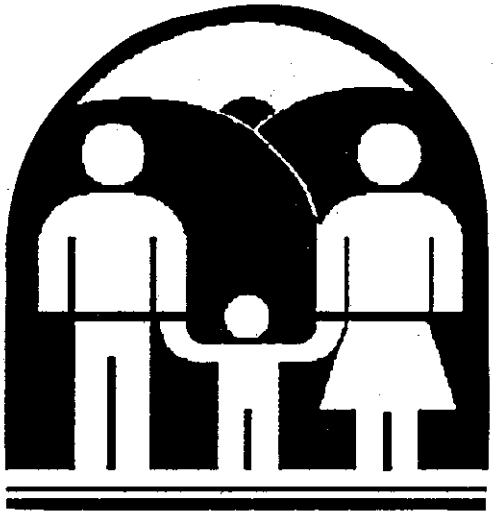
TOTAL QUALITY MANAGEMENT

IN THE

COMMUNITY HEALTH CENTER

- A PRIMER -



MERCED FAMILY HEALTH CENTERS, INC.
MERCED, CALIFORNIA

Compiled by Brenda L. Foster, TQM Coordinator

ACKNOWLEDGEMENTS

This document was produced through financial support from the Primary and Rural Health Care Systems Branch, California Department of Health Services, Sacramento, California. The work would have been impossible without the support of the Merced Family Health Centers leadership and the Quality Management Group, who were encouraged and supported by the Board of Directors to embrace a comprehensive quality management program.

Members of the first four Process Action Teams pioneered the process, showing the way for other teams to follow. All of these individuals have generously contributed their time and effort to establish a quality culture in the clinics and offices of Merced Family Health Centers:

QUALITY MANAGEMENT GROUP:

Kent Angerbauer, DDS, Chief Operations Officer & Dental Director
Cynthia Butler Hunt, MD, Medical Director
Yvonne Dion, Assistant Director of Operations
Gloria Kohn, Medical Staff Coordinator
Kim Martin, QA Assistant
Christine Noguera, Associate Director of Operations
Victor Olano, MATCH Fellow
Jill Marie Purdy, Social Worker
Kaye Rankin, Chief Information Officer
Claudia Rusnak, Chief Financial Officer
Dave Simenson, MD, Clinic Manager & Asst Medical Director/QA
Michael O. Sullivan, Chief Executive Officer

PROCESS ACTION TEAM #1:

Dave Simenson, MD, Clinic Manager
Bea Guevarra, LVN, Head Nurse
Anita Gasper, Medical Assistant
Bertha Ruiz, Office Coordinator
Gloria Andrade, Receptionist

Facilitator: Christine Noguera

PROCESS ACTION TEAM #2:

Jay French, PA, Clinic Manager
Hilda Kanon, DDS, Dental manager
Gayle Kinnear, RN, Head Nurse
Kirby Cristobal, Office Coordinator
Claudia Cerna, Receptionist

Facilitator: Claudia Rusnak

PROCESS ACTION TEAM #3:

Loan Huynh, DDS, Dental Manager
Candice Kalin, RN, Head Nurse
Amy Germann, Office Coordinator
Josie Elie, Billing Supervisor
Latda Kitavong, Medical Assistant
Maria Martinez, Receptionist
Victor Olano, MATCH Fellow

Facilitator: Kent Angerbauer, DDS

PROCESS ACTION TEAM #4:

Heide Woo, MD
Yvonne Dionne, RN, Asst Director of Operations
Margaret Sigarroa, Medical Assistant
Ginger Smith, Medical Records Supervisor
Terri Snell, Lab Supervisor

Facilitator: Christine Noguera

TQM Coordinator & "Coach" for all teams: Brenda L. Foster

External Consultant & Leader of the Initial Quality Team Workshop:
Kevin Sullivan, Sullivan/Luallin, San Diego, CA

TABLE OF CONTENTS

TOTAL QUALITY MANAGEMENT IN THE COMMUNITY HEALTH CENTER

I. INTRODUCTION

In today's economy virtually every organization, no matter what industry it is in, faces a challenge. The increased level of competitive intensity makes even old, familiar issues more challenging - and enhanced performance an absolute necessity. In both the industrial and service sectors, organizations worldwide need to make things happen - with higher quality, greater speed, and lower cost - all at once. (3) Community Health Centers certainly are not exempt from this imperative, as a new era of accountability for the quality of health care dawns in the United States.

In a recent article, Dr. Barry Lachman stated "In ten years unless the emphasis shifts (from cost) to quality, the United States will continue to have escalating health costs with declining technical quality and worsening access problems . . . Health centers can take charge of assuring quality or have standards imposed from the outside." (13)

We must be prepared to show that community health centers continue to be an effective and high quality way of delivering health care. But how can we do this when the cost of poor quality in health care may be as high as 50%? (6) Many organizations are staking their futures on an old philosophy - Quality Management.

The history of quality management in healthcare dates back to the work of Florence Nightingale and her use of applied epidemiology to investigate hypotheses regarding problems with hospital care during the Crimean War. After a period of waning interest during the Depression, the practice of Quality Management grew, and the creation of the Joint Commission for the Accreditation of Hospitals in the 1950s focused even more attention on this area through its Quality Assurance (QA) requirement. (1)

Despite the introduction of industrial style quality management systems in the U.S. in the 1980s, the health service industry continued to focus on meeting internal and external requirements set by accrediting agencies and third-party payers. TQM has become a commonly accepted process to enhance manufacturing. However, the processes involved in manufacturing are generally consistent and fairly predictable, which is why the

statistical process of TQM is easy to use in decreasing variation. Healthcare, on the other hand, is quite different. Although process and medical procedures do have some degree of predictability, no two patient medical cases are exactly alike. Because the very nature of healthcare demands flexibility in the treatment of patients, it is very difficult to control variation, one of the foundations of the TQM process.(11)

Because of this complexity, during a time when other industries were beginning to implement quality improvement processes organizationwide, health service organizations simply tended to revitalize their QA activities. It would take a crisis in the 90s before healthcare organizations would begin integrating Total Quality Management with Quality Assurance activities and analyzing processes to improve standards of care and overall outcomes.

In 1994 Merced Family Health Centers made the decision to take charge of assuring quality by implementing Total Quality Management, funded for the first year by a grant from the California Department of Health Services. The purpose of this work is to share our experiences and to encourage other community health centers to make the effort to transition from a reactive style of quality management (quality assurance) to a more proactive stance.

II. THEORY AND PHILOSOPHY

All of the quality measurement and improvement approaches tried in health care originally came from industry. In fact, the TQM philosophy, proposed shortly after World War II (and taken seriously only by the Japanese), relied on building quality into production processes rather than inspecting and eliminating poor quality after the fact.

Clearly, quality in healthcare has multiple dimensions that dictate the need for an industrial style quality management system. These dimensions include clinical quality, patient and customer service, appropriateness of care, cost effectiveness and efficiency, reduction of clinical risk, and patient and employee safety. (12)

Over time, numerous definitions and uses have been developed for the word *quality*.(16) Many terms are used interchangeably, so to reduce confusion we will use the following consistently:

1. QUALITY MANAGEMENT - An umbrella term for all systematic processes directed toward the improvement of care.

2. QUALITY ASSURANCE (QA) - Most experts have abandoned the use of the term *quality assurance*, but we will use it to describe the traditional system generally used for accreditation purposes. Also referred to as Quality Assessment and Improvement (QA&I), this is essentially a checking mechanism driven by accrediting bodies external to the healthcare organization. Commonly we use it after the fact, to determine whether or not we met certain elements considered important in delivering care.

   The process of assessment requires us to gather and analyze data pertinent to these standards of care. These data become outcome indicators that tell us when we need to improve our healthcare delivery system. However, the usefulness of these data is limited because we have not used them to direct ourselves to the specific area we need to improve, upstream, in one of the many healthcare delivery processes.

3. CONTINUOUS QUALITY IMPROVEMENT (CQI) - The ongoing improvement of quality of systems and work processes through the use of objective analysis and scientific method. Collaborative management and customer focus is essential, and teams are frequently used to resolve problems and improve processes. This term is sometimes used interchangeably with TQM.

4. TOTAL QUALITY MANAGEMENT (TQM) - The top-down consumer driven organizational commitment to improve quality throughout the organization. Total Quality Management provides a strong management incentive to pursue continuous process improvement, as well as a scientifically valid methodology for accomplishing it. It offers the healthcare organization a proven method for maintaining its Mission - enabling it to survive today's tough times through improving the processes of its healthcare delivery system. Similarly, TQM offers the healthcare organization a plan for attaining its Vision - high quality, affordable, and accessible patient care.

In contrast to QA, TQM is essentially an organization wide continuous improvement process driven internally and proactively by an executive commitment to meet or exceed the reasonable needs of customers who are both internal and external to the organization. Through education and training in a common set of statistical tools and teamwork techniques, all members of the organization come to share this commitment and are empowered to improve the work processes in which they have responsibility and control.

Traditional quality assurance has looked intently at the technical excellence of the medical portion of healthcare. However, quality includes the art of care and all of the processes by all individuals in the health center. For example, an appointment system which makes access inconvenient for patients could lead to a poor immunization rate and higher rates of infectious disease in a community.

5. PROCESS MANAGEMENT - A key component of TQM/CQI is managing and continually improving processes. All work is part of a process - a series of activities or steps that produces an output of some kind (a product or service). The more definable, repeatable and predictable the steps are, (a) the more manageable the process, (b) the more uniform the outcome, and (c) the easier the improvement of the process and, therefore, the product or service.

