

Quality Systems for the Clinical Laboratory

Prepared by a CSLT Working Group

CJMT Volume 57 # 2, Supplement

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Quality Systems for the Clinical Laboratory

This information paper has been prepared by a Working Group of the CSLT, to provide an overview for laboratory technologists and managers of how and why quality systems are evolving in health care facilities in Canada.
It is not intended to be a definitive work on quality management, or to follow any one particular philosophy. It provides an introduction to concepts of quality management within a health care context and relates them to the clinical laboratory.

1. THE EMERGING IMPORTANCE OF THE TOTAL QUALITY CONCEPT

The development of systems leading to improved quality in health care has been evolving rapidly since the late seventies and eighties. Stimulated by accreditation agencies and American initiatives, Canadian health care facilities began to implement quality assurance programs. During this period, quality assurance was extended beyond quality control activities to include all of the elements required to offer a service. The success of a process was measured by comparing actual performance against that deemed acceptable. Within the QA model, quality was usually defined as the performance achieved through the adoption of external and internal standards. Inspection and problem resolution provided the focus for QA activities. These programs were primarily department specific, and rarely addressed the interaction of the various departments involved in the overall delivery of health care. Programs were essentially organized along functional lines, which meant that problem solving was often one dimensional, and involved limited employee participation. New approaches were required in the 1990's to address the proactive improvement of quality in health delivery systems. Added to these issues is the current focus on resource management within health care, and the search for new ways of managing the system which will preserve quality of care while providing affordability.

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What is Quality?

Within the TQM model, the achievement of quality is a continuous process involving all personnel at all levels of an organization in the pursuit of excellence in every process, with the ultimate objective being quality patient care. Quality is defined as consistently providing services which will meet or exceed the needs of our customers. What is different about this definition of quality is that the perception of quality for the customer (in health care, the ultimate customer is the patient) is not solely based upon the technical and professional considerations which have in the past defined quality. TQM ensures that along with technical criteria and standards, a facility focuses on the customer's expectations of what constitutes a quality service. For a patient, factors such as perceived competence, reputation of a facility, waiting time, and other impressions will strongly influence perception of the level of service received. The patient may perceive the level of quality as that which must be in place to ensure safe care (the expected level) or one level above (the requested level). If the quality of service is above that expected or requested, the patient may be delighted that the service has exceeded expectations. While it is appropriate that most of our resources be directed to ensuring that at least the expected level of quality is achieved, rising customer expectations provide the dynamic for the continuous improvement of quality.

Here we have addressed the term "customer" from the perspective of our primary customer, the patient, but it is important to note that in TQM the concept of "customer" expands well beyond the common interpretation (patients and their families) to include staff and others who receive service from the laboratory. For example, students would be the customers of a laboratory training program, and total quality management of the program would entail monitoring indicators of student satisfaction with the training received.

The Context For Change

Change in the way health care facilities are being managed is being driven by several issues:

1.1 Industry Experience:

Quality initiatives and their success in industry have had an important impact on expectations in all service areas, including health care. The importance of customer satisfaction necessitates revision of the way in which provision of service to patients and other customers has been managed in the past.

1.2 Patient Expectations:

Paternalism that has existed within health care has decreased as patients have become more knowledgeable and have demanded greater involvement in decisions concerning health care and treatment options.

1.3 CCHSA Standards:

It is generally accepted that for quality to exist there must be close collaboration between the numerous individuals and professions providing the services. This is reflected in the changing focus of health care accreditation systems. The Canadian Council for Health Services Accreditation (CCHSA) has progressively modified its standards to reflect the importance of integrated service delivery. The 1995 standards demonstrate a dramatic change away from standards specific to departments and functions toward what is termed a "client centred" approach, which emphasizes the importance of partnerships and team effectiveness to promote the environment for continuous improvement of the quality of care and services.[1]

The CCHSA approach to evaluation of a facility's programs will change dramatically as of 1995. In place of assessment of the compliance of individual departments with specific standards, surveyors will interview interdisciplinary care teams. Standards for these teams will focus on each stage of the client's care within the service, and will permit the surveyors to assess the effectiveness with which the health care team is able to deliver health care of continuity and quality.

While the CCHSA does not endorse any specific management philosophy, it will be necessary for a facility to demonstrate that it is capable of providing the integration of professional teams necessary to produce successful patient outcomes. This means that laboratory staff are being increasingly called upon to move outside their own departments and work with other professionals. Many facilities have chosen to adopt some form of quality management to provide the framework within which these teams operate.

