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Blanchfield Army Community Hospital is looking to optimize their Operating Room through efficient utilization, as mandated from the Surgeon General of the Army, by enacting one or more different courses of action: change the in-room time, schedule a swing shift, resource share with other facilities, or maintain business as usual. Projected outcomes include improving the utilization rate, numbers of surgeries, and the access to care. The first three courses of action show improvement with these projected outcomes, however, the business as usual approach was found to not be beneficial in resolving current and projected needs for utilization. Ultimately, applying the remaining three courses of actions in stages will lead to an increase in workload and better utilization of the resources available. Making changes within the surgical setting can be a difficult task for any healthcare organization to accomplish, but without doing so, Fort Campbell has the potential of losing one of its primary resources in maintaining the Soldier's readiness; the Operating Room.

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POLICY ANALYSIS OF SURGICAL UTILIZATION

Graduate Management Project

Policy Analysis of Surgical Utilization at Blanchfield Army Community Hospital

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Health and Business Administration

This paper is submitted in partial fulfillment of the
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The opinions or assertions contained herein are the private views of the author and are not to be considered as official policy or positions, or reflecting the views of Blanchfield Army Community Hospital, the Army Medical Department, the Department of the Army, the Department of Defense, the United States Government, or Baylor University.

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Abstract

Blanchfield Army Community Hospital is looking to optimize their Operating Room through efficient utilization, as mandated from the Surgeon General of the Army, by enacting one or more different courses of action: change the in-room time, schedule a swing shift, resource share with other facilities, or maintain business as usual. Projected outcomes include improving the utilization rate, numbers of surgeries, and the access to care. The first three courses of action show improvement with these projected outcomes, however, the business as usual approach was not beneficial in resolving current and projected needs for utilization. Ultimately, applying the remaining three courses of actions in stages will lead to an increase in workload and better utilization of the resources available. Making changes within the surgical setting can be a difficult task for any healthcare organization to accomplish, but without doing so, Fort Campbell has the potential of losing one of its primary resources in maintaining the Soldier's readiness; the Operating Room.

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Policy Analysis of Surgical Utilization at Blanchfield Army Community Hospital

Introduction

Overview of Blanchfield Army Community Hospital

Located at the home station of the 101st Airborne Division in Fort Campbell, KY, Blanchfield Army Community Hospital (BACH) provides extraordinary healthcare to its beneficiaries every day. Fort Campbell is located approximately 50 miles to the northwest of Nashville, TN and is situated on the southwest side of Oak Grove, KY, and to the northwest side of Clarksville, TN. Though the large post is positioned over 2/3rds on the Tennessee side of the state line, the location of Fort Campbell's Post Office is on the Kentucky side which, ultimately, provides the post with a Kentucky mailing address. The physical facility of BACH is easy to access by its beneficiaries due to its location less than 0.5 miles from one of Fort Campbell's main gates (Gate #3). In support of the 101st Screaming Eagles, BACH's unit motto is "Pulse of the Eagle." The mission of BACH, as stated by the Hospital Commander Colonel Thomas, is to "ensure medical readiness and provide trained medical personnel to the Force, while optimizing healthcare for Soldiers, Family members, and Retirees." The vision of BACH is "to deliver world-class medical care to all our patients." The values of BACH hold true to the values of the United States Army: Loyalty, Duty, Respect, Selfless Service, Honesty, Integrity, and Personal Courage.

Blanchfield was originally designated as the United States Army Hospital, Fort Campbell, KY, on August 19, 1942. The addition of this hospital to the Army Medical Department's (AMEDD) inventory had an operating capacity of 2,100 beds. The hospital extended over 73 acres of land that consisted of 53 two-story buildings from the standard World

War II cantonment design. On September 17, 1982, during the dedication ceremony for a new facility, the hospital was redesignated as the Colonel Florence A. Blanchfield Army Community Hospital.

This hospital is unique in the United States Army Medical Department in that it is the only hospital named after an Army Nurse Corps officer. Colonel Florence Blanchfield played a prominent role in World War II to promote the nursing aspects of medical care in the military and was instrumental in attaining permanent commissioned officer status for military nurses. Chief of the Army Nurse Corps from 1943 to 1947, Colonel Blanchfield was the first woman to receive a regular Army commission. Blanchfield Army Community Hospital, "Pulse of the Eagle," is one of the largest and best-equipped hospitals in this area. BACH has a 241-bed capacity and spans 480,000 square feet. A caring staff of more than 1,200 personnel provides the highest quality of care. BACH's first priority is to provide health services to support more than 23,000 soldiers at Fort Campbell. The hospital oversees the management of health care for 72,000 beneficiaries (BACH, 2006).

Secondary to the current staffing needs and requirements of the United States Army, BACH is staffed for 66 beds and the average daily census is 30 patients. The services that BACH provides include: family practice, pediatrics, women's health, internal medicine, emergency services, urology, orthopedics/podiatry, eyes/ears/nose/throat (EENT), general surgery, and specialized clinics in optical refractory care and bariatric surgery. Patients that require care outside of these scopes of practice, or are unable to be seen within the hospital specialty clinics due to space available, are referred to local hospitals in the surrounding area: Gateway Medical Center for subspecialties, Cumberland Hall for inpatient mental health, Vanderbilt University

Medical Center for trauma and high intensive care needs, etc. For further in depth care, beneficiaries can also be sent to BACH's higher headquarters, Southeast Regional Medical Command (SERMC) at Dwight D. Eisenhower Army Medical Center, located in Fort Gordon, GA, Brooke Army Medical Center in San Antonio, TX, or Walter Reed Army Medical Center in Washington D.C.

The operating room consists of six suites. Each of the operating rooms has a service specific identifier (Table 1) that generally runs parallel to the surgical specialties blocked times. Though these rooms can be used interchangeably for just about any surgery, efficiencies have been found when using specific surgical suites for specific services.

Table 1

Surgical Specialty Suites

OR	Specialty Service
1	Ear Nose & Throat / Oral Maxillofacial
2	Gynecology
3	Urology / Orthopedic
4	Orthopedic
5	Eye
6	General

No structural or large-scale renovations have occurred within the operating room since the hospital was built in 1982. It is projected that renovations will begin starting in fiscal years 2010 or 2011. Much of the equipment, however, has been kept up-to-date with the continuous changes in technology to maintain the standard of care. The rooms are generally the same size and consist of the same layout. On average, each operating room, when staffed appropriately, has three scheduled cases performed in it every day, which averages approximately 12-15 total cases per day. Some cases may skew the averages because of their large time differences; an

anterior/posterior cruciate ligament (ACL/PCL) reconstruction surgery may take 2-3 hours and a cataract surgery may only take 10-20 minutes.