Every organization has hundreds, if not thousands, of processes that connect to, or fit inside other processes. Many are small, like the process for reserving a meeting room. Others are larger. The process management approach is grounded in these basic beliefs:

> Organizations may be structured vertically but most work takes place horizontally.

> All work processes are made up of definable, repeatable and predictable activities.

> If a work process cannot be measured, it cannot be managed effectively.

> Effective work processes depend on involved, empowered, skilled employees.

Process Management includes focusing on what is most strategic for the organization and then documenting, monitoring, standardizing, improving and possibly pursuing innovation for the strategic processes.

The process focus of quality improvement is a great advantage for health care workers, especially physicians, because clinicians are fed up with feeling harangued and hassled by the current quality assurance structure that watchdogs the results of care and rewards behavior by punishing the individual practitioner. As all workers begin to understand the variation in the process of care - often by identifying places where the system fails - they can begin to improve it.

You must understand that full implementation of TQM/CQI does not happen overnight. In fact, full implementation takes three to six years and application of considerable resources. A General Accounting Office study on Quality Management breaks organizational implementation maturity into five phases: (1) Decision; (2) Getting Started; (3) Implementation; (4) Achieving Results; and (5) Institutionalization. This report shows that organizations generally do not reach the fourth phase of achieving significant results until well into their third year. It reinforces the point that it takes patience to remove barriers, change an organizational culture, and achieve results.

III. STRATEGIES THAT WORK

Organizations should accept that there is no one generic Continuous Quality Management formula which applies to everyone. What can be a tremendous success at one location can be a dismal failure at another. We offer you information on what we at Merced Family Health Centers have done in our first year - the "Getting Started" phase. In order to get the biggest "bang for our buck," we have attempted to ensure our success by using only the basic management techniques which have been shown to be successful.

According to the International Quality Study, (3) there are practices that have consistently positive impacts on performance across all organizations. For organizations

just beginning a Quality Management effort, the International Quality Study recommends the following:

1. Resist the desire to move too rapidly or attempt too much.
2. The biggest leverage lies in addressing those practices that influence the customer: training those who interface with customers, equipping employees to do their own problem solving, and increasing face-to-face contact with customers to gain input on desired improvements in existing products or services - as well as new product/service ideas.
3. For cost reduction or enhanced cost management, cut out what does not add value. Benefits from redesigning processes to eliminate the non-value-added time and resources may be delayed in their impact but will have long-term positive effects.
4. If there is one caution for beginners, it is to stay focused on the basics and not be distracted by fashionable trends in management practices.

PEOPLE STRATEGIES:

5. Organizing teams into effective work units is one of the basic strategies.
6. Formal training in "problem solving" is extremely beneficial.
7. Heavy investment in training for all levels of employees is money well spent. (All forms of training - general & specialized, optional & required) Get immediate benefit from the overall training budget by allocating a portion of it to training employees in how to interact effectively with customers.
8. The IQS data do NOT show that overhauling the assessment & compensation practices is an effective stimulus to improved performance in the lower group. However it does show beneficial impact from placing high importance on quality as an assessment criterion for non-management personnel, indicating that companies should first start measuring close to the action, where improvement will first occur.

PROCESS STRATEGIES:

9. Become highly attuned to customers. Get customer input from face-to-face

interaction rather than relying on information gained through distributing survey forms.

10. Opening up the strategic planning process to widespread input was NOT helpful in the beginner group, and in some instances appeared to actually be harmful.
11. Beginners make their gains from people development & process improvement.
12. An overall strategy of achieving quality by "designing it in" is a beneficial policy - but the results will not be immediate. So, don't dismantle your inspection procedures prematurely. Recognize the quality level at which your organization is currently performing, & base your inspection policies on your internal realities rather than on the trends you see in the industry.

The difference between successful and unsuccessful TQM outcomes may just be a matter of how TQM is approached. Some might say that with the proper training, the TQM methods have the potential to be successful in almost any industry. What seems to have been ignored by these entities is the idea that TQM is not just a technique or a tool that can be adapted to fit any situation.

TQM works well in organizations that meet certain cultural criteria. Its successful application requires that a certain belief system be in place before it is implemented. The belief system revolves around meeting customer needs. The organization must be steeped in the philosophy of using teams to solve system problems. The potential for failure must be accepted as an important part of the improvement process. "Tolerate failure - it is the price of success," is a common motto of a successful TQM application. In addition, the TQM philosophy must be based on an information system that is designed to collect statistical data, rather than monitor behavior or punish.

IV. TQM VERSUS QA(4)

Traditional QA has had a limited impact on improving our healthcare system. Until now, the leaders and managers of healthcare organizations have not had adequate incentives to pursue the improvement opportunities it indicates. Accordingly, the

improvements driven by quality assessment data rarely have scientific validity because we do not base them on a systematic investigation of the facts. Instead, in an effort to meet accreditation standards, we generally use our best guess, or gut feel, to identify the cause of the problem. Without the benefit of scientific analysis, we usually identify and solve a symptom rather than a root cause. Because we failed to attack the root cause of the problem, in time we find that the same problem recurs. For example, too often we simply lay blame for the problem with one of the providers in the healthcare delivery system. Yet the true actionable root cause may be a lack of training, procedural consistency, or simple communication.

Whether fairly portrayed or not, many have come to view QA as an activity to fix blame. In contrast, TQM searches for root causes of problems in processes within the healthcare system, rather than among the ranks of its employees. Even though some hospitals have incorporated QA into their management philosophy, there is little emphasis on error-free work, management by prevention, and the sense of ownership or involvement in quality issues by employees or managers. In many healthcare organizations the QA department is tucked away and usually dues not influence systems between accreditation surveys.

QA programs currently in use generally focus on three major areas: (1) assessing or measuring performance, (2) determining whether performance conforms to standards, and (3) improving performance when standards are not met.(14) Once the healthcare organization meets the standards, however, the QA program often comes to a standstill until it notes another problem of nonconformance. On the other hand, the TQM/CQI process actively seeks opportunities for improvement and takes action to eliminate costly variations, thereby improving quality. Unlike QA programs, TQM is a continuous process that never stops.

Laffel and Blumenthal (14) noted several limitations to the current approach to quality. First, QA often does not extend beyond meeting standards, thereby making the system static and reactive. Second, the QA coordinator and/or QA department is the main driver of QA. In contrast, focused and combined efforts of all departments and employees

drive TQM. Finally, QA has traditionally focused on the performance of the physician and other clinicians and has underestimated the contributions of nonphysicians and organizational processes. TQM, on the other hand, evaluates the contributions of nonclinical departments as well, so that they too can play an important role in the effort to improve healthcare service.

Compared to TQM, QA tends to be narrow in scope - focused on variables that are easily measured. TQM is more comprehensive - first defining the process and required outcomes, then seeking objective evidence to indicate that an opportunity for improvement exists, identifying the most important area in which to conduct improvement experiments, and finally verifying that the process outcomes have improved. QA outcome measures reflect an essential inspection process. They are designed to indicate poor outcomes. These measures have limited value because they do not provide insight into the causes of defects. TQM provides a system that can work in conjunction with traditional QA outcome measures to focus on identifying and eliminating root causes of defects within the processes involved in producing these outcomes.(13)

As presented by Andrews,(4) six key elements distinguish TQM from traditional QA programs:

1. A focus on process, not people
2. Defining quality as meeting the needs of the customer
3. Improving quality to reduce costs
4. Building quality into the process
5. Using a scientific approach to problem solving
6. Approaching quality as a management strategy

Some leaders of healthcare organizations have reacted as though they face an either/or decision about QA and TQM. This is not so. Common ground exists between QA and TQM, and each offers complementary strengths. Together, QA and TQM can serve as a solid foundation for an optimal TQM based healthcare system. Thus, the integration of QA and TQM presents the healthcare industry with an opportunity to build

upon the best of these approaches in order to reach the goal of continual improvement in quality.(6)

Without proper integration, QA and TQM efforts parallel each other, duplications occur, and organizations send mixed messages regarding the degree of support for the role of QA.(12) At Merced Family Health Centers we brought the Quality Assurance and TQM facets together one year into the implementation phase by combining the QA Committee and Quality Council to form one entity - the Quality Management Group. Quality management is now a seamless - and more effective - process.

V. GETTING STARTED

TQM is a long-term, ongoing process that requires hard work and a step-by-step approach. If it is to succeed, management, as well as employees representing all levels of the organization, need to master and utilize the skills associated with the TQM process.

Recognizing that a successful quality culture demands sustained senior leadership commitment and involvement, MFHC began its quality journey by establishing a Quality Council in January of 1994 to guide our progress. The Council included ten individuals, most of them in leadership positions within the organization.

At the time, the reasoning was that the committee needed to consist of those leaders who had the power to implement change and thus show the commitment of top management to this philosophy. It was later discovered that although this group was successful as a steering committee, it lacked full support from the staff because it was perceived as not truly representing the totality of the organization. The committee elected to expand the membership to include members from various levels and geographical locations within the organization.

The intent was to create a steering committee that further cut across organizational lines and more closely reflected the culture of the medical centers. It became clear that the role of the Quality Council is to reflect the collective expertise and wisdom of every member of the staff. The present Quality Management Group is a better reflection of its culture.

The Quality Council (Quality Management Group) sends a strong message: our top leaders are personally and directly involved in quality activities, including acting as advisors to teams. At the monthly council meeting, members assess team progress, review action plans, assess AmbuQual data, and set goals for further implementation.

A subcommittee from the Quality Council began working on the details of implementation, researching what other medical organizations were doing in the area of quality management. Based on their findings, the Council decided that some strong initial training would be required from an outside consultant and, after evaluating several proposals, a decision was made to work with Sullivan/Luallin Marketing and Management Services of San Diego, California.