1.4 Accountability:

Partially driven by economic constraints and reduced funding in health care, health care facility management has begun to reflect the need for each individual within a team to be accountable for his/her activities. Organizational hierarchies are flattening, and the role of managers has begun to shift away from that of decision maker to one which provides a supportive and facilitative environment to permit staff to excel.

1.5 Elimination of Departmental Boundaries:

Departmental and functional boundaries are being dissolved with the adoption of program management, where all the needs of a particular patient group are addressed within the program. This reflects the multidisciplinary approach to health care delivery advocated within the CCHSA standards, and which is the hallmark of the TQM concept.

2. PRINCIPLES OF TOTAL QUALITY MANAGEMENT

Total quality management in the health care context has been defined by Phillip Hassan of St.Joseph's Health Centre in London, as "providing the best possible care through continuously improving services to meet or exceed the expectations of patients, physicians, staff and the community" through the adoption of several principles within the health care facility.

Berwick, Godfrey and Roessner[2] have outlined several basic principles of quality management, summarized as follows:

a. Productive work is accomplished through the **organization of processes.**

Within the process framework, each person will fulfil one of three roles: supplier, processor or customer.

b. Quality management is **customer centred.** The focus is not on quality as defined by the health care provider, but is on the perception of quality by the person for whom the service is being provided.

c. **Defects** are **most likely** to be the result of **process problems** than they are people problems.

d. There is a **cost associated with poor quality.** This includes detection costs (required to monitor processes to identify defects), the cost of correcting the problem once identified (for example, the cost of repeating a test run), and costs associated with producing what is perceived to be a sub-standard product. The goal is to ensure that processes are performed correctly each time so that errors and rework are avoided.

e. There is **predictable variation within every process.** Understanding this is essential to improving performance and for ensuring realistic quality initiatives that do not lead to an even more unstable, unpredictable system.

f. The **focus** of quality management initiatives should be **on the most important areas** in a process (those which are the most problematic, or are high risk or high volume).

g. Quality management is based upon **scientific method** which requires a more rigorous approach to problem solving. Decisions are based on the analysis of data, which assumes (optimistically, Berwick notes) that measurement of a process is always possible, and that terms such as "morale", "satisfaction" and "reliability" may be "translated into operational measurements through carefully designed quantitative questionnaires".

h. The **total involvement of every employee** is essential at every stage of a process: planning, implementation, and execution.

i. There are three components of quality management: **quality planning, quality control and quality improvement.** Quality planning involves defining what the customer requires, designing the processes to meet established goals and implementing these processes. Quality control involves the maintenance of a process at target levels of performance (or what has in the past been called QC and QA in the laboratory). Quality improvement describes the process undertaken to lead to improvement of the existing level of performance.

These important points are summarized in a publication by the Canadian Psychological Association entitled *"Total Quality Management for Psychology Services in Health Care Facilities".*[3]

"Total Quality Management, as currently practised, rests on several basic principles:

1. Productive work is accomplished through processes, with each person receiving the work of others, adding to it, and providing it to the next person in the process.

2. Threats to quality arise most commonly from problems in the processes of services delivery, rather than the individuals involved in it.

3. Quality depends on sound and explicit relationships among suppliers, providers and customers.

4. Managing quality is the business of everyone in the organization or system."

TQM and the Leadership Philosophy:

The adoption of the principles of quality management involves a change in leadership that is best illustrated through a comparison of traditional management and total quality management. **Top level management's endorsement of and active involvement in the total quality management process is a prerequisite to successful implementation of TQM within a facility or department.** The practice of TQM requires a very different approach to management.

Traditional Leadership	TQM Leadership
Central, hierarchical control	Coordination, facilitation integration
Central leadership	Leadership shifts to empower people, groups
Plan, Direct, Control	Coach, facilitate, listen, develop

Comparing Quality Assurance and Quality Management:

The following table summarizes distinctions between quality assurance and quality management:

Quality Assurance	Quality Management
Externally driven	Internally driven
Follows organizational structure	Follows patient care
Focused on problems/ individuals	Focused on processes/ systems
Works to endpoints	Has no endpoints
"Assures" quality	Improves quality
Centralized	Part of everyone's job
Poorly coordinated/ fragmented	Organization-wide
Little top management involvement	Top management lead

In simple terms, the relationship between our current QA plans and the approach suggested by TQM is as follows:

- While many of our QA goals are outcome oriented, TQM requires that we be more explicit in linking our activities to customer requirements.
- Client satisfaction surveys have always been important, but the emphasis will now be on feedback which allows our customers the opportunity to provide input into improving our processes.
- Laboratory services represent systems within other systems: it is necessary to focus on the ways in which these various systems interact with each other, as well as the way in which our individual service functions.
- In the past we focused on meeting predetermined standards: if these were met, the service was assumed to be operating at a quality level. This implied a static system, rather than the TQM notion that **any** service, no matter how effective, can be improved. We no longer wait until a standard is not met to work on improving the quality of a process or service.
- Within the TQM philosophy, problems and deficiencies represent value, in that they are opportunities for improvement, which is quite a different perspective from that in traditional systems.