The majority of credentialed surgeons that operate at BACH, outside of the few civilian providers who work OB/GYN, are military providers. Much of their productivity and time is limited in order to maintain their own personal training for the Army and the hospital. Secondary to being in the military, many of these providers have at least one additional duty that they are in charge of outside of the standard direct patient care. They also suffer from multiple deployments and short term, on station times. In the perioperative and anesthesia setting, the majority of the workers are from the civilian population. Many of these personnel have been with the organization for several years and are integral to maintaining the standards and ideals within the surgical setting. The military personnel from these settings also deal with the same dilemmas as the providers, with the extra work and commitments outside of direct patient care. However, everyone's drive for commitment to care assures focus on patient care.

Problem Statement

In order to increase efficiencies and decrease costs within the Army Medical Department, the Surgeon General of the Army (OTSG) is looking to close operating rooms at Military Treatment Facilities (MTF) who are unable to meet workload requirements through proper utilization of available resources. This is seen by two sides: the United States government and the individual providers. When government hospitals run operating rooms inappropriately, taxpayers are paying for unused and underutilized services. Bottom line, the taxpayer's money is being wasted. For the individual surgeons assigned to low workload MTF's, they are not able to properly maintain their skills, which impacts their mission readiness; this then may affect their

patient outcomes and decrease the overall effectiveness of the Army Medical Department (AMEDD).

The Army Surgeon General's guidance is for all MTF's to maintain the standard of an 85% utilization rate. It has been mandated by OTSG that by December 2009, MTF's who cannot meet the standard may lose their surgical services. The surgeons stationed at the suboptimal utilization hospitals will be moved to other hospitals that can properly use their skills more effectively. Also, current trends within the AMEDD show that the annual budgets for Army Hospitals show an approximate 5% decrease in the Core (standard) money given to provide care every year (Figure 1). The loss of income will need to be replenished by increasing and improving the Earning's category of the budget that is provided through workload. Ultimately, optimizing the Operating Room will improve workload and therefore, help to sustain current and future hospital operations. The need to improve HEDIS (Healthcare Effectiveness Data and Information Set) measures will help to increase reimbursement as well.

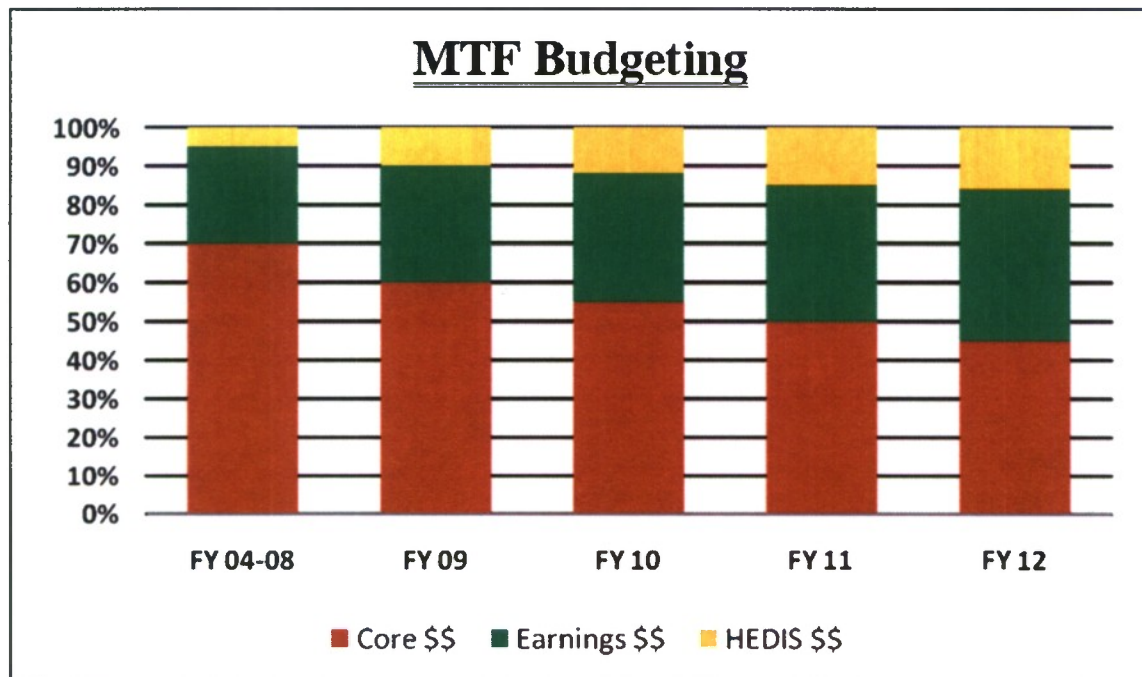


Figure 1. Depiction of approximate future Medical Treatment Facility Budgeting

The research question for this policy analysis is “how does Blanchfield Army Community Hospital improve its operating room utilization?” Though BACH is not in the lower 1/3rd of the MTF’s for utilization, the need for structured change from the current environment is inevitable. BACH has the potential for meeting the requirements from OTSG and maintaining itself as a surgical service provider.

Evidence

The following are definitions as listed by Dexter, 2003:

Regularly scheduled hours are hours that an OR team member plans on working when not on call (0700-1500).

Call hours are any hours outside of the regularly scheduled hours that an OR team member may have to stay late to finish a case or be called in to fully conduct a case.

Surgical service refers to a group of surgeons who share allocated OR time (orthopedic, general, EENT, etc).

Allocated OR time is an interval of OR time with a specified start and end on a specified day of the week that is assigned by the facility to a surgical service for scheduling cases.

Room utilization is the percentage of time the OR is used (calculated by totaling time from nurse start time to nurse end time) from what time is available.

Service block time utilization is the percentage of time that a specific surgical service uses from what time was available to the service.

Turnover time is the time from when one patient exits an OR until the next patient on that day’s OR schedule enters the same OR. Turnover times include cleaning the OR from the prior case and setting up the OR for the next patient.

