possible. It would be preferable to hold them at the facility where the successful and/or innovative intervention has been implemented.
6. The objectives and the agenda of a collaborative event must include the ones described below, among others:

**Objectives:**

a) To share an effective and/or innovative intervention executed by a CQI team in the network or in another health service network, which is similar to the health care units participating in the collaborative.

b) To support identification of the steps and requirements for the other CQI teams in units with similar gaps / variations or problems, so that they can adapt / implement said successful interventions in the short term.

**Agenda:**

- Welcoming participants and presenting the objectives and agenda for the event.
- Sharing the gap / variation / improvement opportunity or problem addressed by the health team and the successful intervention implemented to solve it. Sharing: What is it? What does the intervention consist of? How did it come about? Also share the steps taken and the requirements that had to be fulfilled for its implementation, the results obtained and the lessons learned, among other aspects.
- Team discussion, by participating unit or health care process, led and supported by the members of the team that implemented the successful intervention, who will answer specific questions about the development of said intervention and will support the development of an implementation plan adapted to the conditions and capabilities of participating teams.
- Plenary session to present and discuss the plans that have been developed and the commitments to implement them through the next steps.
• Closing the event.

7. There is no need for a specific period of time between collaborative events. If there are several common problems that are unresolved and, on the other hand, there are several effective and innovative interventions by a team in the next one or two months, the opportunity to summon and hold one or two short collaborative events must not be missed. In case this does not happen, it is recommended that collaborative events be held in each service network at least every 6 months and that the various levels of care participate in them.

In addition to the benefits of this practice of periodically and systematically implementing collaboratives, it also encourages the development of a culture of quality, which contributes to motivating and stimulating teams, as well as to achieving improvements in the techniques, approaches, applied CQI tools, flows, norms, and application of improvements and innovative practices that are more cost-effective and are based on the country’s local evidence.