- Finally, TQM does not replace QA programs: these become the monitors for the continuous quality improvement approach. It will still be necessary to provide ongoing evidence that quality standards are being met. However, our QA programs are likely to become more fluid as quality improvement initiatives enable us to exceed many of our predetermined standards, and encourage us to press beyond current levels of performance.

How The Total Quality Approach Relates to Existing Hospital Programs

The diagram below illustrates the interrelationships between the various aspects of total quality management. The diagram has been constructed to illustrate the more static aspects of quality management: quality assurance, quality improvement and risk management.

Traditional quality assurance includes equipment maintenance, quality control, policies and procedures, and many of the structural aspects of quality programs. Where quality assurance activities intersect with quality improvement processes the areas are more fluid, for example: outcome measures of quality are modified by continuous improvement teams.

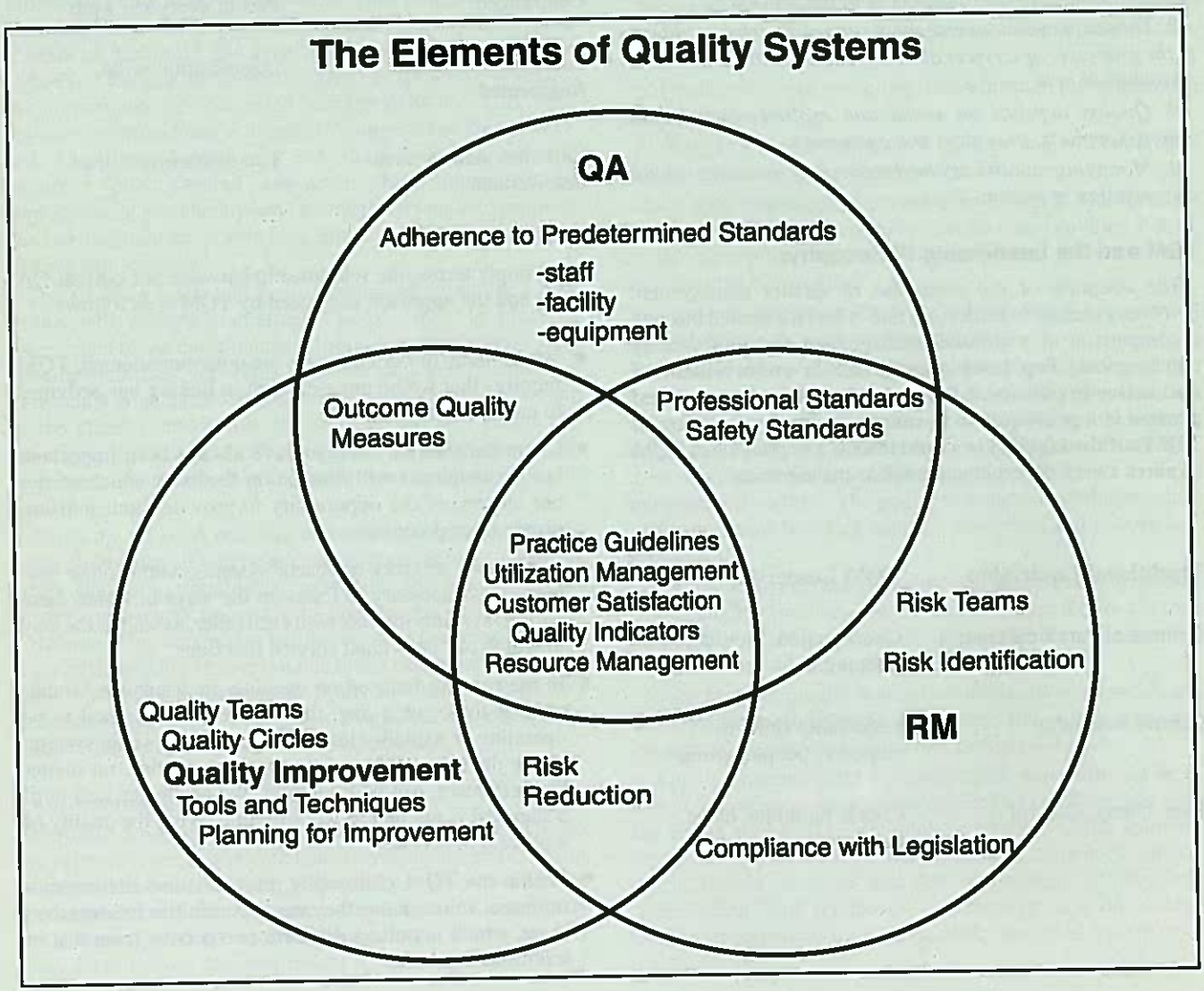
The area intersection of quality assurance, risk management and quality improvement includes activities such as practice guidelines, quality indicators and utilization management.

