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**UNITED STATES ARMY-BAYLOR UNIVERSITY  
GRADUATE PROGRAM IN  
HEALTH CARE ADMINISTRATION**

**CLINICAL PATHWAY IMPLEMENTATION AT DAVID GRANT  
MEDICAL CENTER: EVALUATION AND RECOMMENDATIONS**

**A GRADUATE MANAGEMENT PROJECT SUBMITTED TO  
THE FACULTY OF THE U S ARMY-BAYLOR  
GRADUATE PROGRAM  
IN CANDIDACY FOR THE DEGREE OF  
MASTERS IN HOSPITAL ADMINISTRATION**

**BY  
CAPTAIN DAVID PFAFFENBICHLER**

**DAVID GRANT MEDICAL CENTER  
TRAVIS AIR FORCE BASE, CALIFORNIA  
MARCH 1996**

## **ACKNOWLEDGMENTS**

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## **ABSTRACT**

The managed care environment present in the American Health Care System and the Air Force Medical Service demands the need to manage the triad of health care: quality, access, and the cost. The area of utilization management, specifically the development of clinical pathways, plays an instrumental role in the management of this "Triad." As the uniformed services continue the transition to the TRICARE concept, the areas of utilization management and clinical pathways will play an increasingly important part of the health care delivery system.

It was the purpose of this study to determine the effect of clinical pathway implementation on length of stay for patients in specific diagnosis related groups. Additionally, the purpose of this study to help develop a mechanism to: (1) identify diagnoses for clinical pathway development; (2) properly develop clinical pathways; (3) properly implement clinical pathways; and (4) successfully evaluate the impact of clinical pathway once implemented.

Four diagnoses were examined, a non-experimental, retrospective study of patients medical records was conducted. A random sample of records for each diagnosis was selected for both pre and post clinical

pathway implementation, in all 270 patient length of stays were included in the sample. The study found that for the four diagnoses examined length of stay was decreased, but the decrease was not statistically significant. Recommendations are made to assist in the identification, development, implementation and evaluation of clinical pathways.

Pressure in today's budgetary environment demands Department of Defense medicine become cost-effective to survive. Clinical pathways can serve to assist in the production of high quality, cost-effective care, while simultaneously increasing access for the beneficiary population. Clinical pathways represent a potential action plan to help to develop a more cost-effective system of delivering the highest quality care available in the Air Force Medical Service today.

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## **INTRODUCTION**

### **CONDITIONS WHICH PROMPTED THIS STUDY**

The managed care environment present in the American Health Care System as well as the Air Force Medical Service demands the need to manage the triad of health care: quality care, access to care, and the cost of health care. The area of utilization management, and more specifically the development of clinical pathways, plays an instrumental role in the management of this "Triad." As the uniformed services continue the transition to the TRICARE managed care concept, the areas of utilization management and clinical pathways will play an increasingly important part of the health care delivery system.

The clinical pathway concept originated in the late 1980's from work done at the New England Medical Center to develop outcomes-based and patient-centered nursing case management tools. Designed to orchestrate the optimal sequence and timing of medical interventions, clinical pathways have since evolved into an interdisciplinary tool, facilitating the coordination of care between multiple clinical departments and caregivers. Since the development of the concept of

clinical pathways, the literature has been replete with information regarding the success of clinical pathways with regard to the aforementioned triad of care.

The managed care environment at David Grant Medical Center supports the establishment of clinical pathways to assist in the provision of quality, accessible and cost-effective care. Clinical pathways were first implemented at David Grant Medical Center in May 1994. In less than two years, approximately twelve clinical pathways have been developed and implemented. These pathways were developed in the utilization management element of the TRICARE flight. There was no clear method or process to determine how each pathway was developed.

The majority of the clinical pathways currently present in the medical center appear to have been developed from existing pathways from other organizations or national standards, and from individual provider practice patterns. A clinical evaluation steering committee was established in February 1995 to serve as the David Grant Medical Center central manager for issues concerning clinical utilization management. This committee is chartered to continually improve access and maximize outcome management processes, and serves as the primary oversight agency for development of clinical pathways (Medical Center Regulation 168-43, 1995).

Although it appears to be accepted by the majority of the staff that clinical pathways are effective in terms of both cost and quality, specific data and analysis have not been fully developed to support these claims. In order to compete in the managed care market, David Grant Medical Center and the Air Force Medical Service must effectively develop procedures to implement clinical pathways, and to evaluate the clinical pathway once implemented.

### **PROBLEM STATEMENT**

Until now, formal studies have not been done at David Grant Medical Center to validate the effectiveness of clinical pathway implementation for specific diagnosis related groups. The information gained from these studies would enhance the effectiveness of David Grant Medical Center's decision-making process in the area of utilization management and clinical pathways. This information would thus improve the ability of health care leaders in making informed decisions regarding the quality and utilization of health care services. Additionally, an effective method to identify diagnoses, develop and implement clinical pathways for these diagnoses, and a subsequent evaluation of clinical pathways needs to be formulated.

## **LITERATURE REVIEW**

There are a number of terms synonymous with clinical pathways. These terms include: critical pathways, clinical indicators, physician-directed diagnostic and therapeutic plans, practice parameters, and practice guidelines (Field and Lohr 1990, Hart and Musfeldt 1992, Kelly and Swartwout 1990). For the purpose of the literature review, these terms, although their definitions vary slightly, will all be referred to as clinical pathways. Clinical pathways are defined as: "The optimal sequencing and timing of interventions by physicians, nurses, and disciplines for a specific diagnosis or procedure, designed to minimize delays, and resource utilization and to maximize quality of care" (Coffey et al., 1992). Using a clinical pathway as a tool for managing resources, continuous quality improvement, and enhanced collaboration among a multidisciplinary medical staff, clinical pathways can potentially enhance the professional practice environment and benefit patient care.

Clinical pathways have their roots in construction and industrial applications. The focus of these settings has been the coordination of personnel resources, limited physical resources, and time deadlines. These variables are ever present in the managed care environment found

in today's American health care system. Many feel the survival of health care institutions is dependent upon a delivery system that focuses on an appropriate use of resources and controlling length of stay, while simultaneously monitoring clinical progress toward identified outcomes (Brandt Jan. 1994, Clark, Steinbinder and Anderson 1994, Cordell 1995, Solovy 1993). Minnesota, a state with a reputation of being very proactive in the delivery of health care in a managed care environment, has passed legislation requiring hospitals to implement clinical pathways (Hart and Musfeldt, 1992).

As health care reform continues to take place, the shift toward managed care is also accelerating. Part of this acceleration involves the expansion of clinical pathways to many diagnoses and procedures (Coile, 1995). Today, providers of health care are being held more responsible for demonstrated improvements in outcomes of care. Tomorrow's health care system will couple this increased responsibility with the requirement of integration across the health care continuum. Clinical pathways may facilitate assistance in the areas of integration and outcomes management.

Another important facet of managed care growth is the reliance on capitation (Coile, 1996). In the capitated health care system that is becoming more prevalent in the United States a number of functions will gain importance. Among these functions are utilization management

and clinical pathways. Thriving under capitation it is important to secure both high quality and appropriate efficiency in clinical care. “If you are going to accept fixed actuarial risk for care, you can’t have fifteen physician’s treating a case fifteen different ways” (Fromberg, 1996).

A 1993 survey of 581 hospitals reported the benefits expected from clinical pathways. A summary of these benefits is included as Table 1.