In March and April, Kevin Sullivan gave a three and a half day seminar for the Council members, a couple of members of the Board of Directors, and several individuals from selected clinics who had been identified as potential team members. This initial training was an in-depth familiarization with the TQM philosophy and principles as well as an opportunity to learn and practice common quality improvement and problem-solving tools.

In a goal-oriented organization, the focus is on problem solving, issue identification, formation of teams, open communication, collaboration, participation, and even empowerment, all of which are crucial to the success of a TQM program. TQM works best in organizations in which there is a clear sense of purpose that is shared by all members. TQM does not fit well in organizations where different groups bargain and compete for a share in the balance of power and use their influence to realize personal or group aspirations.

In a truly political organization, where there will never be agreement and group interests will always be diverse, no attempt should be made to achieve a cultural transformation toward TQM. Here, TQM is not appropriate, nor will it ever be an effective management tool in a highly politicized organization. At best, it is an effective marketing technique that the politician can use to demonstrate that he or she is truly contemporary and up to date with the latest management fad.

During a management retreat in May 1994, MFHC leadership held further discussions regarding TQM implementation and developed a Mission and Vision Statement. This was considered an essential element in establishing a clear sense of purpose for all members of the organization. If you want organizational change, you must develop a bold plan, actively sponsor the changes, and support them tenaciously over a period of time. Revisit and revitalize the purpose and vision of the organization.

Vision is the focus - start with a compelling vision for the future as a guide to change; this is the key to long-term success. It is the vision that drives all action, so focus on the results you want dearly to attain. A vision clearly identifies for all concerned (employees, customers, and suppliers) exactly what the organization stands for and precisely why they should support it. Vision tightly directs attention to the critical factors that produce long-term results and thereby success. Unfortunately, most organizations today are filled with rhetoric. An old Chinese proverb goes, "Lots of noise at the top of the stairs, but no one coming down."

The leadership of MFHC determined after the initial training and strategic planning that it would be necessary to hire a TQM Coordinator, or quality "coach," to lend the necessary focus to the implementation of TQM throughout the organization. This person began working in June to coach the staff toward an understanding and implementation of total quality management, and to assist the Executive Director in making it happen.

Transformation to TQM is a big job and it can't be done haphazardly. Someone must oversee the scores of logistical, administrative and advisory processes involved in implementing quality. Someone must:

> advise managers, helping them to keep sight of the big picture and the long-term vision.

> help managers assess the impact of various quality efforts to determine what is effective and what is necessary so that the right things are being done and are being done successfully.

- keep track of various improvement efforts; assess needs; coordinate any central ized training.
- provide technical assistance to the project teams, helping them plan their project, conduct good meetings and develop themselves as a team, and guiding them in the scientific approach.
- provide orientation to new managers and other key participants.
- maintain a library of information resources and training materials.
- coordinate publicity for quality efforts through such vehicles as newsletters and the local media.

Although the proper organizational culture is important, it is not likely that this alone will be enough for people to accept the TQM concept. People do not feel the urgency to change unless they consider themselves to be a part of the vision and are encouraged to accept the vision only when they have a stake in the outcome. This incentive can be achieved by forming teams to solve problems that inhibit personal performance. Empowered teams can be a powerful force, as we have discovered at MFHC.

Empowerment is described as the ability to take unencumbered action. It is providing people with the necessary skills and training, and then presenting the objectives to them and allowing them to figure out the best way to accomplish the tasks. Isolated attempts at empowerment are useless in the absence of the proper culture. TQM requires a secure environment that encourages risk, failure, and a focus on lessons learned.

Many quality theorists such as Juran and Deming teach that the quality transformation will never be completed until front line personnel (those with the greatest potential to impact customer service and satisfaction) learn, understand, and apply continuous improvement principles and techniques. To start that phase of the learning process, we held orientation sessions at each site, beginning last June. Initial sessions were for ALL employees, although attendance is voluntary, and approximately 175 have been briefed so far.

The Orientation consists of Customer-Supplier Relationships, Teamwork, Roles of Key Members (Leader, Scribe, Timekeeper, Facilitator), Simple Tools (Brainstorming, Flowcharting, Pareto Chart, Cause & Effect Analysis), the Quality Team Process (consistent step-by-step approach), and the role of the Quality Council. A special TQM Orientation was provided for Head Nurses, Office Managers and Providers.

VI. TEAMS

As you can see, the first step in the implementation process is to establish the infrastructure, a quality environment with upper management support. The projects that require improvement are then assigned to teams. The teams are empowered with the resources, motivation and training to diagnose problems, implement solutions, and establish controls to maintain improvements. The lessons learned from the improvement process are then applied to future quality planning.

In order to establish a solid footing, the decision was made to begin process improvement by chartering two teams, with four teams within a year the ultimate start-up goal. The first two teams met in June 1994, and putting them together was a real learning experience.

Effective teams do not come about by accident. No one should expect to throw a team together, give them a charter or mission, and anticipate break-through results. Team relationships are too complex for that kind of thinking.

To generate commitment, the following points should be considered:

1. When inviting people to join a team, it is of the utmost importance that you attempt to communicate with them in THEIR thought patterns. It's not enough to transmit the idea; you must elicit the emotion, too. Very few people will get excited about something they don't understand. They can, at most, support the idea and comply with your wishes.
2. The commitment must be meaningful to the person being invited. If people don't understand how being a part of the team is of benefit to them and their

organization, they won't easily commit.

3. It is important to be clear about the extent of the commitment and the evidence for proper performance. The clearer participants can be initially about what is expected, the less confusion will arise later.
4. Commitment is not a static thing; it changes with time. People will become more or less committed, depending on how their needs are met. Culture and subconscious mind processes have a profound effect.
5. In an aligned team, commitment is shared among its members. Behaviors of one person can influence the commitment of others. In the worst case, other team members question their own participation on the team and lose their commitment. Compliance apathy on the part of a few may breed mediocrity for the whole team.

The team approach requires that a group of knowledgeable employees with the proper range of skills at the lowest appropriate organizational level be involved in addressing issues of mutual concern. In addition, use of the team approach builds a sense of commitment, personal responsibility, and achievement in each team member. The varying perspectives of the cross-functional team members will help to assure that important considerations are not overlooked. After problems are solved and/or processes improved, team members will be more apt to engage in cross-departmental problem prevention.(10)

Each team meeting becomes an adventure in helping team members start to understand their system, its interactions, and their interdependence. Each meeting is an opportunity to help team members envision a new working situation, a new order of affairs where processes work with predictable reliability.

As a general rule, teams should have no more than eight members (excluding the facilitator). They should be encouraged to meet at convenient times and be provided with food if the meeting is during a mealtime. Our teams meet for one hour during lunch once a week. They spend approximately one to three hours during work hours between meetings on "homework" such as collecting and analyzing data.

Every team needs a "champion" - someone who recognizes that a problem area exists and who is willing to take on the responsibility of providing organizational authority and support to the team. The champion is not necessarily on the team but has ownership of the problem, will support the final decision, and has the authority to implement the recommended corrective actions.(10)

Each of our four Process Action Teams has a champion from the Quality Council. This person also acts as Facilitator and attends all team meetings. As employees become more knowledgeable in team dynamics and the quality improvement process, the champions will not necessarily attend every meeting.

Teams should always have members who play the following key roles(19):

1. LEADER: The leader is responsible for directing the group and managing the meeting. He or she leads the members through the various activities required to achieve the meeting's objectives.

   One of the leader's jobs is to ensure that all members participate in the session. This may involve bringing in quiet members and restraining those who are dominating the discussions. The effective leader balances two major elements, the task and the people.

2. TIMEKEEPER: To help manage a team's time effectively, it is essential that the team members agree on a game plan - allocating a certain amount of time for each activity of a process or meeting.

   The timekeeper monitors how long the group is taking to accomplish its tasks, gives regular updates to make group members aware of where they are in relation to time, and may lead the initial discussion to allocate times.

   The group may decide to reallocate its time as the meeting progresses. It may even decide not to complete the task within the time limit. These are group decisions - not the timekeeper's decision.

3. SCRIBE: The scribe (or recorder) is responsible for recording the group's ideas, decisions, and recommendations. He or she maintains the group's memory. The

scribe is an active participant, continually summarizes and clarifies, and posts major thoughts, concepts, or other meeting information on the board during the progress of the meeting so that all can see what is happening with their meeting.

The scribe usually works at a flipchart easel, a whiteboard, or a copyboard. Their printing should be legible, and large enough for everyone in the group to read. It is important that the scribe record accurately what is said during the meeting. The charts should be labeled or titled and numbered. Some scribes change the color of their markers when they move from item to item. All of these make it easy to reconstruct the group thought process for typing minutes or to review where the group is at the beginning of the next session.

As each sheet or board is filled, the scribe posts it or copies it so that the group members can go back and review at any time. The scribe is also responsible for the tacks, tape, and other supplies required to post the charts. The way a scribe goes about maintaining the group's memory will affect how well the group works.

4. FACILITATOR: A facilitator helps a group free itself from personal or group-related obstacles or difficulties so that it more efficiently and effectively pursues its objectives. He or she is not necessarily a regular member of the team and may be responsible for supporting several teams at any given time.

Members serving other roles in the meeting may also serve as the facilitator. Regardless of who has the formal responsibility, facilitation must be shared by everyone. All participants share the responsibility for making a meeting or session successful.

An organization's facilitator may spend more time with newly trained employees, helping them to apply and practice skills that are still new and a little different. The facilitator can serve as a role model, demonstrating for team members some of the skills required for their roles. It is especially valuable for the facilitator to spend time helping the leader with team leadership skills between meetings. He or she will also evaluate the group's application of the processes, to

ensure the members are using the appropriate tools, not jumping to conclusions, etc.

