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**U.S. ARMY MEDICAL DEPARTMENT**  
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# Perspective

## Developing a Strategic Vision for the AMEDD of the Future

The United States Army and the Army Medical Department (AMEDD) need to be constantly adapting and changing. As the national political and strategic landscape changes, the Army must adapt to meet its current needs and those of the future Army. Many changes within the AMEDD are dictated by such factors as force structure, global interests of the U.S., and the rapidly evolving practice of medicine. Most strategic plans look three or more years into the future and do not address the short-term objectives over the next several years when the typical command tour will have the most impact.

In August 2000, the new Surgeon General of the Army, LTG James B. Peake, directed the implementation of the Balanced Scorecard (BSC) to project a clear strategy for the AMEDD. The BSC is a system for managing and implementing strategic objectives, which departs from the traditional top-down approach. The main goal of the BSC is to provide a strategic vision that is clearly articulated to all employees. This allows all levels of leadership to develop realistic goals and vision within the context of this strategy. Each employee is provided the opportunity to fully participate in the execution of the strategy by fostering initiative and cooperation.

The lead article in this issue of the AMEDD Journal, *Bringing the BSC to the AMEDD*, by MAJ Timothy N. Holt, MS, is an introduction to the concept of the BSC. It outlines the development of the BSC, the motivation for its implementation, and the intent to redefine how the AMEDD works. The article further examines how the four balanced perspectives of financial, customer, internal process, and learning and growth all have an equal role in developing an overall strategy map. Finally, it discusses how strategic objectives are converted into specific measures, targets, and initiatives.

The BSC will have a significant effect on how business is conducted within the AMEDD whether it is at the level of MEDCOM, each Regional Medical

Command, or within each medical treatment facility. I would highly encourage that everyone read this article in its entirety and encourage all fellow soldiers and civilian employees to read it as well. The success of this project and the vision of LTG Peake for the future of Army medicine will depend largely on the willingness of everyone within the AMEDD to embrace the BSC concept.



Major General Kevin C. Kiley

Other articles in this issue highlight a wide variety of roles for the AMEDD including such topics as mobilization of resources, the effect of deployments, and the process of medical malpractice.

- *The Emotional Cycle of Deployment: A Military Family Perspective.* This article presents an excellent review of the psychological aspects of deployment to Bosnia on soldiers and their families. The five stages of deployment and their respective coping mechanisms are discussed to further educate commanders and health care providers on the significant impact of family separation.

- *Medical Malpractice and the U.S. Army.* This is a presentation of the procedures used by the U.S. Army Medical Claims Office to handle medical malpractice claims and an outline of the responsibilities of the Medical Claims Investigator.

- *Running Shoe Design, Selection, and Care: Does it Make a Difference?* In this in-depth discussion, the author provides an explanation of the importance of selecting the correct running shoes; based on body and foot type, shoe style, type of terrain used, and the individual's running program. It details the design and construction of running shoes and offers a basic understanding of foot structure, impact forces, and the

mechanics that have a profound effect on the incidence of running injuries.

- *Obstetrical Pre-Packs: Improving Quality, Efficiency, and Cost.* This submission discusses how a process action team at Madigan Army Medical Center identified and introduced cost savings measures through the standardization of obstetrical delivery packs.

- *Endodontics on the Canine Teeth of Military Working Dogs.* Dentists and veterinarians use a unique team approach to perform successful root canal procedures

to repair the canine teeth of military working dogs.

- *Case Reports: Cold Weather Injuries in an Arctic Environment.* The authors discuss the extent of frostbite injuries of eight soldiers in an extreme cold weather environment. It also reviews the protective measures necessary to prevent injury in a hostile situation.

- *Large Non-Painful Exophytic Lesion of the Lower Lip.* The evolution and treatment of a patient with a capillary hemangioma on the lip are presented in a case report format, with a discussion of the several available treatment options.

# New Editorial Review Board Members

The following individuals have been named to the AMEDD Journal Editorial Review Board to replace members who have retired or been reassigned.