(See Appendix A for definitions).

3. PREREQUISITES FOR IMPLEMENTING TOTAL QUALITY MANAGEMENT WITHIN THE LABORATORY

The following steps provide a framework within which basic TQM concepts may be implemented within the clinical laboratory:

1. Define the principal functions for the Laboratory. These have in the past been set forth in the laboratory mission statement.



2. For each of these principal functions, identify the suppliers and customers, and linkages between them.

3. Identify areas which are high risk, high volume and/or problem prone.

4. Set service and performance expectations in line with professional standards and CCHSA requirements. Within the quality management model it is important to identify the expectations of customers, suppliers and providers, and identify the short and long range goals required to meet or exceed these performance expectations.

5. Develop indicators to monitor the quality of service provided, with special emphasis upon the linkages between providers, suppliers and customers, and high risk, high volume and problem prone areas. Define thresholds for these indicators, establish the frequency of monitoring for each. Implement.

6. Develop a plan that meets customer requirements. This step is equivalent to the annual goals and objectives developed by the laboratory, but within the TQM model the focus will be on what our customers have identified as important.

7. Implement the plan, and solicit feedback from your customers.

8. Use this feedback to further refine processes and to identify new important initiatives.

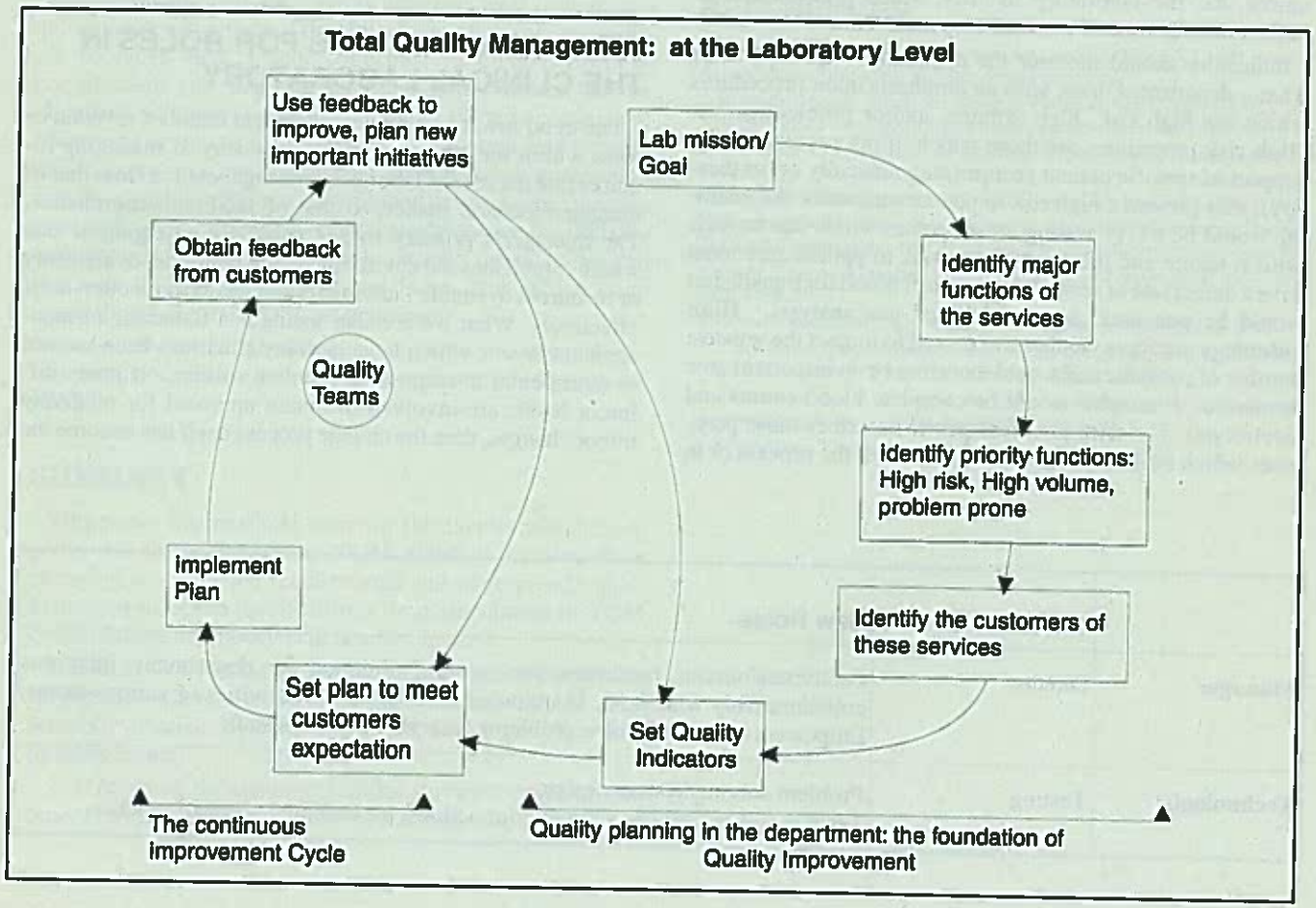
The diagram below illustrates how these steps incorporate the Deming P(lan)-D(o)-C(heck)-A(ct) cycle[5], and also illustrates where the continuous quality improvement cycle and quality teams fit within the TQM process. It should be noted that this process is equally relevant to the department level initiative as it is to an organization wide implementation.