Time and space available (TSA) is how patients are listed for a potential day of surgery after the operating room scheduled has been finalized. Changes to cases cannot be made after the surgical schedule has been finalized.

The idea of optimizing an operating room efficiently and effectively is not new to the healthcare industry. For at least 30 years, scholars have continuously looked for better ways to improve the usage of an operating room and it is clear that there is no “one size fits all” answer. In 1978, Magerlein and Martin reviewed demand scheduling against booked scheduling and found that scheduling patients in advance has a significant effect on the performance of the surgical suite. Much research has been conducted since Magerlein and Martin’s investigation that backs up their study, but there are also those who have found different results from other studies performed throughout the next three decades.

When looking at how to improve the surgical utilization of a healthcare organization, the directors, chiefs, commanders, etc., need to have an understanding that strategy is a key component to enabling efficiency. Placing surgery within an organization’s strategic plan will allow the organization to better plan the direction it wishes to seek. Jackson (2002) discussed that the hospital executives need to decide whether the OR is seen as a cost center, which may lead to labor and supplies being cut, or seen as a profit center, which may lead to an expansion of services to increase revenues. Moreover, the organization needs to understand the ultimate goals of the board or military command to follow the correct azimuth.

One insight that some executives may overlook is the understanding that healthcare is a business. Hence, surgery is a business. This may be found to be truer within the military health system secondary to its similarities of a not-for-profit organization. Regardless of this, a healthcare organization that fails to realize the importance of surgery within their organization

will be unable to make profits or break even. Evidence suggests that 68% of the total revenues made by a healthcare organization are from surgery (Jackson, 2002). The 68% figure may seem high, but further ancillary services (lab and radiology) that are normally required for the majority of surgeries were not even included in the data (Jackson, 2002). This could ultimately lead to the assumption that somewhere between $2/3^{\text{rds}}$ and $3/4^{\text{ths}}$ of an organization's revenue is captured from the surgical setting.

With increasing governmental oversight from Medicare and Medicaid's decision to cease paying hospitals for some of the care made necessary by preventable complications, the need to increase revenues continues to be in demand. Viapiano and Ward (2000) discuss that with severely strained revenues, hospitals often do not have the capital required to expand or develop new programs with impunity. Demographic information and utilization rates, as well as cost and reimbursement issues, must be put into the health care organization's strategic equation. Viapiano and Ward (2000) further discuss how local demographic trends are important elements in the equation, because they may identify local surgical rates that are different from state, regional, or national rates. Local competition must be assessed and regional opportunities explored.

As suggested by Sandberg et al. (2006), hospitals considering allocating resources on perioperative system redesigns should carefully analyze both their case mix and their case volume before spending those resources to enhance perioperative system capacity. Sandberg et al. (2006) further discussed how the additional capacity should reduce staffing costs by eliminating overtime and allow complete additional cases to be performed. Staffing costs are generally fixed, outside of overtime pay, secondary to the legal requirements of surgical staffing

teams. The members of a surgical team include at least one person of the following professions: perioperative nurse, scrub nurse/tech, anesthesiologist/ nurse anesthetist, and surgeon.

Wachtel and Dexter (2008) looked into further analysis of an organization's strategy on surgery through stages. They suggested that when a decision has been made to expand OR capacity, the choice of surgical subspecialties to receive additional block time and fill the additional OR capacity is a tactical decision. Such decisions of the first stage are made approximately once a year by the governing board or command. Wachtel and Dexter (2008) continued to say that afterwards, typically a few months before the day of surgery, a second stage occurs in which operational decisions allocate OR time and determine the hours of staffing for each specialty based on expected workload. This can also be stated as service block time in which the surgeons can then place their patients in to schedule them for surgery. However, McIntosh, Dexter, and Verma (2006) suggest that using utilization to determine block time mistakenly confuses the initial stage of tactical planning of block time for capacity expansion with the second operational stage of matching staffing to anticipated workload.

Within the surgical setting, there are two generally accepted ways to schedule surgery: first-come, first-served and block scheduling. First-come, first-served scheduling allows surgeons equal access to decide when they want to perform cases within the allocated OR time. Ozkarahan (1995) further explains that scheduling systems that run on a first-come, first-served basis often result in high cancellation rates, long waiting lines, and disparity between the OR utilization rates of the various surgical specialties. Viapiano and Ward (2000) suggest this type of scheduling can be seen as favoring surgical services with frequently high elective procedures and leaves little to no room for TSA's or emergency procedures. Dexter (1999) suggests that in order to maximize operating room utilization, it is important to schedule into open time as many

submitted add-on elective cases as possible. Because OR staff salaries account for the majority of OR costs, it is important to match add-on cases to times when OR staff are scheduled to work.

Block scheduling, as defined by Viapiano and Ward (2000), allocates time to surgical services or to individual surgeons, with a predetermined release time before the date of surgery. This blocked time for surgery can either be given to the surgical service or to the individual surgeon to fill their procedures into the allocated times. The allocated time could be based on historical surgical minutes or increased demand for a specific surgical service. Viapiano and Ward (2000) continue to explain when block scheduling is implemented several rules need to be established as the backbone of the system including: determining the amount of time allocated to each surgeon or service, when that block time should be released, and how block time should be reallocated when utilization rates change. However, filling all of the available allocated block time does not address productivity. Viapiano and Ward (2000) propose that when the allocation scheme is based exclusively on time of occupancy, slow surgeons are rewarded and efficient ones punished.

Dexter, Macario, Traub, & Lubarsky (2003) recommend that at surgical suites trying to allocate OR time to a surgeon with a low volume of surgical cases, OR management decision-making not be based only on the simple average of historical utilizations, but by the statistically sound alternative of allocating OR time based on OR efficiency. Tyler et al. (2003) performed a computer analysis of OR utilization and suggested that the most effective way to maximize OR time utilization is to select the days on which to perform elective cases so as to best match the OR caseload with the days on which full-time OR personnel are scheduled to work. The key to maximizing OR utilization is to determine the appropriate amount of block time to allocate to each surgeon and how to choose which day to schedule a patient for surgery. From a survey

conducted in 2003, Tyler et al. found that among patients undergoing outpatient (ambulatory or same day admit) surgery, the median longest amount of time the patients consider acceptable to wait for surgery is two weeks. Within the military health system, access standards for scheduled surgery maintain the same as listed in a memorandum dated 15 January 1997 from the Department of Health Affairs.