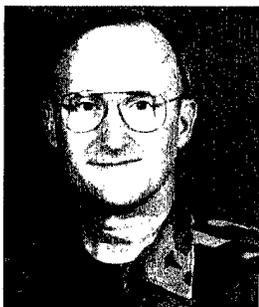
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## 2001 AMEDD Journal Manuscript Competition

The Editorial Review Board is currently soliciting submissions for the second annual AMEDD Journal Manuscript Competition. Clinical and nonclinical manuscripts must conform to the guidelines detailed on the inside back cover of this Journal issue.

The Board will review and judge all manuscripts received by 4 September 2001 for subject analysis, clarity, organization, and writing style. Appropriate recognition will be given to the top three manuscripts which will also be published in a forthcoming Journal issue.

Questions concerning the competition may be directed to COL James M. Lamiell, Chairman, AMEDD Journal Editorial Review Board, DSN 471-2511, (Commercial 210/221-2511) or at [james.lamiell@amedd.army.mil](mailto:james.lamiell@amedd.army.mil)

# Bringing the Balanced Scorecard to the AMEDD

MAJ Timothy N. Holt, MS†

## Balanced Scorecard (BSC) - Bringing Strategy to Life

Introduced by Robert Kaplan and David Norton in 1996, the BSC is a tool designed exclusively for implementing strategy in a standardized fashion. In August 2000, new Army Surgeon General James Peake directed the design of three linked scorecards with the intent of projecting a clear top-level strategy across the entire Army Medical Department (AMEDD) using the BSC approach. The purpose of this article is to provide an overview of BSC theory along with an update regarding this ongoing initiative.

Whereas strategic plans typically look 3 or more years into the future, the BSC concentrates on the present – years 0 to 2 – conveniently mirroring the duration of the average command tour while providing AMEDD leaders with a ready option to turn to for use in achieving their vision. The BSC challenges leaders at all levels to move beyond generalities and express in specific terms desired outcomes and strategic priorities. Although heartwarming, grandiose mission statements that aspire to “be the best” or provide “world class” service are often unrealistic and fail to provide the actionable strategic guidance enabled by the BSC. One particularly appealing characteristic of the BSC is that, once complete, it theoretically resides on a single sheet of paper, providing a concise, intuitive strategic action document for the entire organization to reference. With a clear strategic vision defined, the BSC provides a comprehensive start-to-finish process for translating vision into action. First, leaders at each respective level must articulate their vision in clear, specific, and realistic terms – a difficult and often overlooked step. Vision, defined here as the desired organizational end state, is still generated by

the leadership, and is not a BSC by-product. Secondly, BSC theory departs from the practice of top-down management, replacing the traditional approach toward strategy and measurement that mandates compliance with higher-level directives. Instead, the BSC approach seeks to fully leverage the ability of every employee by encouraging individual action. The premise underlying the BSC is that once strategy is clearly articulated by the leadership then concisely made available to and viewed by every employee, each will then act in a manner consistent with system-wide strategic interests. The BSC system buy-in is enhanced by making every employee feel they individually can make a direct contribution to the future of the organization. If one accepts the premise that each employee knows his or her job better than anyone else, the potential of such a system to improve aggregate organizational performance becomes immediately apparent.

But how does the BSC actually work? This article provides the AMEDD reader with basic BSC theory and terminology while sharing an overview of how the AMEDD intends to use the BSC to enhance long-term system viability by achieving breakthrough performance in targeted, strategically significant areas.

## What is the Balanced Scorecard?

It might be best to begin by first stating what the BSC is not. The BSC is a dynamic, malleable, responsive system for managing strategy, and should not be viewed as a panacea or “silver bullet” that provides a cure-all for system ills. The BSC system also specifically targets the implementation of *strategy*, not all areas of importance