**Table 1**  
**Benefits of Clinical Pathways**

<b>Benefit</b>	<b>% of Positive Respondents</b>
Enhanced quality of care	94
Cost savings/efficiencies	94
Better understanding of utilization patterns	86
Reduced length of stay/ancillary use	85
Better clinical teamwork	84
Improved patient satisfaction	82
Improved continuity of care	81
Decreased care variations	75

(Lumsdon and Hagland, 1993)

The benefits of using clinical pathways are expected to offer an effective solution to managing quality, cost, and access to health care. In health care, higher costs do not signify a better quality product. (Kassirer 1989, Pare and Freed 1995) There are three ways to control cost while not decrementing quality of care: (1) finding and eliminating unnecessary or duplicative services, (2) choosing a less costly, (but as effective) alternatives to standard approaches to care, and (3) providing

preventative services that save money in the long-term (Shapiro et al., 1993). Several pertinent issues must be addressed with regard to clinical pathways: physician involvement, nursing involvement, total quality management and organizational performance, patient satisfaction, clinical pathway development, legal issues, and a retrospective examination of studies involving clinical pathways.

### PHYSICIAN INVOLVEMENT

A complaint often stated by the physician staff is that clinical pathways are, "cookbook medicine." Not all physicians are convinced clinical pathways are the best approach for quality improvement and cost initiatives. The title of the article, "Medicine, Practice and Guidelines: The Uneasy Juncture of Science and Art," assists in summarizing physician feelings toward the use of clinical pathways. The authors contend that clinical pathways should enhance clinical judgment, with the primary objective of enhancing quality care (Battista, Hodge and Vineis, 1995). A common pitfall in implementing clinical pathways is that physicians are not sold on the concept. If physicians are not on board, the clinical pathway effort is futile. Physicians must be convinced that clinical pathways can provide a substantial value or they will not buy into the clinical pathway process (Kahlben, 1995).

It is imperative that a clinical pathway program begin with the commitment of the organization's leadership. This commitment must flow to physicians who believe in the clinical pathway concept and are well respected by their peers (Cook 1994). A good way to foster physicians' involvement is to include them in the clinical pathway selection and development process. Physicians should be included from clinical pathway conception, to the evaluation and retooling phase. Once a pathway is developed and ready for implementation, providers should receive inservice training on the process (Cook 1994). It is vital that the physician own any process which affects patient care, not just single phases of the process (Yandell, 1995).

Hart and Musfeldt discuss the need for physician-led multidisciplinary groups to effectively develop and implement clinical pathways (Hart and Musfeldt 1992, Musfeldt and Hart 1993, Musfeldt 1994). According to the literature, physicians are currently the least supportive group in the hospital for clinical pathways. A survey of 581 hospital executives found that fifty-seven percent of hospitals had a formal initiative for monitoring and managing clinical processes or clinical pathways (Lumdsdon and Hagland, 1993). The median response on a five point scale regarding who is supportive (rated 5) and who is not supportive (rated 1) of clinical pathways was as follows: Physicians 3.32, Department Heads 3.97, Nurses 4.08, and Executives 4.47. Achieving

physician involvement in the clinical pathway process is absolutely critical to effective multidisciplinary teams, and successful implementation of clinical pathways.

Opposition to the clinical pathway process within the professional staff will always be present. Organizations should identify those individuals who will work against the implementation of clinical pathways, but should not invest significant time trying to convince those individuals who are opposed (Korycan 1995). It is important to remember the ethical caveat of Nonmaleficence, but it is also important to remember recent studies have shown that many of the tests which are currently performed may not be clinically necessary and may in fact cause unwanted adverse effects (Kassirer 1989). To authors conclude the efficient utilization of health care resources improves the overall quality of care (Rosenstein and Shulkin 1991).

#### NURSING INVOLVEMENT

As is the case with physician buy-in, nurses also play a pivotal role in the development and implementation of clinical pathways. Traditionally, nurses have been coordinators of care. With the institution of case management, and more specifically clinical pathways, nurses have become true collaborators in the patient care process (London 1993, McGinty, Andreoni and Quigly 1993). In order for clinical

pathways to be effective, nurses must actively participate in the design of care. The clinical pathway concept should serve to enhance nursing autonomy and accountability within a multidisciplinary health care delivery system.

One concern among nursing staffs is that clinical pathways will increase workload (Kahlben, 1995). Staff relations, not only with nurses but the entire health care system, must be considered. The organizational culture, if not accustomed to change, can make the implementation of clinical pathways a stressful process. Implemented correctly, clinical pathways can curtail the paper trail for nurses by combining care plans, discharge planning records, and patient education records (Kahlben, 1995).

#### CLINICAL PATHWAYS AND THEIR RELATION TO TQM AND ORGANIZATIONAL PERFORMANCE

Dr. W. Edwards Deming, one of the pioneers of total quality management (TQM), taught the most effective way to improve quality is to reduce variation in the service or product provided (Scherkenbach, 1988). In fact, Deming along with Philip Crosby and Joseph Juran, each with their own approach, provided the framework for quality improvement in the health care delivery process (Cornwall, 1995). Clinical pathways are simply the application of TQM principles to patient

care. It is important to remember, "Quality improvement is a journey not a destination" (Brandt, Feb. 1994). Clinical pathways should be developed using this same philosophy.

The use of many of the principles of continuous quality improvement are essential in the development and dissemination of clinical pathways (Burns et al., 1992). Among the barriers to increasing health care quality and reducing health care costs are the lack of understanding and inability to control the processes of inpatient care (Nyberg and Marschke, 1993). Berwick prescribes that the concept of TQM should be embraced as the ideal in health care (Berwick 1989).

The basics of TQM teach us that continuous health care quality improvements must be viewed as a cycle. Gates describes the clinical pathway improvement process as: (1) Selecting a process; (2) Selecting a team of individuals involved in doing the work; (3) Establishing goals and key quality indicators; (4) Document the clinical process, (Re)Develop the clinical pathway; (5) Determine measurement procedures; (6) Measure and analysis of data, and (7) Modification of the process to improve care (Gates, 1995).

Clinical pathways should serve to identify the predictable (common cause) and unpredictable (special cause) variations inherent in the process of patient care. Perhaps one of the biggest problems with the American health care system is the variation in intensity of services that

occurs predictably between regions (Welch and others 1993, Wennberg, Freeman and Culp 1987, Wennberg and Gittlesohn 1982). Clinical pathways should help lower variation in the treatment of a specific episode of care. John Hopkins Hospital has developed a continuous quality improvement report to examine this variation. Data is collected for each patient population being served by a clinical pathway to determine whether the expected outcomes were achieved by patients (Nyberg and Marschke, 1993).

Clinical pathways can also assist in compliance with Joint Commission on Accreditation of Healthcare Organization (JCAHO) standards for improving organizational performance (Cook 1994, Lumsdon and Hagland 1993, Joint Commission 1995). The Joint Commission's recently revised Accreditation Manual for Hospitals places new emphasis on organization-wide performance. The multidisciplinary teams necessary for clinical pathway development and implementation serve as a focus toward meeting the JCAHO requirements. The Lumsdon and Hagland survey found seventy-eight percent of the 581 hospitals surveyed believed that changes in the JCAHO's accreditation guidelines will encourage them to develop clinical pathways (Lumsdon and Hagland 1993).

Another area where clinical pathways can benefit the organization is through collaboration. The need for collaboration was highlighted earlier in the need for both physician and nurse involvement in the entire clinical pathway process. Collaboration has many advantages when it is used successfully in health care delivery systems (Abbott 1993, Musfeldt and Hart 1993). Collaboration helps to build an awareness of interdependence to facilitate the achievement of higher goals. Collaboration builds and reinforces recognition and mutual respect within a team, ultimately leading to commitment and support of patient care and organizational goals. It is reasonably safe to say that as the present health care system transforms into an integrated delivery model there will need to be increased collaboration among members of the health care team. Critical pathways are a natural extension of an interdisciplinary collaborative approach to care and provide an excellent medium to enhance the health care team process (Greenfield, 1995).