If surgery or other treatment is then indicated, the surgery or treatment must be scheduled within the time frame indicated by the provider, but no later than one month from the specialty consultation, unless the enrollee waives his or her right for access (Department of Health Affairs, 1997).

One area of the surgical setting that is usually the first to be reviewed for efficiency is the turnover time. This is the time that the patient is wheeled out of the surgical suite until the next patient is wheeled into the surgical suite. Although never mandated, the industry recommended standard for this time is 30 minutes. This time includes cleaning up the OR from the prior patient (trash, linen, wiping, mopping), equipment setup, patient interview, and setting up surgical supplies in preparation for the next patient. Some cases, like pressure equalization (PE) tube placements, may only take up 10 minutes of surgical time with very little mess, which can expedite turnover time. However, trauma, or large orthopedic or general surgery procedures, may take longer than the recommended time secondary to the complexity of equipment and supplies used in the case or the need for more than required cleaning procedures. Mazzei (1994) submits that turnover time is often a focal point for improving efficiency in the OR suite. Although important, minimizing turnover time will not yield nearly the value as reducing length and variability of surgical times.

Metz (2006) suggests that anesthesiologists, perioperative nurses, OR schedulers, and hospital architects can improve OR times by minutes per case. However, surgeons have the potential to improve OR times by hours per case. This can be seen in the example of three turnovers lasting 25 minutes each; thus, shaving 5 minutes off of the planned standard of 30 minutes. These turnovers would offer an extra 15 minutes available for the day, but not enough to conduct more surgeries. Metz (2006) further elicits that administrators, service chiefs, and clinicians avoid the elephant in the room: The biggest determinant of OR efficiency is the capability of the surgeons who work there. A simple alteration in OR scheduling, giving preference to faster surgeons, carries far more likelihood of allowing one or two extra procedures per OR per day than speeding up turnaround times. In a health care benchmarks discussion from Kaiser Permanente in 1998, an anonymous speaker summed this concept up and stated that “for the amount of energy you put into trying to improve turnaround time, you don’t usually gain a whole lot, unless turnaround time is off the wall.”

One of the unforeseen events within the daily operations of an operating room is delays. Sandburg et al. (2006) found that delays occurred when switching surgeons between cases. These delays could be related to how the surgeons may not sufficiently appreciate the value of OR time or were not well informed about the OR’s impending readiness for their cases. Sandberg et al. (2006) further explains that these delays should prompt the hospital to seek and correct the root cause of delays that involve waiting for surgeons, because the cost of unused OR time is prohibitive. Without proper control or management of delays or cancellations, the sunk cost of an operating room team continues to be an expense and may decrease the ability to make enough revenue to break even. Dritz (2006) found that using single surgeon utilization, similar daily enhancements in operating room throughput could be achieved with extensive workflow

design. However, when multiple surgeons were scheduled with a single operating room on a given day, all time savings gained through enhanced efficiency were lost awaiting next surgeon arrival. Within this study, Dritz (2006) found that 74% of all delay codes during a study period were under the heading of “awaiting surgeon arrival.”

A study performed by Basson, Butler, and Verma (2006) found that OR delays negatively affect staff and patient morale, and unnecessary evening overtime may interfere with OR availability for emergencies. An organization that cannot control delays may see an increase in costs, staff turnover, and in errors. Sandberg et al. (2006) suggests that by focusing on nonoperative time and by reducing the nonoperative time through restructuring workflow rather than pressuring the OR staff to hurry, an organization creates an environment in which patient contact time and safety are preserved while productivity is enhanced. To look at another reason for delays, Basson et al. (2006) performed a study within a Veteran’s Administration Hospital to predict the probability of patient nonappearance for surgery by their history of clinic nonappearance. The authors found that the operating room could run more efficiently by mandating that patients who have missed more than 40% of their previous clinic appointments over the past year will be booked only as the last case per day. Therefore, if patients do not show up on their surgery date, the schedule would be less affected than it would if the person had been scheduled as the first case of the day. This could be useful in order to promote patient compliance by rewarding those who follow the correct protocol and discourage patients from being non-compliant. Though no health care organization can deny non-compliant patients from having surgery, they can control when the surgery will be performed and placed into the least problematic time.

A major limiting factor that affects the ability for the surgical team to perform surgeries is safe case performance. Safety includes limited intensive care unit (ICU) beds, hospital ward beds, post-anesthesia care unit beds, blood for open heart or vascular cases, equipment, implants, etc. Dexter (2003) explains that strategic planning decides how much of such resources to have available. Many hospitals have ICU's that often fill, causing delays or cancellations of surgical cases. Dexter (2003) discusses that there are two ways to approach this problem other than just building more ICU beds. One strategy is to adjust the days that services are scheduled to perform surgery to reduce the risk of delays or cancellations. The second strategy is to provide surgeons with flexibility in the days when they have OR time. However, Dexter (2003) clarifies to say that in order to maximize hospital throughput, surgeons need to be able to treat cases on whatever workday the case can be performed safely.

As suggested by Tyler, Pasquariello, and Chen (2003), variability of case duration also makes it difficult to predict actual utilization. Even for straightforward, common operations, actual case time is uncertain. Though anatomy is generally the same between patients, every patient is different and has a different history. This therefore leads to the understanding that actual time for a given operation cannot be predicted. Tyler et al. (2006) concludes in a series of cases that are scheduled to follow the initial case of the day, the actual start time of cases after the first case cannot be determined in advance. Case duration may be based off of the average time historically or the predicted surgical time. Pirnke (1989) performed a study that compared surgeon-predicted procedure time with actual procedure time and showed that surgeons underestimated case length twice as often as they overestimated surgical time. Basson, Butler, and Verma (2006) conclude that despite best efforts at standardization, it is simply not possible to predict which patients or staff will arrive late, which patients may have their case cancelled for

medical or other reasons, precisely how long a case will take to perform, or what unexpected problems may delay care or room turnover.

Policy Options

Due to the timeline for this GMP, overall restructure of the surgical setting is not foreseeable. There are many other departments and personnel (laboratory, radiology, pharmacy, etc.) that fully encompass and enable patients to have surgery. These departments and personnel are currently outside the scope of the GMP, but definitely play a part in the day-to-day operations of the facility. In order to look at how to improve the operating room utilization here at BACH, this author proposes several different courses of action to meet this goal. Though some of the courses of action may sound similar, each may provide different outcomes from the other.