While it is beyond the scope of this discussion paper to explore in depth each of these steps, the following sections will address two of the critical factors in successfully implementing a TQM approach: establishing indicators of quality, and the importance of teamwork in TQM.

4. INDICATORS IN TQM

An indicator is defined by the Joint Commission on the Accreditation of Health Care Organizations as a "quantitative measure that can be used as a guide to monitor and evaluate the quality of important patient care and support service activities. An indicator is not a direct measure of quality. Rather it is a screen or flag that identifies or directs attention to specific performance issues that should be the subject of more intense review."[4]

Laboratory medicine quality assurance plans and risk management programs have for years incorporated indicators used to establish whether processes are on track and perform-



ing as designed, and for flagging those areas where special attention may be required to maintain a system at defined levels of service (or at a defined level of quality). Many of our earlier indicators were structure and process indicators, which reflected a more departmental approach to quality assurance. The focus on total quality management has led to the development of cross-functional indicators capable of identifying problems within systems, as opposed to within distinct functions. Consequently, these indicators will focus to a greater degree upon the impact of system failures on the customer. In the interest of resource management, it will be important that TQM efforts be concentrated on areas which will have the greatest impact on patient care. In summary, appropriate monitoring of laboratory services requires indictors that are:

- Meaningful to your setting
- Clinically relevant
- Oriented to problem and/or high volume procedures
- Relatively easy to monitor (ie. should have an economical methodology)

Approach to Establishing Appropriate Indicators of Quality

Establishing indicators that are patient care focused requires that the laboratory identify which processes most impact the outcome of medical care received.

Indicators should monitor the most important aspects of what a department does, with an emphasis upon procedures which are high risk, high volume, and/or problem prone. **High risk** procedures are those which, if not present for the support of specific patient groups (diagnostically or for therapy), may present a high risk to patient outcomes. An example would be STAT testing, or processes which due to their critical nature and their substantial risk to patient care must have a defect rate of zero. Preparation of blood for transfusion would be one area, as would blood gas analysis. **High volume** procedures would be expected to impact the greatest number of patients, and would therefore be an important area to monitor. Examples would be complete blood counts and electrolytes. The term **problem prone** describes those processes which may be problematic in terms of the process or in terms of interpretation of the results of testing, and therefore present the potential for errors that could impact patient care.

In addition to these areas of focus, it is appropriate that in these resource strapped times, high cost areas are closely monitored: resources spent unwisely are not available for essential patient care. Resource management has a very real impact on patient care.