As a team gets better and more comfortable with the process, the outside facilitator will reduce the time spent with the group until it is self-supporting. This is the ultimate objective: for groups to learn to facilitate themselves.

For the teams to work together effectively identifying processes and solving problems associated with them, team members need education in quality theory and skills training in tools and techniques. Skills needed include (1) technical skills, (2) data-based tools and techniques to improve processes, and (3) interpersonal people skills.

The technical skills are specific to each position and addressed in each team member's job description. The data-based tools and techniques and interpersonal or people skill requirements are generic and cut across functional departments, positions, etc.

Skills using data tools and techniques are necessary because the quality theory of management is a "fact-based" approach. Its aim is to get at the root cause of problems in order to reduce variability in the system. The teams have just-in-time training from the TQM Coordinator to assist in learning interpersonal, team skills and specific tools and techniques.

VII. TOOLS AND TECHNIQUES

In quality improvement and problem solving, teams learn to apply a number of tools to facilitate working through the steps of the process in an effective, systematic way. Most steps in the process require that the team members generate ideas and collect information - to get ideas on which problems to work, to get the information needed to isolate problem causes, and to come up with ideas on how to address the causes and solve the problems. What follows is a synopsis of several quality tools, many of which MFHC teams are using to improve work processes.

A. GENERATING IDEAS - BRAINSTORMING(19)

Brainstorming is an idea-generating technique pioneered by Alex Osborn, an advertising executive. A group of people throw out their ideas as they think of them, so that each has the opportunity to build on the ideas of others.

The discipline of brainstorming is maintained by four basic rules. However, the informality of the process generates an atmosphere of freedom and creativity. These rules are:

> No evaluation

> Encourage wild ideas

> Hitchhike - build on the ideas of others

> Strive for quantity

The group leader presents the problem for which ideas are sought. The wording should encourage specific, tangible ideas, not abstract ideas or opinions. The leader makes sure that the members understand the problem, the objective of the brainstorming session, and the process to be followed.

There are three methods of brainstorming. The most familiar is free wheeling, where group members call out their ideas spontaneously, and the scribe records the ideas as they are suggested. In round-robin brainstorming, the leader or scribe asks each member, in turn, for an idea. Members may pass on any round, but the session continues until all members have passed during the round. Ideas are recorded as in free wheeling.

Yet another brainstorming method is the slip method, which differs markedly from the other two approaches. The leader asks members to write down their ideas on small slips of paper or index cards, then the ideas are collected and organized.

There are advantages and disadvantages to each method. Free wheeling is very creative and it is easy to build on others' ideas, but strong individuals may dominate the session, and ideas may be lost when too many talk at once.

In a round robin the discussion tends to be more focused, and everyone is

encouraged to take part. However, it is difficult to wait ones turn, there is some loss of energy, and it isn't as easy to build on others' ideas.

The slip method is useful when anonymity is desired for sensitive topics and can be used with very large groups. However, it is quite slow, and it is not possible to build on the ideas of others. In addition, some ideas may not be legible or understandable, and it is difficult to clarify them.

B. TOOLS FOR REACHING CONSENSUS(19)

The following tools and techniques help team members work toward consensus. They are not intended to make the decision for the group, but more to "take the temperature," to find out who stands where, and how far the group is from consensus. The objective is to bring viewpoints, especially conflicting ones, to the surface so they can be discussed openly.

Although consensus is commonly used to mean complete or unanimous agreement, its precise meaning is general agreement. Consensus is reached, therefore, when all members of a group are willing to accept a decision. Even though a decision may not necessarily be an individual's first choice, he or she considers it a workable approach and in the best interest of the group.

In the words of William G. Ouchi, author of *Theory Z*, consensus has been reached when all members of a group can agree on a single solution or decision and each can say:

> "I believe you understand my point of view."

> "I believe I understand your point of view."

> "Whether or not I prefer this decision, I will support it because it was reached openly and fairly."

To determine if all group members have reached the mutual acceptance of a decision, the leader or facilitator (or any team member) should ask:

> "Does everyone accept this decision?"

A "yes" answer means the decision has been made.

> "Is there any opposition to this decision?"

If no one speaks, the answer may be that everyone agrees with the decision; the questioner should also be alert for non-verbal signs which could indicate opposition.

> "Can everyone live with the decision?"

A "yes" ensures that no one has a conflict with the decision.

Consensus plays an important role in group problem solving. Almost every step requires that the group converge: on a single problem statement, on the key problem causes, on the optimum solution. Even moving from one step to the next requires consensus that the work is complete, that it's time to proceed.

Consensus is more about listening than about talking. The tools will help identify group members with differing viewpoints - those to whom others should listen, in order to understand why they are not in agreement. Consensus cannot be reached without understanding and exploring the divergent opinions of all group members.

1. LIST REDUCTION(19)

List reduction is a way of processing the output of a brainstorming session. The objective is to clarify the options so that all group members understand them, and then reduce them to a manageable number.

Before the list (of potential problem areas or solutions) can be shortened, everyone in the group must have a clear understanding of all items on the list. The first activity, therefore, is for the leader to go through the items, asking if there is a need for clarification. If yes, the suggester should be asked to briefly explain what he or she meant by the comment. The discussion should not go beyond simple clarification at this point.

Then the group identifies some "filters" which are criteria that should be satisfied for an item to remain in consideration.

SOME FILTERS FOR SELECTING PROBLEMS:

> Does this problem lend itself to being solved by a group?

> Is the problem within our control or influence?

> Is it worth solving?

SOME FILTERS FOR SELECTING SOLUTIONS:

> Is it likely to solve the problem?

> Is it feasible?

> Can we afford it?

Keeping the agreed upon criteria in mind, group members vote on each item: "yes," if it satisfies the criteria; "no," if it doesn't. A simple majority (one half the number in the group, plus one) keeps an item on the list; fewer votes mean the item is bracketed ([ ]). Items are bracketed, rather than crossed out, so that the group can go back to them later if necessary. In general, the group focuses on, and continues to evaluate, only the non-bracketed items on the list. However, since group members have not had an opportunity to react to any of the suggestions on the list, an individual member may request that a particular item remain under consideration until all have had a chance to react to it.

The process may be repeated, with different or more stringent criteria, until the list is reduced to about a half-dozen options. This represents a manageable number of options for applying some of the other evaluative tools.

2. BALANCE SHEETS(19)

Balance sheets allow a group to identify and review the pros and cons of a variety of options. Like the other tools for reaching consensus, balance sheets won't make decisions. They will, however, organize the information and facilitate discussion among group members, moving the group closer to the decision.

Set up a large grid with two columns and a row for each of the options. Label the columns "+" and "-" and then enter the positive and negative aspects for each of the options, in turn.

Balance sheets are simpler and quicker to apply than most of the tools mentioned, and may be all that is necessary to spark consensus on either a problem or a proposed solution.

3. MULTI-VOTING(17)

Multivoting is a way to conduct a "straw poll" or vote to select the most important or popular items from a list with limited discussion and difficulty. This is accomplished through a series of votes, each cutting the list in half - even a list of 30 to 50 items can be reduced to a workable number in 4 or 5 votes. Multivoting often follows a brainstorming session to identify the few items worthy of immediate attention.

HOW TO MULTIVOTE:

a. Generate a list of items and number each item.

b. If two or more items seem very similar, combine them, but only if the group agrees that they are the same.

c. If necessary, renumber all items.

d. Have all members choose several items they would like to discuss or address by writing down the numbers of these items on a sheet of paper. Allow each member a number of choices equal to at least

one-third of the total number of items on the list (48 item list = 16 choices; 37 item list = 13 choices).

e. After all the members have silently completed their selections, tally votes. You may let members vote by a show of hands as each item number is called out. If there is a need for secrecy, conduct the vote by ballot.

f. To reduce the list, eliminate those items with the fewest votes. Group size affects the results. A rule of thumb is: If it is a small group (5 or fewer members), cross off items with only 1 or 2 votes. If it is a medium group (6 to 15 members), eliminate anything with 3 or fewer votes. If it is a large group (more than 15 members), eliminate items with 4 votes or fewer.

g. Repeat steps 3 through 6 on the remaining list with the choices reduced accordingly. Continue this until only a few items remain. If no clear favorite emerges by this point, have the group discuss which item should receive top priority. Or you may take one last vote.

4. WEIGHTED VOTING[19]

Weighted voting is most useful for quantifying the positions and preferences of team members - "taking the temperature" of the group as it is working toward consensus. The approach can be used to identify the group's positions and priorities when fewer than eight or ten options are under consideration.

Set up a grid - members by options - on a flip chart. Give each member a number of votes to distribute in accordance with his or her preference. As a rule of thumb, the number of votes should be about 1 and 1/2 times the number of options. Members then decide how to distribute their votes among the options, to indicate their relative preferences.

NOTE: A vote of "0" effectively says "I absolutely can't live with this choice," and may require an explanation to the group.

Encourage people to spread their votes to represent their relative feelings about the options, rather than lump all their votes on a single favorite.

Have members decide how they will distribute their votes (preferably jotted down on paper) before any votes are recorded on the chart. Ask members to show their votes for each option all at once by raising the number of fingers that represents their votes.

Ask for, and record, votes by option, not by person. That is, call for the votes for the first option, the second, and so on. Record all votes so that the group can see where the agreements and disagreements lie.

Weighted voting does not make decisions. It merely gives the group information about where individual members stand, and how strongly. This information makes it easier to surface opposing viewpoints. Consensus cannot be reached without dealing with those viewpoints.