#### PATIENT SATISFACTION

An integral part of the clinical pathway process is the sharing of the pathway with the patient and family. Giving patients copies of clinical pathways has been shown to improve patients' satisfaction, and that of their families, because they know what to expect, (Musfeldt 1994, Marvin 1995). Today's health care consumer is better educated and

wants to know what the treatment plan is. Patients desire to participate in clinical decisions (Dawson 1993, Stevens 1993). The education of patients and their families is a major spin-off of the utilization of clinical pathways (Redick, Stroud and Kurack, 1994). Clinical pathways offer an effective method of patient education demanded in today's health care environment.

The clinical pathway can also serve to assist the clinician in facilitating communication. Keeping the customer at the center of the activity has always been one of the basic tenets of total quality management. By sharing the clinical pathway and making patients more aware of their treatment plan, the patient can become a true collaborator in the care process (London, 1993).

Clinical pathways may also have another role in today's managed care environment. They may assist in protecting patients against the underutilization of care as providers assume more risk in the capitated environment. The ethical maxim of *primum non nocere*, or "above all, do no harm" may be protected through the concept of clinical pathways. As health care organizations are continually put at increased risk, the propensity to cut services may be tempered with the establishment of clinical pathways. An ever prominent dilemma of promoting economic efficiencies at the expense of quality of care can be diffused if clinical pathways are in use.

## DEVELOPING PATHWAYS

During the clinical pathway development phase, a decision must be made by the development team to use established guidelines, or existing practice parameters, as a frame of reference for their own specific clinical pathway program. Many clinical pathways have been developed by professional organizations on the national level. In 1993 it was estimated that at least thirty different commissions and more than eighty professional organizations were developing more than 1,400 guidelines (Sandrick, 1993). These clinical pathways are based on current information that integrates clinical expertise and relevant research findings. These pathways are specifically designed to assist in clinical decision making. In a recent survey of 581 hospitals, seventy-two percent of the clinical pathways were found to be individually modeled for the institution, fifty-six percent of these clinical pathways were modified from external sources (Lumsdon and Hagland, 1993).

The American Medical Association supports the regionalization and localization of clinical pathways so they can be incorporated into the physician's daily clinical practice (Cook 1994). In many cases, nationally established clinical pathway templates can be localized. The localization

of clinical pathways is also supported by Giffin and Giffin who conclude that clinical pathways are difficult to duplicate between organizations. They propose clinical pathways are unique to the institutions where they are developed because they are based on the particular processes of caregivers within a hospital. For these reasons clinical pathways must be customized to the population being served (Giffin and Giffin, 1994). Rosenstein concurs with the localization of clinical pathways, claiming more success is likely if pathways are developed internally from a multidisciplinary perspective, and reflect the local standard of care (Rosenstein 1995).

Related to the development of clinical pathways, Field and Lohr have outlined eight characteristics that effectively-developed clinical pathways should possess. These attributes are: validity, reliability, clinical applicability, clinical flexibility, clarity, a multidisciplinary approach and scheduled review and documentation (Field and Lohr 1990). Perhaps the most important characteristic necessary for the development of clinical pathways is a need for a multidisciplinary collaboration. Multidisciplinary teams are crucial because buy-in can not occur without involvement and support at all levels (Abbott 1994, Clark Steinbinder and Anderson 1994, and Cook 1994).

## CLINICAL PATHWAYS: A LEGAL PERSPECTIVE

In systems where clinical pathways have been implemented, there have been significant reductions in the number of lawsuits filed (Brennen 1991, Field and Lohr 1990, Musfeldt 1994, Nolin 1995).

Clinical pathways may also offer several benefits to risk management programs. These benefits include a reduction in the number of adverse events related to improvement of clinical performance. Clinical pathways are also useful in the enhancing communication between the provider the patient.

Better communication can effectively serve to reduce litigation based on the patient's disappointment resulting from an unrealistic experience. "Patient confusion and anger resulting from poor provider-patient communication are major factors giving rise to malpractice claims" (Nolin 1995). Nolin concludes clinical pathways can play a positive role in ensuring timeliness, consistency, thoroughness, and patient comprehension of key communications. These issues collectively are the root cause of many malpractice suits.

Many states have passed laws protecting physicians who follow clinical pathways and document why variances occur. Articles written by authors in the Journal of the JCAHO say clinical pathways represent the local standard of care and, thus are medicolegally protective (Musfeldt 1994). Further, clinical pathways can be used to decrease the use of “defensive medicine” if clinicians have confidence in the clinical pathway (Brennen, 1991). Among the most frequent reasons cited for the rapidly increasing cost of health care expenditures is the practice of defensive medicine. Costello and Murphy contend that properly developed clinical pathways can be used as appropriate standards of care in determining if medical malpractice has occurred (Costello and Murphy, 1995). A further study showed if clinical pathways are present, and care is consistent with the pathway, that clinical pathways can serve as a deterrence to attorneys from bringing suit (Anonymous, Clinical pathways and risk, 1995).

An important phase in the clinical pathway development stage should be a review by the legal or risk management department. Disclaimer language regarding the pathway as a general framework for handling patient care for a specific health care problem may also be added.

## CLINICAL PATHWAY STUDIES

Utilization of hospital services, or more accurately institutional services, usually account for about forty percent of the total expenses in a managed care health plan (Kongstedvt, 1995). This percentage can be much higher if utilization is excessive. A common approach to hospital utilization control is the tracking of length of stay for each specific diagnosis related group before and after a clinical pathway is implemented (Andersson 1993, Clark, Steinbinder and Anderson 1994, Cohen 1991, Etheredge 1989, Ethridge and Lamb 1989, Farley 1995, Giffin and Giffin 1994, Kealey and Burger, 1995, Miller and Durbin 1992, Richards et al. 1993, Rosenstein 1994, Weber 1992, Zander 1988, Zander 1990).

In 1991, Scripps Memorial Hospital, La Jolla, California developed four clinical pathways for diagnosis related groups (DRGs) in cardiovascular surgery. The DRGs were numbers:

- 104: Cardiac Valve Procedure with Cardiac Catherization
- 105: Cardiac Valve Procedure without Cardiac Catherization
- 106: Coronary Bypass Procedure with Cardiac Catherization
- 107: Coronary Bypass Procedure without Cardiac Catherization

(Andersson, 1993)

The quantitative variables examined were length of stay and charges per procedure. In the first six months the clinical pathways were in place, length of stay decreased by twenty to thirty percent, and charges were reduced by approximately twenty percent.

Similar results were found for Fletcher Allen Health Care, a 500-bed tertiary care, teaching hospital in Burlington, Vermont (Farley 1995). The DRG examined was number 88, chronic obstructive pulmonary disease, (COPD). Retrospective length of stay data was collected on the COPD DRG for those cases occurring before clinical pathway implementation, (sample size [n]=30). Case reviews following clinical pathway implementation (n=11) showed a decreased length of stay from 6.53 to 5.00 days. It is important to note that although the sample size was too small to conclude statistical significance at the  $p < .05$  level, the results regarding length of stay were highly suggestive.