within an organization. The BSC is also not designed to be owned by an individual or office, but should instead serve as a magnet for good ideas or initiatives. Under this system, less emphasis is placed upon positional influence and input and more importance placed upon garnering ideas throughout all levels of the entire organization, regardless of their origin. In the 1996 Kaplan and Norton text "The Balanced Scorecard: Translating Strategy Into Action" the authors share that in order to thrive and prosper into the information age, it is essential that the knowledge of every employee be exploited.<sup>1</sup> Under the BSC approach, mandating compliance with top-level measures is scrapped and replaced with the clear articulation of strategic goals. Once these strategic priorities are identified and disseminated, subordinate levels become enlightened, no longer required to guess which direction the organization is moving or where current system-wide strategic priorities reside. Each respective level reviews and incorporates guidance received from higher-level scorecards then balances this input with local concerns and priorities to create their own BSC. Importantly, each level is also accountable for action associated with their respective scorecard and for tracking their own performance. Blindly adopting higher-level BSC measures is highly discouraged, as the content and measures found in higher-level scorecards should be evaluated critically, not automatically adopted, and should be viewed as only one, albeit important, source of strategic input. Such a process promises to create organization-wide strategic alignment and synchronization, significantly enhancing the odds of overall system success. As a result, the BSC provides leadership with a flexible vehicle for projecting strategic objectives while serving as an open invitation to all staff to review this document and ascertain how they can contribute individually to these expressly stated strategic objectives. The theoretical BSC management system follows these recommended steps:

- Clarify and translate vision and strategy.
- Communicate and link strategic objectives and measures.<sup>1</sup>
- Plan, set targets, and align strategic initiatives.
- Enhance strategic feedback and learning.<sup>2</sup>

This continuous cycle provides a dynamic,

responsive capability for implementing and managing strategy. The AMEDD, composed of a highly skilled, fully networked workforce, is ideally suited to fully leverage the proven potential of such an employee-centered approach. This assumption was recently confirmed as part of an AMEDD-wide survey, performed by this author, of military treatment facility (MTF) leaders who demonstrated across-the-board receptiveness to change and to new, team-oriented concepts such as the BSC, expressing a clear commitment to such interdisciplinary cooperation. Due to the perceived absence of a clear corporate-level strategy, MTF-level leaders expressed frustration with certain high-level measures and measurement systems, which appear to be losing the battle of providing operational-level, front-line AMEDD decision makers with the timely, strategically-linked information they need in the current fast-paced, complex operating environment. To assist with the difficult task of projecting strategy throughout a large, diverse organization such as the AMEDD, the BSC was selected for use.

### **The BSC – A Proven Track Record**

Many government organizations such as the Veteran's Administration, the General Services Administration, and the Internal Revenue Service have experienced first-hand the ability of the BSC to energize staff members and produce tangible performance results. At a "Balanced Scorecard in Government 2000" conference in February 2000, numerous well-known federal, state, and municipal government organizations shared how they used the BSC to successfully meet strategic performance goals. What these and many other organizations have discovered first-hand is that the BSC can indeed assist in shifting an organization from compliance toward initiative while simultaneously providing a framework for meaningful performance measurement. Interestingly, the power of the BSC rests not only in its balanced approach, but also in its ability to capture the imagination of the organization and unleash the energy and abilities of every employee. As Kaplan and Norton offer, "...the scorecard does not strive to keep individuals and organizational units in compliance with a pre-established plan, the traditional control system objective. The BSC should (instead) be used as a communication, informing, and learning system, and *not* a controlling system."<sup>3</sup> By communicating and informing

openly, every employee is invited to contribute, making strategy “everyone’s everyday job.”<sup>4</sup> In essence, the organization is turned over to the employees to execute strategy via the BSC. Also, if implemented properly, the BSC can assist organizations to migrate away from interdepartmental and interfacility competition and toward cooperation, paving the way for open information exchange and the sharing of best practices, traits of a mature organization. Such cooperation could possibly be the key to true AMEDDD system-wide optimization, for it is quite possible that individual organizations or MTFs may declare success, yet on an aggregate basis the system may still fail to achieve long-term, system-wide success. This possibility necessitates the alignment of strategy across organizational levels coupled with the need for supporting measures and initiatives that have both local and system-wide value.