Setting the Threshold of Indicators

Setting the threshold of an indicator is as important as selecting the appropriate indicator. It is important that the threshold be set at a level which will ensure that it actively signals defects. In many cases this will require an interim period in which the initial threshold is based upon the best available data, the best current standards, and in some cases may be based on the "best guess". What is important is that as more data becomes available, the threshold level should be modified or fine tuned. It is also important to note that the fact that an indicator does not signal a quality problem does not mean one does not exist. Lab staff must constantly apply a common sense evaluative process (reality check) to the monitoring of laboratory data. While indicators provide the background monitoring required for major processes, there is no substitute for human interpretation of the relevance of monitoring procedures.

Several examples of indicators are included in the appendix to this paper.

5. WHAT TQM IMPLIES FOR ROLES IN THE CLINICAL LABORATORY

The trend toward quality management entails a revision of roles within the laboratory. This new way of managing requires that the role of laboratory manager evolve from that of manager/decision maker, to that of facilitator/coordinator. The manager's primary role is gradually emerging as one which establishes the environment and facilitates availability of resources to enable individuals and teams to function most effectively. What we are also seeing is a flattening of management layers, which have in many situations been viewed as detrimental to responsive problem solving. If many different levels are involved to obtain approval for relatively minor changes, then the change process itself has become the

	Old Roles	New Roles
Manager	Directs	Facilitates/obtains resources, sets general direction for department, functions collaboratively with staff; Team member; coordinates activities of various teams; Empowers teams to resolve problems; coaches, develops staff.
Technologist	Testing	Problem solving/system design Team member, fully accountable for actions, professional scope of practice.

defining element of control in the hierarchy, a situation not conducive to optimal performance.

The Concept of Teamwork

The most significant change for employees within a facility that chooses to adopt the principles of Total Quality Management is their more specific involvement in what has previously been considered the realm of management. In the past the role of management has been to set direction, control, define policies and procedures, and so on, and in many cases this would be accomplished by management working in isolation, sometimes with employee input. Within the framework of Quality Management exists the recognition that frontline staff are in an ideal position to provide input to operational improvement. While more progressive managers have recognised the value of employee input for many years, the principles of TQM provide a framework within which that energy and expertise can be channelled. Particularly within the clinical laboratories process innovations and instrumentation needs can be defined with far greater accuracy when staff teams at the bench level are involved in more than a token way. What is also achieved by this important involvement is the general buy-in for change that is so important to the success of any project.

Tools Used by Teams for Quality Improvement Projects

Implementation of the quality management systems requires the development of the skills that will enable individuals to work effectively together, to ensure process coordination and that improvement opportunities can be identified and addressed constructively. Whether teams are addressing problems (often most obviously revealed through quality issues) or are working on areas where improvement may be possible (efficiencies achieved or more effective care provided), they can be most effective when provided with the training and tools to work collaboratively (team skills) and the tools to collect, organize and focus data, which is an integral part of total quality management.

Case studies which illustrate use of various tools in laboratory projects will be published in upcoming issues of the CJMT.

SUMMARY

This paper has outlined some of the factors which have given rise to the interest in TQM which is evidenced by changing accreditation requirements and widespread implementation in health care facilities. Implementation of TQM in the clinical laboratory is dependent upon:

1. A clear focus on the most important aspects of the service we provide, where if quality fails patient care would be most seriously effected (high volume procedures, high risk and/or problem prone).

2. A focus on the customers of our services: ensuring that process improvements address their requirements.

3. A new leadership philosophy: tapping into the expertise of each member of the team to achieve service improvements.

4. Recognition of the importance of interdisciplinary and/or multidisciplinary collaboration: closing the gaps in our existing QA programs and ensuring that quality is defined in terms of the broad experience of patients receiving health care.

5. Taking advantage of staff development in the use of team tools to provide teams the opportunities to be successful in collaborative projects.

6. Demonstrating perseverance and commitment to quality improvement. Giving the process time to demonstrate success.

The methods and tools used to accomplish the transformation from quality assurance to TQM are various. The important point for laboratory professionals is to ensure that our plans are consistent with the total quality picture for patient care. To do this will require collaboration, coordination and communication between the various care givers with whom we interact. It will also require recognition that no one health care process stands alone: quality patient care requires an intersection of processes that ensures our ultimate customer, the patient, of service that will meet expectations and will produce a successful outcome.

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APPENDIX A

TQM Terminology

The following summarizes some of the TQM terms that are used in this paper.