Eighty-five percent of the patient population at Good Samaritan Regional Medical Center (GSRMC), is covered by some form of managed care (Clark, Steinbinder and Anderson, 1994). In 1990 GSRMC implemented a clinical pathway for patients who received a total hip replacement. In this study, ten patients who needed a total hip replacement were placed in a pilot group, the remaining patients (n=50), were placed in a non-pilot or control group. The mean length of stay was reduced to 6.3 days from 9.4 days, for those in the clinical pathway pilot.

For those in the control group length of stay was reduced from 9.4 to 8.3 days. Although there are an insufficient number of data points for the pilot group to claim statistical significance, the study shows the ability of a pilot, or test-run of the clinical pathway as an effective method of trial.

Two anonymous articles in the March 1994 issue of Hospital Case Management lauded clinical pathway's ability to decrease the length of stay. The uniform approach to patient treatment at Hackey Hospital, in Muskegon Minnesota, has assisted in reducing variation of practice among physicians and decreasing length of stay. The hospital developed several clinical pathways in the orthopedic arena. One year after clinical pathway development, the orthopedic unit showed a decreased length of stay from 6.4 to 4.7 days, or twenty-seven percent. At Conemaugh Memorial Hospital in Johnstown, Pennsylvania, length of stay for psychiatric patients was cut nearly in half due to the implementation of clinical pathways. Although it was an institutional challenge to implement the clinical pathways, once in practice, length of stay for psychiatric patients fell from 16 to 8.5 days.

Anne Arundel Medical Center in Annapolis, Maryland also has had significant success in lowering the length of stay in four DRGs (Weber 1992). Length of stay for new mothers was reduced from 2 days to 24 hours. For mothers requiring a Cesarean section the mean length of stay was reduced from 5 to 3 days. The mean length of stay for total knee

and total hip replacements was reduced from 12 days for each procedure to 5 and 7 days respectively. At Anne Arundel the development of clinical pathways has become part of the organizational culture of long-term continuous performance improvement (Weber 1992). Clinical pathways represent a rethinking or recasting of more traditional methods of health care delivery. The experiences and successes of clinical pathway development and implementation at Anne Arundel Medical Center have assisted in driving this fundamental shift to continuous process improvement.

A strikingly similar reduction in length of stay for total hip and total knee replacements was found at St. Margaret Mercy Hospital in Dyer, Indiana. Once implemented, the length of stay for these diagnoses dropped from 11.7 to 5 days (Giffin and Giffin 1994). These findings closely mirror the results at Anne Arundel Medical Center. Also cited in the Giffin article is Mercy Hospital, one of four hospitals in the HealthSpan system in Minneapolis, Minnesota. After implementation of a clinical pathway for coronary bypass patients, the length of stay was reduced from 13 days to 6.5 days. The Mercy study also examined the case cost with a corresponding mean savings of \$6,400 per case.

The University of Iowa Hospitals and Clinics implemented clinical pathways for its Cesarean section cases. The study included 154 patients and found the mean cost per procedure dropped from \$3,950

(+/- \$1,541) pre clinical pathway, to \$3,432 (+/- \$737) post clinical pathway (Kealey and Burger, 1995). The same study showed a cost reduction of \$3,072 per case for the patients requiring percutaneous transluminal coronary angioplasty.

A study that looked at Bristol Regional Medical Center in Tennessee also found dramatic improvement in both length of stay and charges following the implementation of clinical pathways for specific diagnosis (Clare, Sargent, Moxley and Forthman 1995). In this study, the researchers concluded clinical pathways lead to decreased resource use, no compromise in the quality of care delivered, and a beneficial halo effect on other nonrelated DRGs. Specifically, average length of stay for acute myocardial infarction with coronary angioplasty dropped from 10 days to just under 6 days. Charges for this diagnosis also dropped dramatically from \$20,231 to \$11,444 per case. Length of stay for patients who received total hip replacements, fell from 9.8 to 7.7 days with a decrease in charges of over \$700 per case.

It is evident from the literature reviewed that with the proper development and implementation, clinical pathways can effectively reduce length of stay and cost per case. Clinical pathways, however, are not implemented without challenges for the health care organization. When properly selected, implemented and evaluated they can serve to

meet the challenges currently facing hospitals and other health care organizations in the demanding managed care environment.

### **PURPOSE STATEMENT**

It was the purpose of this study to determine the effect of clinical pathway implementation on the length of stay for patients in specific diagnosis related groups. In order to remain focused, it was beyond the scope of this paper to examine the issue of quality as related to patient outcome. It is important to note that not measuring the quality piece of the clinical pathway equation will not serve to invalidate the project. Numerous articles conclude quality of care can be enhanced through the development and successful implementation of clinical pathways (Andersson 1993, Jones and Mullikin 1994, Korycan 1995, Reiling and Baehr 1994).

Additionally, it was the purpose of this study to help develop a mechanism to: (1) identify diagnoses for clinical pathway development; (2) properly develop clinical pathways; (3) properly implement clinical pathways; and (4) successfully evaluate the impact a clinical pathway has when implemented. This mechanism should serve as a guide for future data collection to assist in management decisions regarding clinical pathways. Studying the effect that clinical pathways have had, and developing a method to evaluate the success or failure of future

clinical pathways, can serve to enhance the quality of health care while simultaneously helping to reduce cost and increase access.

The variables to be examined are length of stay for each patient admitted for a specific diagnosis related group (DRG), the clinical pathway developed for that specific DRG, and whether or not it has been implemented. Diagnosis related groups are defined as: "A statistical system of classifying any inpatient stay into groups for purposes of payment. Diagnosis related group may be primary or secondary, and an outlier classification also exists" (Kongstedvt 1995). Clinical pathways are defined as:

"The optimal sequencing and timing of interventions by physicians, nurses, and other staff for a specific diagnosis or procedure. Critical pathways are developed through collaborative efforts of physicians, and to maximize quality of care" (Coffey et al., 1992).

## **METHODS AND PROCEDURES**

### **STUDY POPULATION**

The population being studied is patients of David Grant Medical Center. Specifically, the study examined patients who were hospitalized for the specific diagnosis related groups in the study. David Grant Medical Center's patient population includes active-duty and their dependents as well as retired members of the armed forces and their dependents. The study did not examine patients being treated by the Department of Veterans Affairs as part of an interim joint-venture sharing agreement. These patients were not included because a separate computer system is used by the Department of Veterans Affairs to record the data being examined. Although the population being studied is made up of individuals primarily from Northern California, it includes all individuals admitted for care, regardless of their duty or home location.

### **SOURCES OF DATA AND RESEARCH DESIGN**

A non-experimental, retrospective study of patients' medical records was conducted. The Composite Health Care System (CHCS), was used to determine the length of stay (LOS) for patients admitted for a

specific diagnosis related group, and in two cases a specific ICD-9 diagnoses. A random sample of records for each diagnosis related group was selected for both pre and post clinical pathway implementation. The study used existing records with no personal identifiers attached to the data. For the above reasons, subjects' consent was not sought for participation in the study. The study was approved by the Chief of Hospital Services as an exempt study, and is therefore not required to be tracked by the David Grant Medical Center Institutional Review Board.

The data being collected was gleaned from CHCS. CHCS was used to determine patients who were admitted for each diagnosis related group or ICD-9 diagnosis. From the adhoc CHCS reports, records were randomly selected by patient identification number for normal newborns and normal vaginal deliveries. A convenience sample was used for diabetes ketoacidosis and anterior cruciate ligament reconstruction. This was done due to the limited number of patients available in the CHCS system either before or after implementation of the clinical pathway. Computerized patient records were extracted from the CHCS database and examined by the researcher to determine the length of stay for each patient.