### AMEDDD Activity Based Management (ABM) Initiative

Before moving into the specifics of the BSC, it is important to note that this particular approach for managing strategy was not selected hastily or arbitrarily by the AMEDDD, and represents only one component of a more comprehensive ABM system presently under development. In December 1999, a formal Cooperative Research and Development Agreement joined the AMEDDD Studies Branch, Center for Healthcare Education and Studies with two nationally-known health care ABM accountants and authors along with a process-centered, outcomes-oriented clinician. Each of these individuals has published progressive articles in the field of health care ABM and share an unwavering commitment to better link clinical and administrative staffs in order to improve overall health care delivery capabilities. With the AMEDDD representative filling the role of Primary Investigator, the AMEDDD ABM research team set out in February 2000 to develop the conceptual blueprint needed in order to develop an integrated ABM system that met the unique decision support needs of the AMEDDD manager. After completing an extensive literature review of existing ABM tools and implementations around the country, the research team identified the BSC as the ABM tool best suited for initial AMEDDD use. Although supporting ABM tools such as Activity Based Costing (ABC) are currently under ongoing review by the research team and intended for

future use, the team recommended addressing strategy first via the BSC. Accomplishing this important step up front is designed to increase the value of ABC and other ABM performance measurement tools subsequently introduced. The diagram below represents the basic approach devised by the research team (Figure 1).

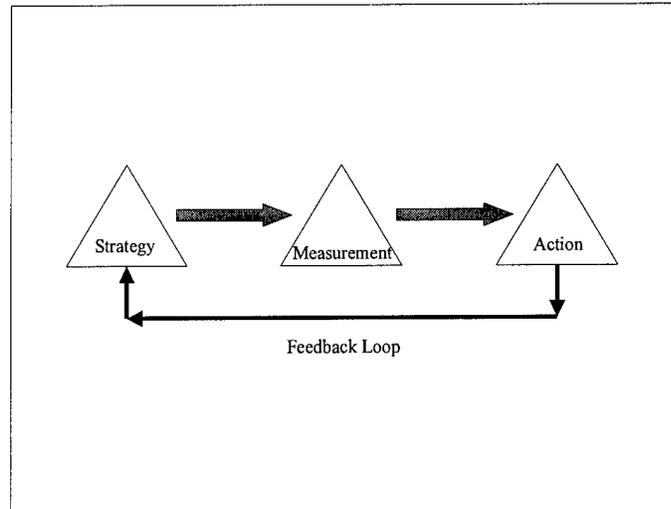


Fig 1. Proposed AMEDDD ABM measurement system.

Addressing strategy first not only provides a logical starting point for the new AMEDDD ABM system but helps to avoid the natural tendency toward selecting measures prematurely, which may not necessarily be consistent with strategic needs and, more importantly, may fail to drive the behavior that produces long-term organizational success. Choosing to address strategy using the BSC as the first step, work on the AMEDDD BSC began in earnest in September 2000. Provided below is an introductory-level overview of pertinent BSC theory along with the status of the AMEDDD BSC effort as it has fully transitioned from the concept stage within the AMEDDD Studies Branch to prototype development by MEDCOM plans, analysis, and evaluation.

### The BSC – Not Just Another Scorecard

The first noticeable difference between the BSC and other approaches used to manage strategy is that it does not concentrate on a single definition of organizational success, such as financial performance, for example. It also does not allow for the subjective definition of terms. The following diagram illustrates the four theoretical BSC perspectives, only one of which is financial (Figure 2).