Course of Action 1: In Room Time

Upon asking the brief question, “what does the 0730 start time really mean?” to the perioperative, anesthesia, and surgical staff, there was found to not be a concurrent understanding. The majority of the perioperative and anesthesia staff thought the 0730 start time is the time to have the patient in the assigned surgical suite. However, the surgeons imposed that the 0730 start time should be when they make their first incision. This discrepancy could, or may, have lead to inefficiencies within the surgical setting.

Currently, secondarily to the types of cases surgeons are booking, an hour or two may be left open at the end of the day. This may be from equipment issues (the time for properly sterilizing instruments to be reused), using historic versus predicted time, or not enough time at the end of the day to fit in another case. This course of action will look at the latter and proposes to fill the unoccupied available surgical time at the end of the day. In order to do so, it would be

proposed that the 0730 start time (in room time) would change to a 0720 in room time. For this course of action to work there has to be “buy-in” from every member of the surgical team from the scrub technician to the surgeon. A lot of this will come from provider and administrative leadership setting the example. First off, before 0700 every morning, the surgeons will have to verify consent and physically initial on, or nearby in some cases, where the surgical incision will be made. Then, the operating room technician and nurse will have to speed their process through communication and assistance with each other. Finally, the anesthesia personnel will need to be ready to get the patient in the room approximately 10 minutes earlier (Table 2). One kink, or confounder, in this chain of events can potentially decrease the efficiency of the given operating room for the day.

Table 2
Surgical Start Times

Time	Current	Proposed
<0700	NA	PT Signed
0700	PT Signed	Interviews
0720	Interviews	PT in Room
0730	PT in Room	PT to Dr
0740	PT to Dr	Surgery

Though this theory may only offer approximately 10-15 extra minutes from the start of the day, it is the idea that this may free up more time later in the day to potentially perform another surgery within the allocated time. Hence, this course of action has the potential of increasing workload, decreasing possible overtime pay, and improving operating room utilization.

Course of Action 2: Resource Sharing

A resource sharing proposal is currently in the works from a local network hospital in town. The network hospital, Gateway Medical Center, recently opened its new hospital that was

about three times its original size. The projection for economic and population growth is strong in Clarksville, and the governing board at Gateway decided to build more now so they would not have to later. This, however, has caused a problem because they are not seeing enough workload through their hospital. BACH on the other hand, has some surgical specialties with multiple numbers of surgeons who are lucky to operate once a week secondary to the surgical services' blocked schedule. The space and availability in BACH's operating room is potentially going to be even harder to come about in the near future. Starting in early November and ending towards the middle of January, over 15,000 soldiers are returning to post. Projections from the hospital command conclude that approximately 7-8% of this population will have surgical requirements within the first couple of months from returning. This population growth has the potential to increase the waiting list times for patients needing or wanting surgery.

This resource sharing agreement has the potential to give BACH's surgeons the ability to improve their workloads without being held to their standard, small allotted times. This resource sharing agreement consists of several different parts. The surgeons from BACH, under this agreement *only*, can perform surgery at Gateway with a license from any state. Gateway will serve as an extension of BACH during these surgeries and just like any military MTF, federal law will allow the surgeons to have out of state licenses. This will actually decrease the costs from sending patients to the network because BACH is already paying for the provider, which is one of the most expensive aspects of surgery.

Many people may ask, "How does performing surgeries outside of BACH help?" As stated previously in Course of Action 1, BACH needs to show an increase in workload. By having BACH's surgeons operate at Gateway, it will actually count towards their workloads. This can potentially increase the availability of open times to perform surgeries and accomplish

the mandate to perform surgeries within 30 days. In addition, this may allow for the surgeons to perform surgeries that BACH was not equipped to perform. This could include instrumentation, equipment, or secondary services like an ICU or physical therapy. Larger, more in depth cases could be performed at Gateway, thus allowing for an increased number of shorter cases to be performed at BACH. This ultimately could show that with a larger amount of workload, more personnel and more equipment can be purchased to fully open up all six rooms at BACH (which is currently held at four due to staffing requirements).

Course of Action 3: Swing Shift

Currently, at this time, the operating room does not operate a swing shift. The swing shift has been used in prior years, however, secondary to the requirements from the Department of the Army with deployments, the ability to staff the shift has not been possible. In theory, the swing shift staffer (nurse, tech, & anesthesia) works from 0900-1700 and is usually the on-call person throughout the week. This person's responsibility when arriving to work is to primarily perform any cases that may be urgent. Secondly, this person is tasked to give breaks and lunches to the personnel working in the OR. Upon 1500, this person then takes over the designated late room for the day to finish the case. Currently, there are no designated late rooms and all elective cases should be completed by 1500. Semi-urgent and urgent cases can be performed outside of the allotted time when it is deemed necessary by anesthesia and the surgeon. Without a swing shift person, the on-call person who comes to work at 0645 will be the one to stay late to finish any cases. This tends to build up a military person's compensation time or a civilian's overtime pay.

Most surgeons like the idea of having one late room assigned everyday because it can give them more opportunities to perform surgery. As stated previously, several hours at the end

of the day are not being used because there may not be enough time to perform the requested surgeries. Allowing for an extra two hours in the operating room can allow the surgeons to perform another surgery or perform a larger surgery that they never had the available time to do. The perioperative and anesthesia personnel may have a better working environment because no one, in theory, other than for emergencies, should have to work overtime. This has the potential to keep excess costs low and personnel satisfaction higher.

Course of Action 4: Business as Usual

Blanchfield Army Community hospital is currently operating at 70-75% utilization for the operating room. Though this is not the 85% that OTSG is looking for, BACH has been able to maintain the approximate 73% utilization for more than a few months now. With several other hospitals lower on the utilization rates, BACH is not under the microscope or being forced to make changes. Patients are currently receiving their surgeries in time and in a safe working environment. Patients will continue to receive their care as they have previously. No matter what, with the population of the 101st Airborne Division, there will always be a surgical need.