STATISTICAL METHODS

One of the main principles of TQM is statistical thinking.(9) Using statistical methods in data collection and analysis increases the credibility and accuracy of the information obtained. TQM emphasizes the use of statistics to interpret data accurately and produce meaningful information in order to understand, improve, and monitor processes in an organization. Accurate and useful information depends heavily on the comprehensiveness, validity, and applicability of the data collected.

According to Longo and Bohr (1991), the reliability of a measure is the extent to which it is reproducible. This means that if a measure is applied repeatedly (even by a different analysts), it will produce the same results over and over again. The reliability of a measure is important to ensure the collection of accurate data. Accurate and reliable

data are dependent on the level of training and expertise of the data collector and data processor. Incorrect or missing entries in a data set may render that set of data unreliable; thus, any judgment based on this data set may be inaccurate and not representative of the true facts. (2)

The validity of the measure is equally important. Validity considers whether one measured what one really meant to measure. To assess the accuracy of a measure one must know the predictive value of the measure. This can be further understood by explaining the concepts of sensitivity and specificity.

The accuracy of a measure or a test is determined by the calculation of its sensitivity and its specificity. Sensitivity is the proportion of times that the measure or the test is positive when the adverse condition or the disease is present. Specificity is the proportion of times that the measure or test is negative when the adverse condition or the disease is absent. This is to say that the accuracy of a test or a measure is dependent on the number of occurrences of false positives and false negatives. The number of false positives and/or false negatives should be very low for the task to be considered accurate. The accuracy of a measure is dependent on whether it is reproducible (reliable), whether it measures what we want it to measure (valid), and whether it predicts true occurrences of what we want it to measure (predictive value).

Information management is a key component of TQM. The data used to support management indicators must come from a sound information management system. The manager should look for trouble spots because, "Bad news is good news." To identify the early warnings of trouble, be alert to new information and to subtle deviations in the typical routine. Data collection is part of the continuous improvement process. Use that information to improve the process. This will result in improved quality, which will thereby improve results. (2)

C. DATA COLLECTION

1. CHECK SHEETS (19)

Data must be collected carefully and accurately. Using check sheets makes it easy to compile, and then to analyze, data. Check sheets are used to determine how often an event occurs over a designated period of time. Information is usually collected for events as they happen; less frequently, check sheets are used for recording events that have already occurred.

Although the purpose of a check sheet is to track (not analyze) data, check sheets often help to indicate what the problem is. Many kinds of data can be tracked using check sheets:

> Number of times something happens.
> Length of time it takes to get something done.
> Cost of a certain operation over a period of time.
> Frequency of occurrence - by department, shift, etc.
> Impact of an action over a period of time.

There are two questions that must be answered to set up a check sheet. What do you want to know? And what is the most reliable way to collect the data? In constructing check sheets, try to form categories that will be easy for the person recording the data to use. The data recorder should not have to make difficult judgments about when and where to "check" a box on the form.

2. INTERVIEWING (19)

Interviewing is a structured technique for collecting information from individuals or groups. If you have access to the people who have the

information you need, interviewing - either in person or on the telephone - can be a very efficient means of data collection.

Tackle the interview just as a reporter would:

> Before the interview, develop a list of questions.

> Be sure to include follow-up questions to get at the information you really need.

> When you conduct the interview, write down the responses.

> Verify your understanding of the interviewee's responses.

If you are collecting sensitive information, you may want to ensure the confidentiality of the respondents. In that case, do not use respondents names, identifiable quotes, or other information.

3. SURVEYING[19]

Surveying is interviewing on paper. Instead of responding to interviewers, people answer items on a questionnaire. The major advantage is that you can get a great deal of information from a lot of people very economically. The disadvantage is that people may interpret the questions somewhat differently than intended; their answers may be ambiguous as well, and there is no opportunity to test understanding.

HOW TO SURVEY:

> Identify the information you need.

> Decide who has information in its most reliable form.

> Plan how you will use the information when you have it in hand.

> Develop a series of questions that will enable respondents to provide the information accurately and unambiguously.

> Keep the questionnaire short, simple, and clear.

> Try out the questions with several people to uncover any unclear questions.

D. DATA ANALYSIS AND DISPLAY(19)

All of the tools for analyzing and displaying data are graphical. As you use them, keep in mind these principles of graphical excellence, from Edward R. Tufte's *The Visual Display of Quantitative Information*:

> Graphical excellence is the well-designed presentation of interesting data - a matter of substance, or statistics, and of design.

> Graphical excellence consists of complex ideas communicated with clarity, precision, and efficiency.

> Graphical excellence is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.

> Graphical excellence requires telling the truth about data.

1. CAUSE AND EFFECT ANALYSIS ("FISHBONE" OR "ISHIKAWA" DIAGRAM)(19)

This is a systematic way of looking at effects and the causes that create or contribute to those effects. The effects can either be problems - the "as is" statement of the situation you want to correct; or they can be desired states - what you want to exist when problems have been solved.

HOW TO USE A FISHBONE DIAGRAM:

> Decide on the effect to be analyzed, and write it on the right end of a board or large sheet of paper - the fish's head.

> Draw a horizontal line from the head across the paper, with several "major bones' drawn on a slant.

> Write the main factors which contribute to the effect at the ends of

> Write the main factors which contribute to the effect at the ends of the major bones.
  - For technical problems, the factors might be Man, Machine, Materials, Method, or Environment
  - Other useful factors include: People, Product, Price, Process, Equipment, Facilities and Performance.

> On each of the major bones, write the factors the team considers to be causes. The team may use brainstorming or other data collection methods to identify these.

> Identify the most significant factor (or combination of factors); collect additional data to verify causal relationship to effect.

2. HISTOGRAMS(19)

A histogram is a specialized type of bar chart showing the distribution of occurrences of a measurable outcome. Because of its immediate visual impact, it is more effective for displaying data than a check sheet or frequency table.

HOW TO CONSTRUCT A HISTOGRAM:

> If the data is not already arranged by frequency, make a check sheet.

> Draw vertical and horizontal axes on graph paper. Mark data values along horizontal axes, from the smallest to the largest; label the axis to indicate what is being displayed, and the unit of measurement (e.g., minutes).

> Label the vertical axis "Frequency," and mark values.

> Using the information in the frequency distribution table, construct vertical bars for each of the values, with height corresponding to frequency.

Use a histogram to display data collected to analyze the problem or to display data collected to evaluate effectiveness of the implemented solution.

3. PARETO ANALYSIS(19)

Pareto Analysis is a technique that separates the "vital few" from the "trivial many." Named for Vilfredo Pareto, a 19th century economist who did work with income and other unequal distributions, a Pareto analysis is designed to point out inequalities.

The familiar 80/20 rule ("Eighty percent of our business comes from twenty percent of our customers") is an example of Pareto analysis. The basic concept behind a Pareto analysis involves the ranking of data, and the analysis is usually presented in a Pareto diagram. Like a histogram (or bar graph), a Pareto analysis shows a distribution. The bars, however, are arranged in descending order.

A Pareto analysis (or diagram) is used to draw attention to problems (or causes) in a systematic way. It shows which are the greatest problems, thereby enabling a group to set priorities.

Pareto diagrams may be used with or without a cumulative line. When cumulative lines are used, they represent the percentage sum of the vertical bars, as if they were stacked on each other going from left to right.

HOW TO MAKE A PARETO DIAGRAM:

> Use a check sheet to collect the required data.

> Arrange the data in order from largest category to smallest.

> Calculate the total.

> Compute the percent of the total that each category represents.

> Compute the cumulative percent.

> Scale the vertical axis for frequency (0 to total calculated above).

> Working from left to right, construct a bar for each category, with height indicating the frequency. Start with the largest category and add in descending order.

> Draw a vertical scale on the right of the graph, and add per cent scale (0% to 100%).

> Plot the cumulative percent line as shown.

4. PIE CHARTS (19)

Pie charts are used to show the relationship of each part to each other and to the whole - how each part contributes to the total product or process. They are easily interpreted and can present data effectively and efficiently.

The 360 degrees of the circle, or pie, represent the total or 100%. The pie is divided into slices proportionate to each component's percentage of the whole:

> For each "slice" of the pie, calculate the size of the angle by multiplying the percent by 360 (e.g., 20% X 360 = 72 degrees)

> Using a protractor, mark off the angle at the center of the pie.

E. TOOLS FOR PLANNING ACTIONS:

1. FLOW CHARTS

Flow charts are particularly useful for documenting the contingencies - and contingency plans - that may arise during the course of implementing the recommended solution.

a. **DETAILED FLOW CHART**[19]

GUIDELINES:

> Define process boundaries.

> Every feedback loop needs to have an escape.

> Process Step boxes usually have only one output arrow. More than one output arrow may require a decision diamond.

> Processes are always more complex than people realize.

Flow charts are ESSENTIAL to analyze processes.

> Flow charts can be used to show the same process in three different ways: as the process ACTUALLY works; as the process SHOULD work if everything was ideal or regulations followed; and how the process COULD work if changes were incorporated. Be aware which approach you are using.

> Actual "process" doers need to repeatedly review and comment on the charted process if a flow chart is to reflect reality.

> Use the simplest symbols possible.

b. **TOP-DOWN FLOW CHART**[17]

Top-down flowcharts force people to narrow their thinking to only those steps absolutely essential to the process. Typically, this approach is faster and more efficient than spending weeks or months constructing a detailed flowchart of every step that occurs.

To construct a top-down flowchart, first list the most basic steps in the process being studied or project being planned. You should end up with no more than six or seven steps. List these

steps across the top of a page or flipchart. Then below each one, list the major substeps (again, no more than six or seven.)

c. WORK FLOW DIAGRAM(17)

Created by tracing the actual movements of people, materials, documents, or information on a floor plan or diagram of the work area. This graphically shows inefficiencies in a system.