After the patient identifier was entered, patient names were checked against the adhoc report to help ensure reliability. While the record was open, the diagnosis was also checked to ensure it was the

same diagnosis that the adhoc report generated. The length of stay for the specific episode of care was then recorded. Length of stay was measured to the nearest hour, and computed to a decimal based on the 24 hour day. The collected data was entered into a spreadsheet for further statistical analysis. Reliability of this study was achieved by entering a sample of the data into the spreadsheet, and then reentering the same data. The data was then evaluated for consistency. Since there were no inaccuracies associated with the data entry, reliability for this study was accomplished. Reliability as defined by Emory is, "Accuracy and precision of a measuring process" (Emory 1985).

The three types of validity to be tested for are: criterion-related, construct and content. Testing for validity means, "measuring the right things" (Kerlinger 1986). Construct validity is supported by the literature review. It is evident from the literature review that measuring the length of stay for patients in each specific diagnosis related group is an appropriate measure.

### **DEPENDENT AND INDEPENDENT VARIABLES**

This study was replicated four times to test the length of stay for each diagnosis related group that had a clinical pathway implemented. The dependent variable was the length of stay for each specific diagnosis related group. The four dependent variables are length of stay for:

**DRG # 222, ICD-9 81.45: Anterior Cruciate Reconstruction**  
**DRG # 294, ICD-9 250.11: Diabetes Ketoacidosis**  
**DRG # 373: Normal Vaginal Delivery**  
**DRG # 391: Care of Normal Newborn**

The independent variable was whether or not a critical path has been implemented. This variable was coded as 0: for pre-clinical pathway implementation, and 1: post-clinical pathway implementation.

### **IDENTIFICATION OF HYPOTHESIS**

The general null hypothesis to be tested was: The average length of stay for a specific diagnosis related group at David Grant Medical Center is not dependent on implementation of a clinical pathway for that specific diagnosis related group at David Grant Medical Center. The general alternate hypothesis was: The average length of stay for a specific diagnosis related group at David Grant Medical Center is dependent on implementation of a clinical pathway for that specific diagnosis related group at David Grant Medical Center.

### **STATISTICAL ANALYSIS**

An independent students  $t$ -test or point biserial correlation was conducted to determine how much relation, the magnitude of the relation between the implementation of a clinical pathway, and corresponding difference in the length of stay. Two hypotheses were tested:

**Null Hypothesis:** Length of stay for a specific DRG is not a function of clinical pathways implementation for that DRG. The null hypothesis would conclude there is no systematic relationship between length of stay and clinical pathways.

**Alternate hypothesis:** Length of stay for a specific DRG is a function of clinical pathways implementation for that DRG. The alternate hypothesis concludes length of stay varies as a function of, or can be predicted from clinical pathway implementation.

Point biserial correlation coefficients ( $r$ ), coefficients of determination ( $r$  squared), a student's  $t$ -test and the  $F$  ratio were calculated for each of the diagnosis related groups studied. These actions were accomplished to test for statistical significance between pre-clinical pathway and post-clinical pathway length of stay. A one-way Analysis of Variance (ANOVA), was also conducted on the data. Lastly, a hypothesis test for means was completed to determine the difference between two group means, or the pooled estimate of variance.

## **THE RESULTS**

A data set was used to compare length of stay data for patients in each of the four diagnoses both pre and post clinical pathway implementation. Individual data points were coded as 0 for pre-clinical pathway, and 1 for post-clinical pathway. The descriptive statistics for this simulation are included in Table 2. The inferential statistics for this simulation are included as Table 3.

LOS post clinical pathway for DRG 222, (ACL Reconstruction), was found to be .5389 days lower than LOS pre clinical pathway for this DRG with  $t(63) = -1.757$ ,  $p = .0838$ , and  $F(1,63) = 3.086$ ,  $p = .0838$ . The results that can be generalized from this statistical test conclude clinical pathways have a positive effect on lowering LOS; however, the null hypothesis must be accepted because  $p > .05$ .

LOS post clinical pathway for DRG 294, (Diabetes Ketoacidosis), was found to be 1.7262 days lower than LOS pre clinical pathway for this DRG with  $t(43) = -1.255$ ,  $p = .2163$ , and  $F(1,43) = 1.575$ ,  $p = .2163$ . The results that can be generalized from this statistical test conclude clinical pathways have a positive effect on lowering LOS; however, the null hypothesis must be accepted because  $p > .05$ .

**Table 2**  
**Descriptive Statistics**

	n	Mean	Standard Deviation	r	r squared
DRG 222					
LOS Pre Clinical Path	40	2.89	1.36		
LOS Post Clinical Path	25	2.35	.89		
Total LOS	65	2.68	1.22	-.2161	.0467
DRG 294					
LOS Pre Clinical Path	16	6.63	4.22		
LOS Post Clinical Path	29	4.9	4.52		
Total LOS	45	5.51	4.45	-.1880	.0353
DRG 373					
LOS Pre Clinical Path	40	2.74	.94		
LOS Post Clinical Path	40	2.51	.70		
Total LOS	80	2.62	.83	-.1400	.0200
DRG 391					
LOS Pre Clinical Path	40	2.59	.74		
LOS Post Clinical Path	40	2.32	.56		
Total LOS	80	2.45	.67	-.2015	.0406

**Table 3**  
**Inferential Statistics**

Statistical Test	Value	p	Degrees of Freedom
<b>DRG 222</b>			
$\underline{t}$	-1.757	.0838	63
F Ratio	3.086	.0838	(1,63)
<b>DRG 294</b>			
$\underline{t}$	-1.255	.2163	43
F Ratio	1.575	.2163	(1,43)
<b>DRG 373</b>			
$\underline{t}$	-1.278	.2052	78
F Ratio	1.632	.2052	(1,78)
<b>DRG 391</b>			
$\underline{t}$	-1.817	.0730	78
F Ratio	3.302	.0730	(1,78)

LOS post clinical pathway for DRG 373, (Normal Vaginal Delivery), was found to be .2358 days lower than LOS pre clinical pathway for this DRG with  $\underline{t}$  (78)= -1.278,  $p$  = .2052, and F (1,78)= 1.632,  $p$  =.2052. The results that can be generalized from this statistical test conclude clinical pathways have a positive effect on lowering LOS; however, the null hypothesis must be accepted because  $p > .05$ .

LOS post clinical pathway for DRG 391, (Normal Newborn), was found to be .2675 days lower than LOS pre clinical pathway for this DRG with  $t(78) = -1.817$ ,  $p = .0730$ , and  $F(1,78) = 3.302$ ,  $p = .0730$ . The results that can be generalized from this statistical test conclude clinical pathways have a positive effect on lowering LOS, however, the null hypothesis must be accepted because  $p > .05$ .

## **DISCUSSION**

It is important to note the study took into account all patients admitted for a specific diagnosis either pre or post pathway implementation. It can not be assumed all post pathway patients were indeed entered on the pathway. It should be noted, however, that once the pathway was established for a diagnosis that patients presenting for treatment should have been entered on the pathway. The purpose of the pathway is to deliver optimal care at an optimal level of intervention. Failure to enter a patient on a pathway that has been developed for a specific diagnosis represents a failure of the health care delivery system to deliver the highest quality and most cost effective care to the beneficiary population. Clinical pathways must be consistently applied to the patients for whom they were designed. (Cordell 1995, Gorton et al., 1995, Korycan 1995) Summarizing, the best treatment plan is ineffective if it is not followed.