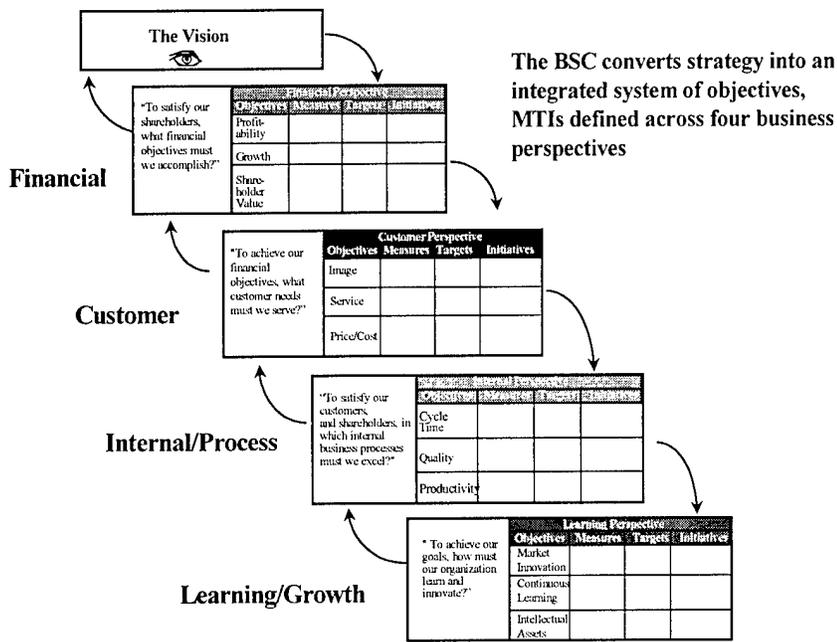


Fig 2. The four BSC perspectives.

As mentioned earlier, the BSC system picks up where the vision leaves off by providing an interconnected set of “perspectives” allowing for vision achievement. In examining these four perspectives, it becomes immediately apparent that they expand upon a one-dimensional management approach. The recent MTF survey of commanders, administrators, and clinicians mentioned earlier suggested that these professional groups understandably lean toward information oriented toward their professional background when making decisions. In other words, the clinical community is heavily interested in clinical processes and related clinical information systems whereas administrators tend to rely more heavily upon financial information. The BSC places equal emphasis upon each of the four key areas, or perspectives. Instead of clinicians and administrators merely coexisting, consider the potential synergy that could result from using a tool such as the BSC to entice administrators to place more emphasis upon clinical process and concurrently encourage physicians to place additional consideration upon the strategic placement of financial resources against these processes. The scorecard has the potential to better integrate these two communities by providing a shared operating framework that is of equal appeal and benefit to both. Although presented hierarchically, the relationships between BSC perspectives are intended to be more causal

in nature. To obtain a more detailed explanation of each perspective, the reader is encouraged to refer to the Kaplan and Norton BSC text. For orientation purposes, a brief overview of each perspective is furnished:

**Financial Perspective.** Financial performance measures indicate whether financial resources are being effectively applied against strategic concerns and allocated and invested in a manner that is truly contributing toward achieving strategic goals. In other words, financial success within a budget driven enterprise such as the AMEDD may constitute more than merely spending 25% of the budget each quarter. Instead, the standing requirement to stay within budget is augmented by the BSC’s new

emphasis on measuring how effectively these scarce financial resources are being allocated against strategic objectives. Decreasing costs, a familiar nonprofit measure of financial performance, shares the spotlight with the effective assignment of financial resources.

Understandably, financial performance in a for-profit concern is typically oriented toward making a profit and the highest possible return on investment, explaining the placement of the financial perspective within the theoretical BSC cause and effect structure. The “bottom line” in the federal sector might more appropriately concentrate on meeting customer needs through the improved placement and utilization of scarce personnel and financial resources against strategically significant, customer-centered programs and initiatives. Such an approach would demonstrate the responsible management of congressionally-appropriated funding, while concurrently benefiting the customer by facilitating the most effective allocation of these funds against current system needs, in essence serving as a “resource multiplier” that enhances existing capability. The AMEDD stakeholders such as the American taxpayer would appreciate this effort, while concurrently responding to congressionally mandated directives such as the 1993 Government Performance Results Act. In addition to

addressing these external expectations, patient care is concurrently enhanced through the improved allocation of financial resources against patient-centered needs. The drivers in the financial perspective, therefore, should be customized to the respective industry and competitive environment.<sup>5</sup>

**Customer Perspective.** The BSC theory places heavy emphasis upon the importance of identifying, managing, and satisfying customers and their expectations. In short, three classes of "attributes" are associated with the customer perspective:

- Product and service attributes: Functionality, Quality, and Price.
- Customer relationship: quality of purchasing experience and personal relationships.
- Image and reputation.<sup>6</sup>

Customer outcomes across all organizations can be assessed using the following outcome-based measures: Market share, Customer retention, Customer acquisition, Customer satisfaction, and Customer profitability.<sup>7</sup> Of course, the attributes and measures listed above are not intended to be all-inclusive, but instead provide a starting point for ascertaining customer needs and developing supporting, outcome-oriented performance expectations. From the outset of the AMEDD BSC development process, senior AMEDD leaders placed primary emphasis upon identifying and meeting customer needs and expectations; this stated commitment providing proof that organizational success can indeed be stated in terms other than financial.