2. GANTT CHART(19)

A Gantt chart is a diagram that documents the schedule, events, activities, and responsibilities necessary to complete a project or implement a team's proposed solution.

Although there are many variations, all Gantt charts document what is to be accomplished, by whom, and when. This chart also allows a group to document the assumptions underlying their implementation plan. For example, if the plan is based on installation of equipment by May 15, that assumption can be noted. The group can then develop contingency plans in case that deadline slips.

HOW TO USE A GANTT CHART:

> Break the implementation plan into achievable steps.

> Assign responsibility for each step to a team member.

> Decide how long each task will take, and set a realistic completion date.

> Document the assumptions on which the plan is based, and the contingency plans to implement if those assumptions are not valid.

VIII. HOW WE DID IT - THE PROCESS IMPROVEMENT PROCESS

There may be more than one route to get to a destination, but the main route must be well-marked so Process Action Teams can eventually get to where they are supposed to be. (5) The basis of any improvement process or system should be the Shewhart Cycle (Deming Wheel) concept of continuously studying the results and improving the process. Also, incorporated into any PIP model has to be the rudimentary philosophy of progressing from problem, to cause, to solution.

There are dozens of Process Improvement Processes described in the literature, and they go by dozens of different names. However, the quality improvement process we elected to follow at MFHC is a hybrid model, based on the Xerox method but incorporating other elements from General Dynamics, Hospital Corporation of America, the U.S. Air Force Reserve, and others. The steps are as follows:

PHASE ONE: CLARIFY THE PROCESS

1. Quality Assurance data (in our case, from AmbuQual) or information from other sources is collected by the Quality Council's Quality Assessment Subcommittee. This is the baseline measurement used to identify an opportunity for improvement.

2. The Quality Council identifies the process needing improvement based on the objective data and writes the team charter. Because the charter will provide the basis for brainstorming, fact gathering, and root cause identification, it is absolutely essential that the description be as acute, succinct, and on-target as possible. In addition, it is essential that the problem or opportunity for improvement be described in terms that have the same meaning to everyone. The Council then selects a team leader and team members - usually those who work inside the process they are tasked to improve, or who are customers of (or suppliers to) the process.

3. The team reviews their charter for thorough understanding. They must internalize the words of the charter and if any clarifications or modifications are needed, this step provides that opportunity. The team must understand what their mission is and the boundaries they will operate within. The unique viewpoint of team members will generate many questions that may cause the charter to be revised.

It is recognized that many times teams will be launched to improve complex processes of which the Council has limited knowledge. Because most teams consist of process experts, it is important that they have the flexibility to change their charters. This flexibility enables them to work more effectively when improving the processes identified for improvement. Obviously, those who are the process experts can best determine the scope of what it is they should be evaluating. When employees are given an opportunity to change and improve their work processes and environment, they begin to feel a sense of ownership and empowerment, which leads to a change in perception and enhanced commitment.(10)

The team must affirm its members' concepts of the people or positions identified as customer, supplier, stakeholder, and process owner. This will lead to a better understanding of the people and positions involved.

4. The "as-is" flow chart is one of the most important steps the team will perform because the team will gain insight into the current process while completing this checkpoint. Even though the task is to simply record the process to be improved on a flow chart, problems or barriers with the current process will become evident in the ensuing discussion. Do not discuss the barriers at length now. That is the task in step 7. Simply list the problems and go on. At this point, the boundaries of the charter will be discussed again as any sub-processes are identified.

Further clarification from the Quality Council may be needed unless the charter was insightfully definitive. The charter is a living document and if it has to be revised after these two steps are done, then so be it.

5. The next task is to identify the customers' requirements - both internal and external. In this checkpoint the team will gain a perspective of their process from the outside and may end up doing interviews, surveys, and having guests speak to the PAT.

Often, different types of customers can be satisfied by the same process improvement. In other cases, a process improvement that helps one type of customer may negatively impact another. The only way to determine these interactive influences is to carefully consult with each customer of the process output and determine exactly the conditions which will best satisfy each of them. The team must then weigh all factors and arrive at a process improvement which yields the best overall result. A list of the customers' requirements is the tangible, desirable outcome of this checkpoint.

6. If the process does not have a measurement the process owner uses to evaluate the overall health of this process, one should be identified here while the team is focused on the "big picture." To select a valuable measure, it may be helpful to ask these questions: "What variables tell you you're doing a good job?" "What historical data is available to the team?" "What SPC charts can be developed from historical data?" "How well is the process doing relative to the voice of the customer?"

Often in medical organizations someone has already collected information that quality improvement teams can use. Simple stratification and displaying data over time can harvest new lessions from apparently valueless existing information.

The two most important tools to help the PAT identify this metric are the preceding checkpoints: the "as-is" flow chart and the list of what is important to the customer. If a measurement was not identified and used before this point, it is too late because of another cardinal TQM rule: PATs will inevitably start improving a process just by studying how to improve it. Why? Because of the increased understanding of the process and the cross-functional communication

now taking place within the PAT. So your PAT may install a metric at this point but beware: any conclusions based on this data are suspect.

PHASE TWO: IDENTIFY BARRIERS

7. Identifying barriers to process improvement (or problems within the process - the concepts are interchangeable) is the next checkpoint. There is an abundance of tools (for example, Cause & Effect Diagram) for this purpose, so use them to make PAT meetings interesting. This should be a relatively easy step because many of the barriers were listed while the PAT was doing the "as-is" flow chart in Checkpoint 4.

8. Prioritize the problems or barriers so you know which to work first. Stating the problems objectively in problem statement format will help your team visualize what they need to do. (Problem statement format includes several criteria: a concise statement about the problem in "as-is" and "desired state" terms and stated objectively. A quantifiable statement with no implied causes or solutions included.)

9. Once the barriers are all laid out, some of them will be identified as constraints in the process. (Constraints are those critical points in a process where most functions must funnel through to be accomplished. If you experience a breakdown at the constraint point, everything else comes to a screeching halt.) Measurements should be installed at that point. In the real world, there won't be very many problems you can easily measure but only a very few are really needed anyway. Those that can be measured should be. It will help you prove objectively to the process owner you have improved the process. These measures should incorporate targets the PAT thinks are realistic and will solve the problem.

PHASE THREE: IDENTIFY CAUSES

10. At this checkpoint, the team identifies the causes of each barrier. Again, there are many tools such as the Cause & Effect Diagram, but the bottom line is to be sure all possible root causes are addressed. These root causes are typically identified on the C&E diagram and circled or somehow "called out."

The process for doing this is:

(1) Continually ask the question, "Why?" for each probable cause that is identified. If asking "Why" gives an easy answer, it's likely that the root cause has not yet been identified.

(2) Select three to five likely causes from the C&E diagram and begin to investigate all of them at once. This will save time if one or more of them turn out to be unproductive, which sometimes happens. Also, since there may be more than one root cause, concurrent investigations will increase the likelihood of more rapid problem resolution.

(3) Follow these steps as you investigate each potential cause.

  (a) State how the potential cause could generate the problem.

  (b) Establish and implement a data collection plan to investigate the cause.

  (c) Analyze the results, using SPC charts and graphs.

  (d) Assess the results and determine if the cause appears to be a *root cause*.

(4) Be willing to accept that new causes may appear during data collection. Be sure to put them on the C&E diagram and investigate them.

(5) Accept the fact that there may be many root causes which contribute to a situation.

Use the measures identified in Checkpoint 9 to gather data to identify and verify causes.

PHASE FOUR: IDENTIFY SOLUTIONS

11. The purpose of this checkpoint is to ensure your Process Action Team (PAT) generates solutions which address every identified cause. You may prefer to call these solutions "improvements." In either case, the basic concept is the same. Now go back to the next barrier (problem) and complete the problem-cause-solution cycle until all are addressed.

PHASE FIVE: ACTION PLAN

12. The PAT now combines all the solutions (pooled from each problem-cause-solution cycle), then filters and prioritizes using quality tools to come up with the final set of recommended solutions for the process owner to approve.

    Realistically, some filtering will have already taken place prior to this point as the PAT recognized the solutions to one problem worked to solve subsequent problems as well. Solutions must be coordinated with involved functions, such as administration, finance, operations, and so on.

13. If one of your problem-cause-solution cycles did not include making a flow chart of the optimized process, it should be done now after all suggested improvements have been boiled down and before the team continues to finalize the solutions.

14. The team now assesses the measurement points for validity and to find out how often to take these measurements. In addition, the team's suggested improvements may lend themselves to other measures which may be substituted or added at this point. As stated earlier, the key is to measure only those few constraints in the process, not just to add measurements for measurement sake. Be sure to assign measures to specific individuals because they are a job in themselves!

15. The action plan with tasks, dates, points of contact, and other information is formulated now and ready for process owner review.

PHASE SIX: IMPLEMENT IMPROVEMENTS

16. Using these steps as an outline, brief the Quality Council to obtain approval. The solutions should not come as a surprise to this group or to the process owner. Periodic briefings along the way would have allowed the process owner to guide the general direction of the team so it does not stray far from the objective. These updates are especially useful if the solutions are somewhat unorthodox.

17. Implement the approved action plan.

PHASE SEVEN: EVALUATE

18. This step assures that the corrective actions taken are effective. Further, it puts in place mechanisms to assure that changes in the process will be monitored and subsequent action taken if the customer concern reappears or if the process displays characteristics associated with uncommon sources of variation.

Review the process measures to ensure you are meeting the targets the PAT established. Some of the basic considerations for ensuring that verification studies are being properly conducted are:

(1) Data collection must permit "before" and "after" comparisons of the process operation.