It is also important to note the manner in which length of stay (LOS) was measured. LOS was measured to the nearest hour for each case that was randomly selected. This method differs significantly from the way LOS has traditionally been measured in the medical center. This

method was deemed necessary to yield a more accurate LOS. David Grant Medical Center uses LOS measured by the day for third party collection. Any portion of a day results in an addition of a day to the LOS. For the purpose of subsistence billing the day of admission is counted against the LOS, however, the day of discharge is never counted. This method is employed regardless of the time of admission and discharge.

In none of the hypotheses tested was the LOS reduced in a statistically significant amount. On a positive note, LOS showed a downward trend in all cases and neared statistical significance in two of the four DRGs examined. This trend, however, is not a substitute for statistical significance. The question of why David Grant Medical Center was not successful regarding clinical pathway implementation given the plethora of literature showing clinical pathway success, must be answered.

Foremost, there needs to be an organizational commitment to the clinical pathway process. This commitment begins with leadership buy-in and support of the clinical pathway concept, and utilization management role within the organization. In the managed care environment has begun and continues to permeate throughout the Air Force Medical Service, utilization management efforts must exist, and effectively lower the cost of health care while delivering a quality product

and increasing access to the beneficiary population. The leadership portion is necessary to achieve medical staff support of clinical pathways.

The medical staff must be the owners of any process that involves direct patient care. Although the medical staff should “own” the process the need for multidisciplinary teams involving all care givers should be formed when clinical pathway implementation is necessary. Once developed clinical pathways should be implemented on all patients who present for that diagnosis. The pathway, representing the “best way” once developed, should be used. A last piece that is lacking is continued staff education in the area of clinical pathways. If they are going to be used and understood there must be a concerted effort in the area of education.

Clinical pathway efforts at David Grant Medical Center should be reexamined to determine how clinical pathways come to fruition within the medical center. The discussion portion will focus on the four main areas of clinical pathway utilization. These areas include: Selection, Development, Implementation, and Evaluation. Additionally the area of variance management will also be explored.

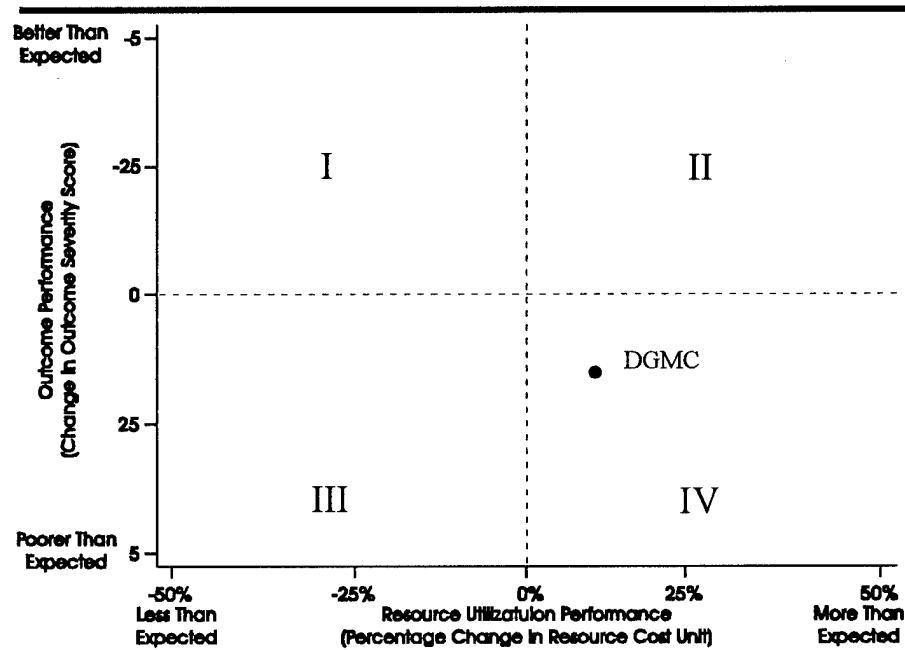
A report that evaluated the care, outcome, and resource utilization associated with pregnancy and births in military medical treatment facilities (MTFs), helps to validate the findings in this study (Crawford and Stahl, 1995). The report completed the analysis of outcomes and

resource utilization associated with the care of mothers and newborn infants. The study reviewed the care of 9,714 mothers and 9,726 newborns at 97 MTFs in the Department of Defense direct care system. The study showed significant differences between observed and predicted resource utilization scores for both mothers and infants among the services, regions, and MTFs.

While accounting for severity of care delivered, the report cited the magnitudes of the differences were substantial with respect to resource utilization. As shown graphically in Figure 1, each of the four quadrants represents a different level of performance in the provision of the birth product line. This performance is summarized in Table 4. David Grant Medical Center's performance is shown in Figure 1. It is important to note any movement toward quadrant one would indicate a savings in both resource utilization and an improvement in clinical outcomes. The study concludes a cost savings of over \$500,000 per year is projected if David Grant Medical Center's practice patterns for this procedure can be improved to mirror those of the five highest rated MTFs in the Department of Defense. Clinical pathways represent a process toward this clinical practice profile.

**Birth Product Line  
Clinical Practice Profile**

- Combined Maternal and Neonatal
- DGMC



**Figure 1: Clinical Practice Profile**

**Table 4**

**Clinical Practice Profile Quadrants**

<b>Quadrant</b>	<b>Indicates</b>
I	Better outcome performance and lower resource utilization
II	Better outcome performance and higher resource utilization
III	Poorer outcome performance and lower resource utilization
IV	Poorer outcome performance and higher resource utilization

## **VARIANCE MANAGEMENT**

Study after study has shown clinical pathways work, and variation in the delivery of health care causes "bad" care (Battista, Hodge and Vineis, 1995, Coffey, Othman and Walters 1995, Schriefer 1995, Wennberg and Gittlesohn 1982, Wennberg and Gittlesohn 1973). Treating a specific diagnosis should be done the best way, "The Pathway." Critical pathways have been developed as a mechanism to reduce unwanted variation in care (Rosenstein 1995). Perhaps the major benefit from clinical pathways is that they present an organized structure or process for health care delivery (Rosenstein 1994). Pare and Freed suggest there are three categories of variation. These categories include: an inherent cause in the system or environment, clinician-related variation and patient or family related variation (Pare and Freed, 1995).

The results from this study conclude that standard deviation and hence the variance was reduced in three of the four diagnoses examined in this study. These variance figures are summarized in Table 5. In one diagnosis the variance actually increased. This increase should cause serious concern as to whether clinical pathways are being effectively utilized for this diagnosis. With regard to the three other diagnoses, it

can be concluded that David Grant Medical Center is on the right track in beginning to reduce the variance in length of stay for those patients admitted for similar diagnosis.

**Table 5**  
**Variance Analysis**

<b>Diagnosis</b>	<b>Standard Deviation (In Days)</b>	<b>Variance (In Days)</b>	<b>Change in Variance Post versus Pre Clinical Pathway (In Days)</b>
ACL Reconstruction			
Pre	1.36	1.85	
Post	.89	.79	
<b>Change in Variance</b>			-1.06
Diabetes Ketoacidosis			
Pre	4.22	17.81	
Post	4.52	20.43	
<b>Change in Variance</b>			+2.62
Normal Vaginal Delivery			
Pre	.94	.88	
Post	.70	.49	
<b>Change in Variance</b>			-.39
Normal Newborn			
Pre	.74	.55	
Post	.56	.31	
<b>Change in Variance</b>			-.24

It is important to note the concept of clinical pathways strives for a minimization of deviation and subsequently variance from the mean. Reduction of variation regarding confluent episodes of care is necessary for the clinical pathway concept to be effective. Medicine is a qualitative science, however, quantitative data can be used to point out

standards and variances in care that can be molded into an improved level of performance. By reducing the variances in care by all providers of care, a more cost-efficient utilization of resources can be promoted.