**Internal Process Perspective.** In addition to emphasizing the importance of customer concerns and the complementary assignment of funding using the financial perspective, key supporting processes must be identified and properly managed. To this end, three principal business processes that comprise the Kaplan and Norton theoretical value chain are offered below:

- *Innovation.* During the innovation process, research is conducted into defining customer needs, identifying and anticipating the present and future needs of

its customers. Too often customer expectations are assumed away when a more effective approach might be to ask them what they want. Upon adopting the BSC, an organization might slightly modify the golden rule; shifting from treating customers the way *you* would want to be treated to treating them the way *they* want to be treated.

- *Operations.* Traditionally, organizations invest considerable time and energy in managing internal operations or key processes. Paying singular attention to individual operational processes such as efficiency or productivity may lead to dysfunctional behavior such as keeping machines or individuals busy even when not demanded by customers or existing requirements. Proposed instead is the reliable and timely delivery of products and services to existing customers.

- *Post-sale service.* The BSC theory challenges organizations to place the same emphasis upon post-service performance to ensure the quality of service delivered did indeed meet customer expectations. This feedback can then be used to make adjustments in operational processes.<sup>8</sup>

The mandate for innovation challenges the entire organization, top to bottom, to be creative in its efforts to identify and meet customer expectations. This requires thorough initial evaluation and ongoing vigilance, as customer and system needs are certain to evolve. Operations, as detailed above, have been historically geared toward industrial processes. Only recently has the BSC began its entry from production-oriented concerns and into the health care industry. Developing and implementing Clinical Practice Guidelines, an ongoing AMEDD initiative, represents a good example of a process-centered approach for improving clinical service delivery. Improving clinical processes also has the potential to both improve patient care and reduce financial expenditures that are now available for reinvestment elsewhere. Within a service industry such as health care, additional processes, to include clinical support and administrative, must be addressed. To singularly concentrate on clinical processes and associated improvement neglects opportunities for improvement in nonclinical and administrative areas, which might, after conducting a cursory Pareto analysis, present the most

lucrative targets for improvement. Post-sale service connotes placing a premium on customer-defined outcomes and mandates tracking performance on a sustained basis. Such an approach requires routine follow-up with customers and the close monitoring of input received that may expand beyond current measures of customer satisfaction.

**Learning and Growth Perspective.** This perspective potentially represents the most overlooked but fertile perspective within the BSC management system. Although it appears at the lower portion of the theoretical BSC Strategy Map, it is preferable to view this quadrant as the foundation upon which all others are built; it is comprised of three categories:

- *Employee capabilities.* Kaplan and Norton contend that “nothing better exemplifies the revolutionary transformation from industrial age thinking to information age thinking than the new management philosophy of how employees contribute to the organization.”<sup>9</sup> Key to the success of any BSC implementation is (its ability) to capture the imagination and interest of the entire staff in a manner that results in action. Three core measurements are related to this category:

- Employee satisfaction: Achieved by including employees in key decisions, recognizing employee effort, encouraging creativity and initiative, increasing satisfaction.

- Employee retention: Minimize turnover.

- Employee productivity: Managing and measuring employee output.

- *Information system capabilities.* Provide adequate information systems and automation resources to enable mission completion to produce accurate, timely performance feedback that ultimately enhances strategically-aligned decision making.

- *Motivation, empowerment, alignment.* With quality information delivery in place, employees must be motivated to act in the best strategic interests of the organization and empowered, encouraged, and given authority to take action.<sup>10</sup>

The Learning and Growth perspective stresses the

importance of every employee. Within a service industry such as health care, people, or personnel resources, are the primary assets available to provide health care services. This perspective challenges the organization to ensure that, in measurable terms, the entire staff is trained and properly positioned to meet customer expectations and shifting customer demographics and medical needs. Employee satisfaction is also a major component of this perspective.