Evaluation Criteria

In order to evaluate these courses of actions effectively, consistent matrix across all four need to be established. Though each course of action may have its own unique characteristics, the need to compare like measures is very important in being able to choose the most appropriate course of action. To properly evaluate these courses of actions, the Surgery Scheduling System (S3) and M2 data warehouse will be used. The Surgery Scheduling System will be used to track all of the surgical times throughout the day; nurse start, in room time, time offered to surgeon (TOTS), cut, close, out of room, nurse end, and then the process starts over again. These results

will depict the actual time that the operating rooms are utilized. Data from S3 will also show differences in utilization from the time used/time allocated and numbers of surgical cases. S3 will ultimately provide the percentage of operating room utilization in which trends can be found through regression analysis. The M2 data warehouse will be used to track relative value units (RVUs) which will produce a proper representation of the changes in workload. This can be measured by comparing the means of the number of RVU's produced per month to see if there is a difference. Comparing the means of number of surgeries provided will also be a metric to assess differences in courses of action.

Course of Action 1: In Room Time

There are two different ways to measure and evaluate the global understanding to what 0730 start time means and if it will free up more time in the afternoon for more cases. Within the first evaluation, S3 can be used to track all of the surgical times throughout the day from nurse start to nurse end, as stated previously. The time that will be focused in on the most is in room time. This is the time that the patient enters the designated operating room or suite. Then, once the anesthesia provider is finished putting the patient to sleep, they pass the patient into the care of the surgeon. From this point, the surgeon can position the patient, scrub, drape, perform a time-out, and make an incision.

To accurately measure the data, initially the anesthesia provider needs to properly annotate the in room time and any reasons as to why the in room time of 0720 was not achieved. From this, the S3 administrative technician will put the information into S3. The data can then be aggregated from the S3's information database. The data will be continuously measured (n-...0....n+) to statistically depict when the in room time (0) is occurring. Measuring the time

available at the end of day by comparing the means from before and after the change may also prove beneficial to prove a difference. From the data, a list of the confounding factors can also be generated to see where some efficiency can be made to improve the in room time.

Course of Action 2: Resource Sharing

In order to measure the effectiveness of the resource sharing agreement with Gateway, S3 and the M2 data warehouse will be used. These results can assist administrators in portraying if there is an improved access to care. Comparing the means of the relative value units (RVU) produced can also give a proper representation and show if there are changes in workload. For the first several months, until the surgeons are more adapted and familiar with the process of working outside of BACH, a trend analysis may be a better method in showing monthly improvement in RVU's and number of surgery cases. After such time, when the surgeons are more accustomed to the process, comparing the means through statistical analysis will be more than appropriate in measuring the effectiveness of the program.

Course of Action 3: Swing Shift

As with the previous courses of action, the goal of the swing shift is to improve the utilization of the operating room. There are two ways to analyze the effectiveness of this course of action; data and satisfaction. However, in order to provide a better method to analyzing utilization rates, the time used from the time allocated would be best. A brief survey will be conducted to measure the whole surgical team's satisfaction with the current working environment. Then several months later after the swing shift has been in effect and the personnel have adapted to the change, the same survey can be given out again. Upon compiling the

satisfaction scores pre and post, a difference in means can be measured to see if satisfaction has changed between the two surveys.

Course of Action 4: Business as Usual

When measuring our current operating room efficiency through utilization, S3 provides the information to show utilization through monthly or yearly reports. Evaluation on maintaining the business as usual posture will consist of performing the same analyses as historically performed. The Surgery Scheduling System can provide administrators the reports and show how the operating room, in general, is being utilized and how each surgical specialty is utilizing their block, allocated time. These reports are data driven from manual input and analyzed by an algorithm within the S3. Differences can be found by comparing current and historical data.

Projected Outcomes

In order to make the changes through these courses of action, a great deal of education needs to occur with each employee within the surgical setting. The current operating theory has been used for many years and change is hard to overcome. Many staff members may be set in their ways and resistant to the change. Within the educational time of preparation, if the employees do not “buy-in” to the idea, these courses of action will fail. Enabling the employees to understand the role they play in the total care of their patients, and not just for the time in the operating room, may increase the possibility for success. Ultimately, these courses of actions may have the same projected results in some areas, but it will be deciding which course of action will be most beneficial to the beneficiaries and the employees of the hospital. The summation of these projected outcomes is located in the Outcomes Matrix (Table 3).

Table 3
Outcomes Matrix

COA	Utilization Rate	Number of Surgeries	Cost	Access to Care
1 - Start Time	Maintain current rate for baseline months; increase upon availability of end of day surgical time	Maintain average for baseline months; increase upon availability of end of day surgical time	Negligible within the operating room; staff already paid to be there. Secondary surgical services may see increase due to shifting staff requirements	Will not change during baseline months; access to operating room should then increase secondary to availability of end of day surgical time
2 - Resource Sharing	Prior to initiation, BACH operating room to be maintaining 85% utilization. Utilizing external facility will help maintain required utilization	Numbers of surgeries to increase due to more available operating room times for the different surgical services or individual surgeons	No direct care costs associated; purchased care costs increase, however, physician fees will be negligible	Access to operating room should increase secondary increased operating room space and time from external resources
3 - Swing Shift	Increase in utilization secondary to more available extended surgical times	Marginal increase secondary to choice of surgeries types placed with increased surgical times	Increase within operating room of approx \$216K; Secondary surgical services to see increase due to shifting staff requirements	Access to operating room should increase secondary to availability of extended surgical times
4 - Business as Usual	Utilization rate will maintain current yield of 70-75%	Maintain average number of surgeries as historically noted	Maintain current costs as seen historically	Maintain the approx 30 days from consult to surgery

Course of Action 1: In Room Time

Initially, patients need to have all of their required tests performed prior to the day of surgery. This will decrease the chances of delaying cases and pushing the OR schedule further back than planned. The same day surgery nurses and ward nurses for those patients staying overnight need to have the patients prepared for surgery earlier than usual. The post anesthesia care unit (PACU) nurses also may then need to be at work earlier in order to recover patients from very short cases. Currently, their start time is at 0730 and having them come to work earlier could potentially have secondary effects such as increased labor costs. The two main types of cases that this could occur in are pressure-equalization (PE) tube surgery and cataract surgery. Both of these surgeries have minimal setup time; 5-10 min surgical time and 10-15 minute turnaround time. The recovery room nurse could potentially have their first patient to recover by 0715-0720 and their second by about 0735. The PACU nurses inability to recover patients earlier than usual may prohibit some of the surgical services from improving their workload and ultimately, their utilization.