### **SELECTION OF CLINICAL PATHWAYS**

The first step regarding clinical pathways is to determine which diagnoses clinical pathways are going to be established for. Clinical departments or service lines must make decisions based on volume, clinical pathway potential and the opportunity for improvement in that area. Another strategy would be to identify the top diagnosis and procedures within David Grant Medical Center and to stratify the diagnosis and procedures by volume cost and length of stay (Clark Steinbinder and Anderson, 1994, Capuano 1995). The analysis should be used as a screening tool to help prioritize the areas for greatest opportunity.

Currently, the TRICARE flight has developed a Utilization Management Reference Metrics Manual. The manual examines various data broken down by clinic or service line. The average length of stay (ALOS), by clinic service were examined and compiled to determine the facility ALOS for each of the DRGs examined in this study. These data, summarized in Table 6, were extracted from the retrospective case mix

analysis system, (RCMAS). The data from the manual serve as an excellent resource to target specific diagnoses or procedures that may benefit from clinical pathway development and implementation. In the specific DRGs examined it appears that Normal Vaginal Deliveries and Normal Newborns should continue to be reviewed. ALOS for both these diagnoses is outside the Maryland Hospital, and Civilian Health and Medical Program of the Uniformed Services, (CHAMPUS) norms (60MDSS/SGSTP UM Reference Metrics).

**Table 6**

**Average Length of Stay For DRGs Examined, (Fiscal Year 1994)**

<b>Diagnosis</b>	<b># Cases</b>	<b>ALOS @ DGMC</b>	<b>Maryland Hospital Norms</b>	<b>▲</b>	<b>CHAMPUS Norms</b>	<b>▲</b>
ACL Reconstruction	72	2.14	2.33	-0.19	2.29	-0.15
Diabetes >35 Years of Age	18	5.57	5.91	-0.34	6.03	-0.46
Normal Vaginal Deliveries	369	3.27	1.68	+1.59	1.82	+1.45
Normal Newborns	384	2.36	1.86	+0.5	1.93	+0.43

## **DEVELOPING CLINICAL PATHWAYS**

Foremost, the development of clinical pathways should always be a multidisciplinary process, and should include input from all professionals whose care will be included in the pathway. It is evident from the research that internally modifying an existing, established pathway to local circumstances, through a multidisciplinary approach, represents the most effective way to develop clinical pathways (Brandt Feb. 1994, Capuano 1995, Gates 1995, Pare and Freed 1995, Rosenstein 1995, Simkin 1995). The use of historical data, a literature review, external models, internal inputs and local standards of care all play a critical role in the development phase of clinical pathways. Gates suggests that you, "Think Globally, Act Locally." The implementation of clinical pathways begins with obtaining national guidelines and literature but needs the use of local data in order to refine the pathways for local use (Gates 1995).

The establishment of clinical pathways has to be a working partnership with the administrative areas and the medical staff (Clare, Sargent, Moxley and Forthman 1995, Shulkin and Rosenstein, 1993). Clinical and financial data has to be merged to in order to effectively

develop clinical pathways that provide maximum benefit for the organization. The importance of this relationship can not be overemphasized. In today's health care environment partnerships must be forged with the administration and the medical staff. This partnership is critical in the establishment of clinical pathways.

Multidisciplinary teams should be seen as a task force charged with process improvement -- the process being the delivery of quality, cost-effective care. Clinical pathways can not be developed in a vacuum. The vacuum effect can take many forms such as clinical pathway development by a sole physician, or development by the utilization management department. Only through the use of multidisciplinary teams, consisting of all members who will treat a specific diagnosis, can a clinical pathway be properly developed. The development of a clinical pathway should be based on consensus within the organization, tempered with outcomes data to guide the process towards the goal of optimal delivery at an optimal cost.

The medical staff should be involved from the very beginning with regard to clinical pathways (Battista, Hodge and Vineis 1995, Brandt, Feb. 1994, Musfeldt, 1995). Medical staff buy-in will be a critical determinant in the success of pathway development as well as implementation. An internal group of supporters within the medical staff

can assist in providing political leverage necessary for medical staff acceptance (Korycan 1995, Farley 1995, Musfeldt, 1995, Rosenstein and Shulkin 1991).

### **IMPLEMENTATION OF CLINICAL PATHWAYS**

Developing clinical pathways in itself is a difficult task, but the implementation phase presents its own set of challenges. Education must take place and information must be shared in order for the pathway to be disseminated throughout the organization (Brandt Feb. 1994, Capuano 1995, Clark, Steinbinder and Anderson 1994, Marvin 1995, Rohrer, Poppe and Noel 1993, Rosenstein 1991). An education plan conducted in conjunction with specific clinical pathways provides an introduction to many managed care principles for direct providers of care. "There can never be enough staff education" (Farley 1995). Rosenstein and Shulkin view physician education as the key to promoting cost-effective changes in practice behavior (Rosenstein and Shulkin, 1991).

Basic educational sessions are particularly useful to share cost information with physicians. By presenting physicians with information which allows them to compare their practice with that of their peers, changes in behavior are more likely to appear. In addition to education,

feedback regarding practice patterns, and emphasis on quality, support of physician leaders, and minimizing intervention and paperwork, can all play a critical role in promoting cost-effective physician behavior (Shulkin and Rosenstein, 1993).

Clinical pathways also allow for the quick education of new employees. Due to the environment in which the military health service system operates, health care personnel are moved into new health care environments quite often. At David Grant Medical Center, the residency programs compound this constant influx of, "new faces." Clinical pathways that clearly identify patient outcomes can assist new staff members in delivering focused care quickly and efficiently. Clinical pathways can also assist in reducing error and omissions in care because they readily identify all aspects of care that need to be accomplished (Marvin, 1995). This is true not only for a new member of the health care delivery team, but by all staff members (Kealey and Burger, 1995).

Efforts must be made to integrate the clinical pathway into the documentation of care process. If a clinical pathway is seen as additional work on a part of the physician, nursing or ancillary staff, it will be a major hindrance to implementation. Yandell suggests clinical pathways should be part of the daily routine and patient medical record (Yandell, 1995). Musfeldt suggests physicians like to refer to the

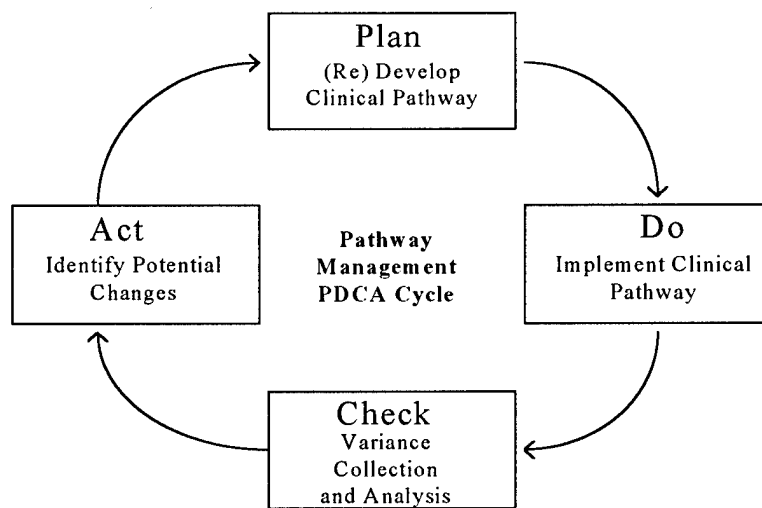
pathway, so it needs to be available as part of the medical record (Musfeldt, 1995). Physician noncompliance with clinical pathways can also be due to health care system inefficiencies or incomplete implementation (Ellrodt et al., 1995). All efforts should be made in order to minimize noncompliance for these reasons.