With this basic overview of the four doctrinal BSC perspectives complete, the next step in constructing a scorecard is the development of the strategy map. The following highlights the approach being used by the Balanced Scorecard Collaborative (BSCol), the consulting firm presently assisting the AMEDD in developing an AMEDD BSC system.

### **Strategic Planning, Vision Development, and the Value Proposition**

Before detailing the process for building a strategy map and scorecard, it is important to note that the BSC is not intended to assist in developing the strategic plan and inherent vision and value proposition. It is still incumbent upon leaders to conduct this preliminary work and to develop the vision and related strategic plan that will feed the BSC process. An important step proposed by Kaplan and others is the development of a value proposition that stresses the importance of avoiding the tendency to attempt to be all things to all people, but instead recommends narrowing strategic focus to a single area, such as customer intimacy. Of course, measurement and effort is not restricted to the area selected, but it does serve as the focal point for subsequent action and resources. For further reading on this topic, see “The Discipline of Market Leaders” by Michael Treacy and Fred Wiersema.

### **Strengths, Weaknesses, Opportunities, and Threats (SWOT): Prelude to the Strategy Map**

The first formal step in creating a BSC is to develop a strategy map. Before this takes place, the BSCol recommended that a SWOT analysis be conducted. The SWOT is a preparatory step undertaken by the leadership to assist in assessing the current operating environment. This author recommends placing primary emphasis upon opportunities and threats. Although admittedly similar, opportunities require a broad understanding of the current

operating environment in order to choose forward-looking opportunities that, if addressed properly, will result in future success. An opportunity not taken advantage of would not necessarily have a negative impact. A threat on the other hand, if not proactively identified and addressed, could potentially have a negative impact if not identified and if no action is taken. Not only does the SWOT exercise offer a familiar, well-documented approach for both assessing the current environment and peering into the future, it also serves as an excellent consensus builder. The diagram below shows a recommended SWOT matrix (Figure 3).

Used as a nonjudgmental brainstorming tool, the SWOT format is used to identify as many relevant opportunities and threats as possible. Leveraging previous strategic planning work that should include the clear vision and value proposition discussed earlier, will assist during the SWOT exercise. In addition, a detailed understanding of the four BSC perspectives paired with a firm grasp of the existing operating environment, will result in a SWOT that is of the highest possible quality. The opportunities and threats identified within each of the four perspectives are prioritized and then taken forward for potential use as strategic objectives on the BSC strategy map.

Source: BSCol		
	Opportunities	Threats
Customer		
Financial		
Internal Process		
Learning & Growth		

Fig 3. BSC SWOT matrix.

### The BSC Strategy Map (and Associated Terminology)

The Strategy Map is the foundation for the BSC. The objectives placed on the map represent the starting point for developing the measures, targets, and initiatives (MTIs) that will populate the BSC. The importance of strategic objectives cannot be overstated. These outcomes-based objectives are “snippets” of the vision that peer into the future to provide strategic direction. To illustrate how the strategy map works, while simultaneously defining BSC terminology, a sample strategy map is furnished below (Figure 4).