Customers/Suppliers

The link between customer and supplier is central to the TQM approach. To illustrate, consider the preparation of a blood component for transfusion. The technologist has several suppliers: external suppliers such as the Red Cross for blood components, external supplier for reagents; internal suppliers such as the blood collection team, nursing who provide requisition information, and the physician who issues the order. The technologist is a customer of each, but also fulfils the role of supplier as the component of blood is issued for transfusion. If at any stage within a process the supplier fails to provide what is required for the next person to appropriately complete the process, the quality of the end product may be adversely affected.

Process

A process may be described as a sequence of steps incorporating various inputs, applied through a variety of steps to produce outputs. The notion of variability within processes (and identifying when this variation can and when it cannot be improved or eliminated) is therefore an important concept in the drive to continuously improve quality.

Indicator

Measure used to monitor and evaluate the performance of important aspects of a service.

Empowerment

Providing employees with the opportunities, authority and resources to resolve quality issues in which they are directly involved.

Quality

The degree of adherence to a standard. Doing the appropriate thing the appropriate way at the appropriate time.

Quality Improvement

Continuously improving our ability to meet and exceed customer needs and expectations.

Risk Management

Exposure to any event that may jeopardize the reputation, net income, property, patients, residents, personnel or liability of the facility.*

Utilization Management

The purpose of a utilization management program is to plan, organize, direct and control the delivery of health care in a cost effective manner. Utilization management entails setting standards for efficient use of resources and acting to ensure these standards are met.*

* From the Canadian Medical Association Publication: Quality of Care: Issues and Challenges in the 90's.

Appendix B

The following illustrates one hospital's approach to quality indicators. It is provided as a sample but is not intended to be exhaustive.

NORTH YORK BRANSON HOSPITAL
DEPARTMENT OF LABORATORIES
QUALITY INDICATOR REPORT: October, 1994

Indicator	Type	Threshold	Procedure	Results/Patterns	Actions/Timeframes	Outcomes
1. Indicator area: Provision of Clinically Useful Laboratory Information						
a. Testing meets TAT standards	Q(O)	100%	TAT audits	Coag. testing and night shift substandard in September.	Core lab implementation complete Nov. 1994	
b. Significant flags on external proficiency testing	Q(O)	N=O	Review of LPTP, Wellcome Proficiency testing	0	None indicated	
c. Failure to call critical results to physicians/nursing staff	R(O)	N=O	Monthly audits of notification logs against STAT Broadcast report. Trended monthly	< 1% on daily log. Remedial action initiated daily	Formal log implemented October, 1994 to document remedial actions	
d. # Times physician could not be contacted for critical result	R(O)		**New indicator: October 94. Threshold under review**		Documentation on Critical Values log	
e. Blood culture contamination rate	Q(O)	<4.0%	Trended monthly	Range 1.3-3.3, January to October	None indicated	
f. Number of blood gas reports delayed by incomplete requisition (signature, time, etc)	R(O)	N=0	Trended monthly	**New indicator: commence use October, 1994**		
g. # ENCON* reports (other than specimen collection errors) in which laboratory service is implicated	(O)	N=0		**New indicator: commence use in October**		

Key to Indicator Categories:

R	Risk Indicator	P	Process Indicator
Q	Quality Indicator	O	Outcome Indicator
S	Structure Indicator	TAT	Turnaround time

*ENCON reports = An external service for trending internal incident reports

Indicator	Type	Threshold	Procedure	Results/Patterns	Actions/Timeframes	Outcomes
2. Indicator area: Laboratory process control						
a. Mislabelled specimens	R(P)	0%	Number of incidents tracked through Incident report reviews, ENCON reports (quarterly)	Lab staff: 3 (13 in 1992) Unit staff: 14 Blood gases: 11 (22 in 1992) Results: Jan to Oct '94	Each incident followed up with documented remedial action, retraining. Blood gases procedure/submission to be specifically monitored/trended in 94/95	
b. Lost specimens: S. Pathology	R(P)	0%	Incident report audits (quarterly)	0	None indicated	
c. Specimen rejections	(Q(P)	N=5%	Reasons for rejections to be trended for specific remedial action	**New indicator, October 1994. Threshold to be established**		
d. Computer data entry errors	Q(P)	5%	Audit of "Edit Verified Results Report" (quarterly)	18 errors for 9 months. <1%	None indicated	
e. # times test delayed >4h as a result of unexpected equipment down-time	Q(P)	N=0	Audit of Lab Incident reports	One incident: 16h delay in on-line results.	Trending to continue	
Indicator area: Resource Utilization						
a. Operating cost per total units (non-medical staff, supplies and other expenses)	Q(O)	<$0.79	OHA Consolidation Report: Standard is mean of peer group	$0.66		
b. Staff productivity (based on workload units per hour)	Q(O)	>40.36	OHA Consolidation Report: Standard is mean of peer group	43.48		
c. % Total function cost to total hospital cost	Q(O)	<5.6%	OHA Consolidation Report: Standard is mean of peer group	5.13%		
d. Employee Absenteeism (Sick time) Days per year	Q(O)	N=<7 days		N= 6.1 (extrapolated from October '94 absenteeism report)		