In many cases the implementation of clinical pathways as a tool to influence physician practice patterns and improve quality of care through standardization will meet resistance (Holoweiko 1989, Milne and Pelletier 1994, Stevens 1993). The most effective strategy for insuring cost-effective physician behavior is to directly align physician incentives with hospital incentives (Rosenstein and Shulkin, 1991). This is an option currently not applicable to the Department of Defense health care system. In the absence of this strategy, objective data should be used as an alternate tool for achieving physician buy-in (Musfeldt, 1995).

### **EVALUATION OF ESTABLISHED CLINICAL PATHWAYS**

Perhaps the most important issue to address regarding evaluation is the feedback loop that must be present back to the development stage. The clinical pathway must be dynamic and continually evolving as the dynamics of the health care environment change rapidly. Continual

evolution may be a part of any pathway. Readjustment may be necessary in organizations who are in the early stages of clinical pathway use. Clinical pathway development and subsequent evaluation through a Plan-Do-Check-Act (PDCA), cycle can serve to continuously improve clinical processes (Luttman, Laffel and Pearson, 1995). A rendering of this PDCA cycle is included as Figure 2.



**Figure 2. Clinical Pathway PDCA Cycle, (Luttman, Laffel and Pearson, 1995)**

Measurement of the results of clinical pathways are essential for any organization that desires to remain competitive in today's managed care environment. An integral part of the clinical pathway must be a commitment to ongoing data retrieval. This retrieval is necessary to

provide statistical analysis and to identify variation from projected norms. The analysis portion is essential to reduce inefficient practices and to optimize resource allocation.

Under the major category of effectiveness, several areas should be addressed relating to the improved outcome of care (Barlow, 1994). Two such areas that immediately come to mind are morbidity and mortality. The area of efficiency must also be addressed. Length of stay was examined in this study, under the area of efficiency. Although not addressed in this study, cost also plays a large factor regarding efficiency. A validation of the diagnosis and treatment should also be accomplished to determine the appropriateness of care. Satisfaction is perhaps another area that can be addressed regarding evaluation. Satisfaction can be broken down into three main areas: patient satisfaction, provider satisfaction and staff satisfaction with the clinical pathway process. All three are vital links to the successful utilization of clinical pathways.

Baseline data regarding the diagnosis being examined is also necessary. Once the medical center determines what to measure for each clinical pathway, baseline data, (when applicable) should be collected. These data will serve as a fundamental measurement for determining the success of each pathway.

Clinical pathways offer an important step in creating a more efficient health care system. In fiscal year 1995 David Grant Medical Center's budget was decremented \$900,000 for savings that are to result from the utilization management arena. This decrement represents approximately two percent of the total budget of the medical center. This decrement however, is only one portion of the cost that must be recovered.

There are also fixed costs associated with the establishment and maintenance of a utilization management office. These tangible costs primarily include manpower and material consumed in maintaining the clinical pathways. Clinical pathway savings should, at the very least, be equivalent to the decrement and the fixed costs of utilization management office related to clinical pathways. Evaluation of the clinical pathway process should include methods to determine cost savings and how those savings compare to the cost of doing business. The effective utilization of clinical pathways can play a significant role in the recovery of these precious health care dollars.

## **CONCLUSIONS AND RECOMMENDATIONS**

I expected to find the implementation of clinical pathways at David Grant Medical Center effectively lowered the length of stay for the diagnosis related group for which these pathways were developed. In all DRGs examined, this was indeed the case; however, they were not lowered by a statistically significant amount. There is a large amount of literature that shows the clear benefits of implementing clinical pathways. In addition to a lower length of stay, these benefits include: higher quality medical care, health care delivery at a lower cost, a reduction in variance of health care provided for similar diagnosis, increased health care access, and lastly, improved patient and staff satisfaction.

### **A METHODOLOGY FOR CLINICAL PATHWAY SUCCESS**

The use of clinical pathways at David Grant Medical Center must follow a methodology for success. The following is a synopsis of the literature that can yield the most success for clinical pathways at David Grant Medical Center. The methodology begins with the paramount support of utilization management initiatives and more specifically,

support of clinical pathways from the organizations leadership. The management of clinical pathways must then be looked at in four specific phases: the identification phase, the development stage, the implementation phase and the evaluation phase.

The identification or selection of those diagnoses that are candidates for clinical pathways must be based on quantitative data. Specifically, those diagnoses that have costs or lengths of stay that are higher than DoD or national norms should be looked at first. It is critical to remember that outcome or quality is the most important matter regarding patient care. The area of quality was not examined by this study and is traditionally a difficult area to quantify. Once possible diagnoses are identified, volume, cost and length of stay must also be examined.

The key to the development phase is multidisciplinary collaboration between all caregivers. This collaboration is essential in order to design the best process of care and to achieve buy-in from the staff who will actually be performing patient care. Established national standards should be adapted (if necessary) to meet the unique needs of David Grant Medical Center. These standards have already been developed to yield the highest quality outcome, often with a significant savings in manpower and resources consumed, yielding a reduction in overall cost per procedure.

Implementation of clinical pathways can not be completed without a comprehensive education program for the caregiver staff. The utilization management department should play a critical role in the provision and facilitation of the educational process. When implemented the clinical pathway should also be a part of the care documentation process and not result in extra work for the caregiver team.

The process of evaluation begins with the task of collecting baseline data regarding the diagnoses being examined. Quantitative data such as length of stay and cost should be collected. In addition, more qualitative areas such as outcome or quality of care delivered are absolutely essential to ensure the highest quality medical care possible continues to be delivered. Yet another key area to examine and collect data on is the variance in care given for those patients with similar diagnoses. Another possible area to consider evaluating is both staff and patient satisfaction with the clinical pathway process. A key to the evaluation phase includes the provision of a feedback loop from the evaluation phase back to the development phase. Clinical pathways must be flexible and adjusted as necessary to ensure continuous process improvement.

These phases must be used by the David Grant Medical Center staff to better manage the clinical pathway process to yield the highest quality, most accessible cost effective health care possible. Clinical

pathways are essential to effectively manage health care in a capitated managed care environment. Providing accessible, cost-effective, quality care to a beneficiary population continues to be a challenging endeavor. Clinical pathways may assist in meeting this challenge by combining efficiency and collaboration to provide the best quality patient care to the beneficiary.

Many individuals stand to benefit from the appropriate utilization of clinical pathways. The patient will benefit from appropriate utilization and access to health care resources. Providers will benefit from overall improvements in health care quality and efficiency. Payers, in this case the American taxpayer, will benefit in an improved value for their tax dollar.

There is no need for utilization management or clinical pathways if the provider of care is not at risk. Today, it can be argued that the future of military medicine as a provider of health care is at risk. Pressure in today's budgetary environment demands that Department of Defense medicine become cost effective to survive. Clinical pathways can serve to assist in the production of high quality, cost effective care, while simultaneously increasing access for the beneficiary population. Access to care is arguably a major choice for individuals deciding to enroll within the MTF, or with a civilian provider. The conclusion to be drawn

is that DoD beneficiaries do have choices and these choices can be influenced with action. Clinical pathways represent an action plan in helping to develop a more cost-effective system of delivering the highest quality care possible in the Air Force Medical Service today.

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