However, if all of the personnel requirements are monitored and staff members have “bought-into” the idea of change, this course of action has the potential to succeed. Motivation is a key driver to making things happen in the OR and surgeons are definitely a large part of motivating. The majority of surgeons like performing surgery and most are always seeking ways to perform more surgeries. By opening up enough time to perform surgery towards the end of the day, surgeons can continue to perform surgery within the allocated time. Initially, for this course of action to prove its effectiveness, utilization rates will fall. This is due to surgeons finishing with their cases even earlier than usual because of the earlier start to their days. However, after several months of this action in play, unused time can be analyzed and booking procedures can

be updated. In doing so, the Surgery Scheduling System can be updated to officially change the start of surgeries. This will shift the workload earlier in the day and open more time for the surgeons to book their cases (Figure 2). After the initial phase, the utilization rates should increase due to the ability of surgeons to more properly fill their blocked, allotted time.

	Currently	Proposed
0700		
0720		
0730	Ankle arthroscopy 1:30	Ankle arthroscopy 1:30
0800		
0830		
0900		
0930		
1000	ACL Reconstruction & Arthroscopy 2:30	ACL Reconstruction & Arthroscopy 2:30
1030		
1100		
1130		
1200		
1230		
1300		Knee Scope 0:30
1330	Knee Scope 0:30	
1400		
1430		Knee Scope 0:30
1500	Knee Scope (cannot be booked)	
1530	0:30	

Figure 2. Course of Action 1 Allocated Booking Adjustment

Course of Action 2: Resource Sharing

Under the resource sharing agreement, surgeons have the ability to perform surgeries without being limited to specific service's blocked time. Currently, the orthopedic surgeons have 7-8 operating rooms blocked for them every week. The problem is that there are at least eight orthopedic surgeons. Each surgeon has the potential of having one room per week, but some may have a caseload that could require more than that allotted time. By making more time available

for surgeons to operate, patients can receive timely surgical care and surgeons can perform more surgeries.

Potential confounders to this course of action involve the network hospital, Gateway. The hospital is very new and its staff is still becoming accustomed to their new environment. The working environment may not be stable for some time until Gateway learns to operate its new endeavor. From this, providers may feel weary about practicing in this unfamiliar work setting and decide not to participate in the agreement. Again, with time, Gateway will become more accustomed to their policies and procedures, and the providers from BACH should eventually feel the same as well.

A large issue with this course of action, as well as the previous, is education. The surgeons need to be informed of their option to perform surgeries outside of BACH. The patients, as well, need to be educated on the reasons for change in venue of their procedure because they may have biases in their healthcare. Patients have the potential of thinking that Blanchfield does not want to take care of them. This could appear as if BACH would rather send these patients to some other facility than take care of them. Issues concerning cost sharing for inpatient stays and which beneficiary categories can participate (active duty, dependents, retirees, TRICARE Prime, TRICARE Standard, etc) will need to be addressed. Some might actually request that their surgery be performed at BACH and do not want to go to another facility for their procedure. Educating the patients as to how this agreement benefits their healthcare can alleviate many of these personal beliefs.

After the surgeons and patients come to an acceptance on this matter, the likelihood of the program improving utilization is generally moderate. With the higher level of care available

at Gateway, surgeons can take care of their higher acute patients and larger surgical procedures. In doing so, the surgeons may take on cases that were previously unable to perform, thus keeping the patient within BACH's continuum of care. However, the ultimate goal is to improve the operating room utilization rate at BACH. If there is too much of a shift from surgeries at BACH to surgeries at Gateway, the original purpose has been overlooked. The premise was to perform larger surgeries or recapture previously unattainable surgeries at Gateway to allow shorter cases to better fit a surgical service's blocked surgical time. Fully booked blocked schedules still need to occur in order to make the course of action work. Potentially, this course of action could increase utilization and increase patients' access to the surgical setting, but ultimately, this is a new concept that will take a lot of work and time to get providers to "buy-in" on the idea.

Course of Action 3: Swing Shift

Due to the current staffing requirements and the revolving door of deployments, BACH's operating room is unable to provide personnel to cover the swing shift. However, in order to make this course of action work out, another person from each area (nurse, tech, and anesthesia) would need to be hired. Using the current, 17 September 2008, median base salaries from Salary.com (not including bonuses), the total combined cost for hiring these three personnel would be approximately \$216,000 (Table 4).

Table 3

Annual Cost of Hiring for Course of Action 3

OR Technician	\$34,110
OR Nurse	\$55,807
CRNA	\$126,545
Total	\$216,462

For this course of action to be implemented, the hospital command, and more than likely, the regional command, would need to decide if 10 more hours of operating room time a week would be worth the approximate increased cost of \$216,000 every year. One of the only possible foreseeable ways to make the swing shift monetarily efficient would be to have it start later and the surgical day go on longer. For instance, allowing the late room to go until 1900 to allow for four more hours a day and 20 more hours a week of available OR time.

Likewise, as stated in course of action 1, the other secondary departments outside of the OR would be affected by this as well. The PACU only has staff coverage until 1700 and anytime after that, the patients are recovered in the ICU. This currently is standard practice for those cases that occur during the night or during the weekend for urgent and semi-urgent patients, but not for elective. More PACU staff would need to be hired as well to cover this excess need to recover. This would also affect radiology, lab, and pharmacy as well. There would also need to be an assurance that the person who has their surgery at the end of the day receives the same quality of care as the first patient, or else further negative externalities may present upon the organization. If this cannot be assured, elective surgeries performed outside of the present allotted block time is not plausible. Ultimately, even extending the surgical time to 1700 or 1900, these personnel will not have the ability to capture enough workload to break even with the cost of salaries.

Course of Action 4: Business as Usual

Based on the current activity level within the department of surgery, course of action 4 could sustain the current operating environment. Surgeries would still be performed and surgeons would continue to have the ability to schedule their cases into their specific service's

blocked time. The utilization rates will maintain the current 70-75% as seen over the past several months. The one foreseeable problem of this course of action is the large returning population of the 101st Airborne Division towards the end of 2008. The approximate 1000 soldiers, 7% of total returning population, who will require surgical need, will bolus the surgical system and push aside any other elective surgical cases in order to meet required access standards. Without any change to the current dynamics, patients will be put on the waiting lists for longer periods of time and more will have to be referred out to the network, thus increasing BACH purchased care costs. Cases, more than likely, will be pushed further into the day after the 1500 end of regularly scheduled day. This will put further stress on the system within the operating room and the rest of the hospital leading to large amounts of overtime pay and worker dissatisfaction.