Key to Indicator Categories:

R	Risk Indicator	P	Process Indicator
Q	Quality Indicator	O	Outcome Indicator
S	Structure Indicator	TAT	Turnaround Time

Indicator	Type	Threshold	Procedure	Results/Patterns	Actions/Timeframes	Outcomes
Indicator area: Staff related indicators, Staff Development						
a. % of laboratory staff participating in courses	Q(S)	>30% overall	This indicator will be modified to reflect the College (CMLTO) standards for competence assurance. Currently under development	88% Technologist 50% all staff		
b. # staff performing technologist functions not licensed with the College	R(S)	N=0	Proof of licensure documented annually	0		
c. Workplace specific WHMIS training completed annually for all staff	R(S)	100%	Training and written test: in November each year	100%: November, 1993		
Indicator area: Coordination of Out-of-Laboratory Testing						
a. Staff certifications completed to schedule	R(O)	100%	Review of certification roster	100%		
b. All units where programs in place participate in external quality control program	R(P)	100%	Audit of external program quarterly	100%. All meters close to mean		
c. Equipment used for testing is quality controlled daily	R(P)	95%	Audits conducted weekly by Laboratory staff	98%		
Indicator area: Satisfaction with Service						
a. % of patient surveys that indicate dissatisfaction with some aspect of lab service	Q(O)	0%	Satisfaction surveys assessed annually for trends, potential areas for improvement	12%: Too long a wait 5%: Staff unfriendly 88%: Satisfied	Intensive inservicing to be conducted for Procurement Team in 94/95. Reasons for waiting time problems to be subject of study.	
b. # users dissatisfied with service	Q(O)	N = 0	Complaints trended quarterly by category	2 Nursing complaints: one related to blood collection, the second to TAT on coagulation	Nursing survey to be conducted in November '94.	

Key to Indicator Categories:

R	Risk Indicator	Q	Quality Indicator	S	Structure Indicator
P	Process Indicator	O	Outcome Indicator	TAT	Turnaround Time

Indicator	Type	Threshold	Procedure	Results/Patterns	Actions/Timeframes	Outcomes
Indicator area: Blood and Blood Products Inventory						
a. Inventory monitored daily for minimum stock, proper storage, expiry, signs of deterioration	R(P)	100%	Daily inventory check audited	100%		
b. Storage and management of blood for autologous transfusion is in compliance with the CSTM Standards	R(P)	100%	Daily inventory check audited	100%		
Indicator area: Transfusion Service						
a. Number of transfusion service incidents that had the potential to seriously impact patient care	R(P)	N=0	Lab incident report audit	0		
b. Number of cases where the disposition of blood issued from the Transfusion Service is not confirmed in the Meditech System	R(O)	0%	Daily Outstanding Specimen report. Monthly trending	0		
c. Red Cross lookback for all blood units and components transfused can be traced to a recipient	R(S)	100%		100%		
d. Adherence to Blood Transfusion bedside checks, including duration of transfusion, are confirmed by laboratory staff	R(P)	100%	Transfusions are audited for duration (to confirm transfusion does not exceed 4h) and to confirm appropriate bedside check	4/1119 exceeded 4h	Nurse managers notified on each occasion.	Incidence has dropped since nurse managers routinely notified
e. Number of cases when candidates for Rh-Immune Globulin were not identified, or physician not notified of unexpected candidacy for RhIG.	R(O)	0%	Surgical pathology cases are audited daily for products of conception; post-partum blood groups audited.	0		
f. Appropriate utilization of Transfusion service ensure the C/T* Ratio does not exceed 3:1	Q(O)	N=0	Monthly report generated	Jan 94: 3.1:1 ratio	Incidence now monitored by Medical Audit and Tissue Committee	

Key to Indicator Categories:

R	Risk Indicator	Q	Quality Indicator	S	Structure Indicator
P	Process Indicator	O	Outcome Indicator	TAT	Turnaround Time

*C/T Ratio = crossmatch to transfusion ratio

APPENDIX C

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