(2) If no other meaningful comparison is available (as is the case in some very rare situations), use the customer's specification limits as the original benchmark.

(3) Verification MUST be based upon objective data analysis over time. Subjective observations are NOT appropriate.

Begin to put some credence in the process measurements from here on out. You have installed your changes and, based on their complexity, they should begin to change the process for the better as time goes on.

19. If your targets are not immediately achieved, do not panic. However, after a reasonable amount of time you may find that either your targets were not realistic, or your improvements were ineffective. If your targets were not realistic, then the process owner should help the PAT determine more appropriate targets to evaluate the improvements. If the improvements were not effective, then it's time to return to step 1 and find out what went wrong.

PHASE EIGHT: INSTITUTIONALIZE IMPROVEMENTS(10)

20. Assure that the newly improved process is monitored. During the problem solving/process improvement procedure, teams discover key root causes of statistical variation. Keeping these causes under control after solutions are implemented will guarantee that the entire process stays in control. Therefore, teams need to assign responsibility for continuously monitoring the improved process(es).

21. Develop an action plan to make the process improvements part of the ongoing system. Effective action plans require that all parties understand why their system allowed a problem to develop (A flowchart of the process will show where in the process the problem could have been prevented.) They also need to know who has specific follow-up responsibilities so that process changes will generate corrective action.

22. Incorporate the process improvements into policies, standards, and procedures. Management systems and practices should encourage employees to participate in process improvement. Changes in the management system can require documenting new standard procedures, streamlining to remove obsolete procedures, and revising previous standards. Any changes in policy need to be communicated clearly to all customers.

23. Establish training. To ensure that all involved employees are aware of the changes and have the necessary skills to support the new process, training may be needed in Statistical Process Control, better process, project management, and/or new technologies. But training must be followed by on-the-job application to ensure the institutionalization of the learning.

IX. MFHC TEAMS IN ACTION

The four Process Action Teams established as part of the initial TQM implementation plan are currently finalizing their first quality improvement projects. This is a brief summary of their projects to give you an idea what we have accomplished so far.

Team #1 (Childs Avenue Medical Group, Clinic A) was chartered in July 1994 to look into the problem of long patient waiting times. This stemmed from the strategic objective of increasing access for patients and was based on the results of a patient survey which indicated a high index of dissatisfaction with waiting time.

Using the step-by-step process, this team has implemented several solutions. They were surprised to see from their data that long waits occured most frequently in the exam room prior to the arrival of the provider. However, in order to reduce the times required for other subprocesses and thus influence the total amount of time waited, the team instituted several improvements such as streamlining patient registration, obtaining vital signs at one station prior to sending the patient to an exam room, reducing redundancy in forms, etc. However, long waits still occurred, and the data still indicated providers probably held the key to a real solution. Finally, the team decided to "take the bull by the horns" and enlist the assistance of providers in reducing patient waits.

At this time, a patient will be asked if they wish to see another provider if theirs is running more than 30 minutes behind. It is hoped that having patients see the provider with the shortest waiting time (the patient's option, of course) will reduce dissatisfaction with waiting. After a suitable period of time, data on exam room waits will be compared again to find out how successful the solution was.

Team #2, formed at the Patterson Clinic in July 1994 , selected the process of triaging telephone calls as their improvement project. After describing the process and collecting data to objectively define it, the team began zeroing in on the root cause of the problem - high numbers of inappropriately transferred calls. A Cause and Effect Diagram helped them arrive at some important conclusions and allowed them to get to the next step in the quality improvement process - that of brainstorming potential solutions.

Brainstorming solutions is one of the most satisfying parts of the quality improvement process, and other clinical and office staff were invited to add their ideas for improvement. Using discussion and multivoting, the team was able to narrow the list to a few "best" ideas. These included establishing a step-by-step protocol for handling telephone calls and a comprehensive training program for receptionists or others who answer the phones.

Improvements have been implemented, and objective data is being collected to determine the success. Subjectively, there has been a great deal of improvement. It is the opinion of the staff that handling calls consistently and courteously has made a tremendous difference. Not only does the external customer receive the service they desire, but the internal customers (providers, nurses, etc.) are happier with the quieter environment (not as much overhead paging) and fewer interruptions. Having concise guidelines and clearly articulated training has made the receptionist staff happier, too, and their positive attitude shows in the way they respond to phone calls.

Team #3 was chartered at the Modesto Clinic in December 1994 and began working on an issue identified by an employee satisfaction survey performed earlier in the year. The survey results indicated that a large number of employees did not feel they could "depend on information from management." Of course, this was not definitive enough, so the charter instructed the team to select one vital component of the corporate communication process and base their improvement project on that one component.

As the Modesto Clinic was to be the initial implementation site, the team decided to obtain more specific information from their "customers" before proceeding. They developed a survey to elicit information about dissatisfaction with communication and

found that, although individuals were generally satisfied with communication from their clinic managers, they did not feel they or their managers were getting timely, reliable, consistent, or accurate information from "upper management" in Merced.

The bulk of corporate information is disseminated to employees through staff meetings, so the meeting process was selected as the target of improvement. An "as-is" flow chart was developed, based on interviewing individuals who routinely organize and lead meetings. Comparison showed a great deal of inconsistency as well as potential barriers to communication.

After brainstorming and flowcharting an ideal meeting process, the team submitted their action plan to the Quality Management Group, who approved it. One part of the plan was a recommendation that leadership provide lower echelons complete and timely information. The other part of the plan was to institute the newly flowcharted meeting process at all clinic meetings, beginning immediately.

The QMG approved the plan, and the team implemented the process with the assistence of the clinic manager. After several meetings, clinic personnel will be re-surveyed to determine the extent of improvement. If there is a significant improvement, the changes will be implemented at all sites.

Already, there is a subjective sense of improvement. Clinic managers and employees feel the better organized meetings are a tremendous change for the better and that meetings are no longer a waste of time. The follow-up survey will indicate whether the perception has changed regarding information from upper management.

Team #4 is based at Childs Avenue Medical Group, Clinic B, and their charter resulted from data unearthed by Clinic A during their research on causes of long patient waiting times. The data showed a significant number of patients returning to the provider for a follow-up visit for whom no lab results were available in the chart.

Following construction of a top-down flowchart of the process (from "Lab Test Ordered" to "Report Filed in Chart"), the team brainstormed potential causes of the problem, working with a supplier (lab) representative on the team. Data was collected for approximately one month on the number of no-shows for labwork, number of incomplete

lab requisitions, number of charts missing when lab report ready to be filed, etc.

Perato analysis indicated the most significant part of the problem rested with charts not being available when lab results were ready to be filed. The team is now researching reasons for charts being unavailable in Medical Records.

All four teams have displayed a great deal of patience and perserverance in learning and applying the tools of quality. One of the most striking insights gained from this project has been an appreciation of the complexity of problems that span multiple department areas. Cross-functional teams like teams 3 and 4 help the organization understand the interdependencies among processes and how multiple, simultaneous changes may be required to achieve the desired improvement.

Members have dealt with the usual problems of teams in their various phases ("forming, storming, & norming") and have grown with the experience. Their Facilitators and quality "champions" - members of the Quality Management Group - have also learned a great deal and are now better able to integrate TQM with QA at all levels.

At a recent seminar representatives from each team briefed the audience on their team's progress, using storyboards they had created. This was the point at which team members seemed to gain the most insight into what they had accomplished. Their reports celebrated not only technically successful projects, but also the sense of enthusiasm and enjoyment among the staff as they explored methods that freed them to make informed changes. Sharing TQM with others is indeed a great learning experience.

X. CELEBRATING SUCCESS

It is important to communicate TQM endeavors and success stories whenever possible. TQM updates are presented at the Quality Management Group meeting and periodically at board meetings. The monthly Employee newsletter provides a forum for TQM news and serves two purposes - keeping the staff updated on team progress and providing a tool for aiding culture change. This newsletter also discusses the benefits of TQM, future expectations, and how those expectations can be met.

Storyboards are an additional method used at MFHC to celebrate and share TQM successes. A storyboard is a large cork board that displays a team's history. It begins with a brief statement explaining the purpose of the mission or the team. The methods the team used to understand and analyze the process are then described. The final document is the team's action plan for improving the process.

There should be symbolic as well as material rewards for the results that workers help to achieve, and rewards should be designed at all levels, for individuals, groups or teams, etc. The key is consistency. Too many organizations treat workers like inventory that can be replaced at will. Only when workers feel a sense of job security will they take risks to make improvements.

XI. THE FUTURE OF TQM AT MFHC

The next step is to select and train additional facilitators and team leaders. As nonparticipating team members, facilitators do not become involved in improving the content of a specific process, but instead are responsible for maximizing the effectiveness of the TQM process. They keep the team on track, ensure participation of all members, and aid the team in identifying which statistical tools to use to improve their process. To select facilitators, the Quality Management Group will identify employees who have good people skills, are respected within the organization, and can remain objective in a team setting.

The ultimate goal is for all of the managers to become team leaders, internal consultants, facilitators, and TQM process experts. In addition to the initial TQM orientation, selected individuals will attend eleven four hour facilitator training sessions, which will prepare them to be TQM "coaches" for their own work sites. The training will include group dynamics and skills in building teams, TQM principles and concepts, quality tools, facilitation skills, and practical exercises.

The next major step is to develop and administer a program designed to assist supervisors in their transition from managers to leaders. As most TQM experts agree, middle management is the toughest segment of the organization to change. Top

management is totally committed to and even excited about the possibilities of TQM. However, mid-level management is apprehensive and feels somewhat threatened. The goal is to develop a TQM supervisory program that will help them feel good about TQM and at the same time aid them in going through the transition.