Analysis of Trade-offs

All courses of action have both positive and negative externalities that may affect their effectiveness in improving operating room utilization. In order to properly analyze the different courses of actions, the Iron Triangle can be applied. Investigating the differences on how each course of action will enable the depiction of how cost, quality, and access are traded-off.

Course of Action 1: In Room Time

Creating the global understanding of what the standard in room time should be by mandating all patients will be in their respective operating rooms at 0720, will leave no room for individuals' personal thoughts or ideas as to when the in room time should be. The increased costs associated with this course of action are minimal or even negligible if the PACU and inpatient wards can accommodate preparing patients 10-15 minutes earlier. The appearance of quality from the patient's perspective may seem quite high due to the fact Blanchfield wants to

return the patient to a prior state of health by making sure their cases are done earlier in the day and on time. Showing this drive to take care of more patients within the same allotted work time may give the perception of high quality due to the increased efficiency and effectiveness. Access itself will not increase at first due to the preliminary timeline of not booking any more cases than normal to properly analyze the available time at the end of the day. After several months of reviewing this baseline data, if the time available at the end of day has increased, then more smaller cases can be booked within the new allotted time. Thus, more patients would be treated per day and wait times for surgeries would decrease and enable the organization to better operate within the appropriate access to care measures.

Course of Action 2: Resource Sharing

Out of all of the courses of actions, resource sharing is the most diverse outside of the current practice standards. In theory, this course of action cannot be accomplished without first optimizing BACH's operating rooms. Cost-wise, purchased care costs may increase. However, due to not having to pay for the surgeon's professional fees, purchased care costs may actually decrease for those patients who could only use the network for their specific surgeries. Quality also can go either way. Increasing the available times for surgeons to operate, and not limiting them by equipment or secondary services, can improve quality by properly managing the continuum of care for their patients. However, some may see this course of action as a decrease in quality because it may seem to them that the Army is not sufficient in providing surgical care. Though this idea would prove to be untrue, proper marketing of this course of action would show that resource sharing is only occurring because BACH is actually providing the best and maximum care it can and that it is actually an extension of BACH's services. Once provider and

patients have bought into the idea, access to the operating room will continue to increase secondary to the increase in available surgical times.

Course of Action 3: Swing Shift

Within the AMEDD, most medical centers have already put this course of action in effect. This is due to the increased trauma and surgical specialties available at these facilities. At BACH however, traumas and larger, more complicated, surgeries are often transferred out. Cases performed at BACH very rarely go over three hours and average about an hour and a half. The costs of operating a swing shift within the operating room would increase. More operating room staff would need to be hired in order to enable this course of action. Likewise, more PACU staff would need to be hired as well to cover this excess need to recover. Radiology, lab, and pharmacy personnel costs may increase as well. Ultimately, there would need to be an assurance that the person who has their surgery at the end of the day receives the same quality of care as the first patient. Without this assurance, negative externalities may present upon the patients and ultimately, BACH. Access to care could potentially increase by using a swing shift due to available operating room time. However, at the risk of diminishing the quality of care provided at BACH, if not all primary or secondary services have bought into the course of action, elective surgeries performed outside of the present allotted block time would not be plausible.

Course of Action 4: Business as Usual

Costs associated with the business as usual course of action will maintain their current operating expenses. No additional personnel need to be hired. The quality of care provided will maintain the same outcomes as well. Access to surgical services will continue to marginally fall within the required 30 days from consultation. This current course of action is working well for

the current operating environment, however, the approximate redeployment of 15,000 Soldiers to Fort Campbell may change this. In order to, at the least, properly maintain the quality of care and access standards, costs of care associated with the redeployment will certainly increase.

Likewise, if commanded by the Hospital Commander to improve access of care during the redeployment time period, inevitably, costs will increase and quality may suffer without proper management of resources. The inability to adapt to changes in the operating environment will prevent this course of action from further benefiting the beneficiaries of BACH.

Recommendation

This author recommends that sustaining the current operations, course of action 4, will not help to improve the utilization of the operating room. However, each of the remaining courses of actions plays an integral part in enhancing the surgical utilization here at BACH. Thus, being said, this author suggests to apply the remaining three courses of actions in stages. This author recommends that initially course of action 1 would be the most beneficial stage to start with due to its ease of application and low costs. Then, once this course of action is complete and proves to be effective, course of action 2 can then be applied. Likewise, when course of action 2 is complete and proves to be effective, course of action 3 can then be applied. The recommended stages for courses of action should follow as listed: changing the in-room time, operating a swing shift, and then enable resource sharing. Using these stages allows for improving utilization from a micro level to ultimately a macro level. In order to manage these stages successfully, proper internal marketing measures need to be in place to enhance employee “buy-in” through promoting a more effective and available surgical care setting.

Conclusion

Healthcare is a business, thus, the operating room is a business as well. The operating room provides much of an organization's revenue and needs to be a primary focus when looking at improving revenue. Making changes within the surgical setting can be a difficult task for any healthcare organization to accomplish. Many externalities, pressures, and goals need to all be taken into account to achieving an organization's objective. This is a team process that needs to be managed appropriately. By effectively and efficiently acting upon each staged course of action, the availability for surgical times will increase and therefore improving access to care in the surgical setting. Using "what you are paying" for is a key point. Therefore, optimally using the fixed cost of resources (staff and space) in the operating room will improve the availability for surgeries and workload. This will directly improve reimbursement from workload and indirectly allow for the continuous improvements in technologies and procedures. Improving the utilization of Blanchfield Army Community Hospital's Operating Room can help to maintain the need for surgical capabilities in the FT Campbell catchment area. Bottom line, if BACH can consistently fill seven out of the eight available hours for each operating room every day, their utilization rate would prove more than what is required by the Surgeon General of the Army. Without doing so, FT Campbell has the potential of losing one of its primary resources in maintaining the Soldier's readiness. It is the duty of this organization to prevent this from becoming a reality and to find ways to continuously improve the quality of care provided. The Vision of BACH sums this up to state, "to deliver world-class medical care to all our patients." The Soldier's and their families deserve the best care that BACH can provide; "Pulse of the Eagle."

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