Supervisors will be expected to participate in changing this traditionally autocratic and bureaucratic system to a participative management system. In order to do this successfully, the role of the supervisory staff will need to move from managers to team leaders. As team leaders, they will learn how to facilitate their teams, helping them to identify opportunities for improvement. They will learn how to use the TQM process to improve quality and efficiency, while decreasing waste. They will learn to share decision-making responsibilities and how to coach their teams effectively, so that each team can make its own decisions.

One of the major goals is for the members of each team to collectively feel a sense of ownership over what they do. Historically, management has held this ownership because management has been responsible for making all final decisions. This mentality has discouraged committed participation from many of the staff.

While Facilitators are being trained, the Quality Management Group plans to conduct a quality assessment using the seven examination categories of the Malcolm Baldrige National Quality Award. These categories include leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance of products and service, quality results, and customer satisfaction. An important part of this assessment will be identification of quality costs to quantify financial benefits of making process improvement, provide a before-and-after picture of process costs, and monitor project improvements over time. The assessment team will consist of QMG members selected based on their experience with one of the seven areas of the Malcolm Baldrige criteria.

As a result, seven teams will be established. During the initial meeting, the TQM Coordinator will conduct training on data collection and discuss various methods for obtaining the information needed to conduct the assessment. In addition, the meeting will

help each team establish a strategy on how they will conduct their assessment. During the two months that follow the initial meeting, the teams will conduct their assessment, gather their information and data, and write up their findings. The information to be obtained will consist mostly of historical data, interviews, and surveys, both written and oral. Upon completion, the committee will assemble for a one-day wrap-up in which each of the seven subcommittees present their findings and recommendations for improvement. Through nominal group process, the team will then prioritize a list of opportunities for improvement. Consolidation of this information will result in a final report for the Quality Management Group who will in turn charter Process Action Teams to address critical issues.

XII. SUMMARY & RECOMMENDATIONS

TQM emphasizes looking at the process of healthcare delivery in ways which maximize staff productivity and free up time by eliminating wasted efforts, so there is real potential for improving the quality of health care delivered to the community. In the manufacturing industry where the cost of poor quality is 20-30%, TQM has been reported to result in ratios of returns of ten to one on investment in the work of improving quality. (5) Based on this and other reports from various sectors, we believe TQM can save money for the health centers while improving quality and staff satisfaction. In addition, the customer focus holds out the promise of increased satisfaction and can improve community perception of the health center and aid in marketing.

Health center development has moved through a number of phases, and some see TQM as just another fad which will soon disappear. On the contrary. Quality management, whether it is called TQM, CQI, or some other name, will continue to evolve - hopefully to the point that it becomes second nature within the organization. There is some concern that the cost of time and effort will outweigh any potential benefit, but far more time and money are saved than spent in eliminating problems in the process of delivering care. TQM implementation in hospitals and HMO's has already shown the approach to have great promise in the health system.

If top leadership and management does not buy in, TQM will not work. Making the paradigm shift, getting the swing of the process and using it well takes time and effort. The leader of an organization may do well by considering the following key changes:

1. Work hard - change begins with you. Ask yourself, "What am I doing that either empowers people to change or prevents them from changing?" It won't be easy; you have years of programming that tell you the manager is the leader and is there to fix problems and provide answers to questions.
2. You must change from being a dictator to being a facilitator, or a coach. Today you have smart people working for you; could it be that they know more than you? The vision is the focus of all your activities.
3. Communicate the purpose, philosophy, mission, and goals (e.g., the vision).
4. Create a sense of urgency - for the energy to change today.
5. Measure the results of quality, customer service, employee growth and development, communication, on-time delivery,etc.

XIII. CONCLUSION:

It has been suggested that implementing TQM requires a minimum of three to six years before an organization can expect to achieve any notable results. Further, any commitment to a shorter period is likely to be ineffective, and the organization should withhold assessment of improvements until that length of time has elapsed.

Yuhasz used a sample of executives to study functional requirements for TQM.(21) Of 57 TQM needs, he identified 14 as the major requirements. Listed in priority, they are as follows: Team building, productivity improvement or work restructuring, an organization-wide plan for TQM, start-up operations and education, follow-through operations and education, leadership orientation to TQM, management development, merging of QA and Quality Improvement, performance appraisal for TQM, physician support, mission and communication reinforcement, board level development, and leadership and marketing communications.

In this age of rapid healthcare reform, forecasting the future of quality endeavors is somewhat presumptuous and very elusive at best. No one country, system, or healthcare organization stands alone. The TQM leadership paradigm - based on empowerment, collaboration, and teamwork - represents one of the most profound changes ever faced by traditional management in healthcare organizations. This type of leadership will allow healthcare organizations to tap their greatest resource - their human resource. Ultimately, the organizational environment will be one that supports a mission that is quality patient care, not just in words, but also in fact.

There are a couple of serious issues that we must face squarely. First, limited financial resources for healthcare could increase competition while decreasing service provisions, cooperation. and collaboration. To avoid this situation, and still control healthcare expenditures, we will need to develop new, consensual solutions to age old problems.

Second, TQM is still a new concept to many members of the healthcare community. It is subject to many, often conflicting, interpretations. Some say that TQM is the only comprehensive management methodology that can guarantee the delivery of cost-effective, accessible, high-quality patient care, while ensuring the long-term financial survival of healthcare organizations. Others see TQM as a mere buzzword and suggest that "this too shall pass." To deliver a quality healthcare service in the future, we must reconcile both of these positions.

Persistence is a vital ingredient to ensuring success in implementing TQM. Initially, many on the Quality Council falsely believed that the TQM transition could be accomplished quickly. However, there is more to TQM than statistical tools and teams. The hard part is dealing with the fact that TQM is also a change in culture. No organization can change its culture over night. It takes patience, time, and most of all, persistence.

TQM is not just a fad that will eventually disappear. Ultimately, it is a philosophy and management system that will change every element of the organization. It is a new way of doing business. It will allow us to take off our blinders and become a learning

organization that embraces change and opportunities for improvement. It will teach us that efficiency and quality can exist in the same environment. However, the most important objective is that the supervisors understand that the implementation of TQM within the medical centers, as well as the entire healthcare system, *must* happen. Our national healthcare system is out of control, and we can no longer afford to ignore its problems. If we are to meet the demands of the American public, change is absolutely essential. TQM is the means for implementing that change.

The road to a quality management system that is woven into the fabric of an organization is unending. There are hills, twists and turns, rivers and obstacles to cross, and unknown barriers to overcome. The strategic approach to transforming culture is to use the vision and mission to set the direction. The key success factors and values of the organization frame the journey and set the boundaries.

At MFHC we recognize the quality journey is long and arduous. However, given our desire to be the Community Health Center of distinction promoting Quality Management, we must become focused on customers' requirements and committed to providing a service that delights the customers. We believe the approach we have adopted to improve our work processes will enable us to reach this vision.

REFERENCES

1. Al-Assaf, A.F., MD & Schmele, June A., RN, PhD. The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

2. Al-Assaf, A.F., MD, MPH. *"Data Management for Total Quality"* The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

3. American Quality Foundation & Ernst & Young. *"International Quality Study."* 1991.

4. Andrews, S.L. *"QA vs QI: The Changing Role of Quality in Health Care."* Journal of Quality Assurance. 38:14-15. 1991.

5. Baumer, Kenneth, CPT, USAF, *"Improving the Process Improvement Process,"* Quality Air Force Symposium, Montgomery, AL. 1994.

6. Berwick, D. *"Quality: How do QI and QA Differ? An Expert Illustrates the Answer"* Hospital Management Review. 9:2. 1990.

7. Bohr, D. & Bader, B. *"Medical Practice Guidelines: What They Are and How They're Used."* The Quality Letter, 3(1):1. 1991.

8. Curtis, Keith, MBA, PhD. *"Total Quality and Management Philosophies."* The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

9. Deming, J.E., PhD. Out of the Crisis. Cambridge, MA. 1986.

10. General Dynamics, Valley Systems Division, Quality Improvement Process. Rancho Cucamonga, CA. 1989.

11. Gentling, S.J., MHA & Morrison, J., MPH. *"Total* Quality Within the Healthcare System." The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

12. Green, D. *"Quality Improvement versus Quality Assurance?"* Topics in Health Records Management, 11-58-70. 1991.

13. Lachman, Barry S., MD, MPH. *"Introduction to Total Quality Management,"* NAHC Update. Baltimore, MD. 1994.

14. Laffel & Blumenthal, "*The Case for Using Industrial Quality Management Science in Health Care Organizations."* Journal of the American Medical Association, 262(20):2869-2873.

15. McEachern, J. Edward, MD & Schiff, Lorraine, RN, MBA & Cogan, Oscar, MD. *"How to Start a Direct Patient Care Team" "Quality Review Bulletin"* (JCAHO); June 1992.

16. Schmele, June A. RN, PhD. *"Quality Management Terminology,"* The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

17. Scholtes, Peter R., et al, The Team Handbook, Joiner Associates, Inc., Madison, WI. 1988.

18. Tindill, Bryan S., MSHA & Douglas W. Stewart, DO. "Integration of Total Quality and Quality Assurance" The Textbook of Total Quality in Healthcare. St. Lucie Press, Delray Beach, FL. 1993.

19. U.S. Air Force Reserve, TQM Program, Robins AFB, GA. 1991.

20. Williamson, et al. *"Health Science Information Management;"* Quality Assurance in Health Care, 3(2):95-114. 1991.

21. Yuhasz, L.S. *"The Functional Requirements for TQ."* The Quality Leader. 2(1):1-3.1991.