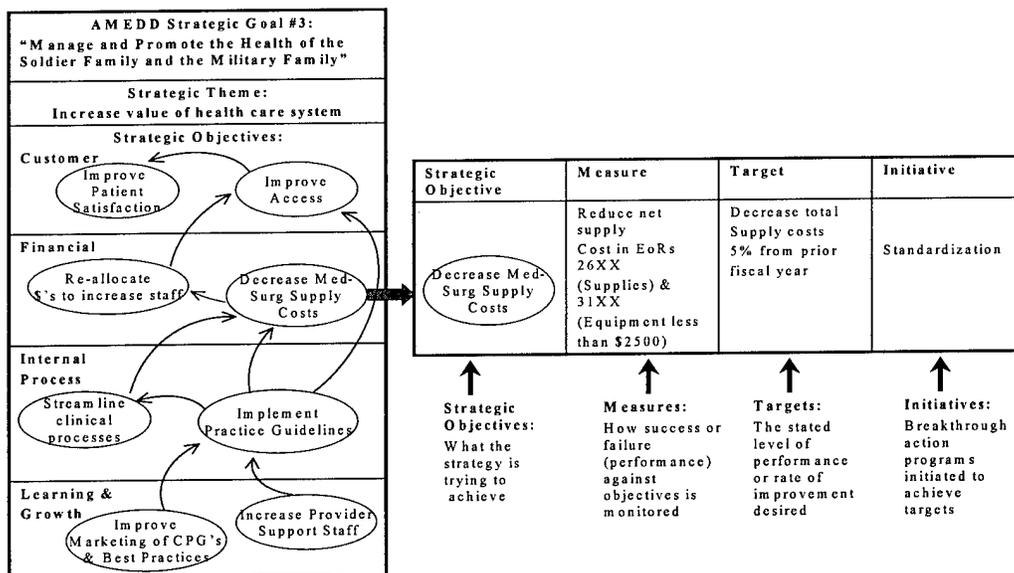


Fig 4. Sample AMEDD strategy map.

The hypothetical strategic theme chosen is to "Increase the Value of the Healthcare System." Strategic themes are broad, sweeping areas of strategic interest and are often culled directly from previous strategic planning work, the vision (and underlying value proposition), and the SWOT. This particular theme clearly identifies the customer (the patient), and concurrently selects "increasing value" as the theme's outcome-oriented intent. In the example that follows, two customer-oriented expectations are converted into strategic objectives, clearly identified (improved satisfaction and access), then mapped. The arrows highlight the cause and effect relationship between strategic objectives. These cause and effect relationships between strategic objectives and across the four perspectives mandate that careful consideration be given to how best to craft objectives that are synchronized in a manner that flow through the perspectives and toward achieving the vision. An examination of the remaining linkages portrays how these important and inter-related objectives work together to contribute to accomplishing the overall performance objective of improving patient satisfaction while simultaneously contributing to the broader theme of increasing system value. Not only does the strategy map technique provide a more complete approach to assist in achieving strategic goals, but there is also room existing within each of the four perspectives to allow nearly any department or section to participate and contribute. Due to their importance in this process, strategic objectives should be carefully chosen. These objectives, or "bubbles," provide leaders with the vehicle for projecting their strategic priorities and should be selected carefully in order to avoid driving the organization in the wrong direction, a most undesirable outcome.

### Converting Strategic Objectives into MTIs

With the vertically oriented strategy map complete, individual objectives are selected for development of MTIs. *Measures* are selected that will ultimately define success against the strategy map objectives. Once the measure is finalized, realistic, future-oriented *targets* are developed for each measure that state in specific terms what constitutes success for each measure. The final step in creating a BSC is the resulting *initiatives* that enable the organization to meet the established targets. The organization-wide initiatives generated through the BSC represent the power of this approach and the desired

system output. The BSC process discussed illustrates how a high-level strategic theme can be walked down to the front-line level for action. Such a system also provides an appealing alternative to that of merely complying with random, high-level measures, assuming any strategically-linked measures were available to begin with.

Moving horizontally from left to right through the scorecarding process, one or two measures (maximum) should be selected in order to gauge performance against each objective. In this example, the measure "Decrease Medical-Surgical Supply Costs" identifies decreasing costs as the primary measure along with the exact location where the desired savings are to be garnered from (Budget Elements of Resource 2600 – Supplies, and 3100 – Equipment < \$2500, which are accounts in the general ledger), followed by a stated savings goal of 5% that provides a clear, stated target. Measures selected are certain to modify existing behavior and should be chosen with caution, being careful to pick measures that encourage desired business practices and that do not conflict with each other. By electing to make cost reduction a priority, expect employees to begin looking at ways of cutting back, economizing, and undertaking cost cutting initiatives.

Once measures are in place, the next step is to identify one or more initiatives that will allow the organization to achieve the desired result, in this case, cost reduction, from the clearly identified general ledger accounts. In this example, the standardization of medical supplies and equipment was the initiative chosen to achieve the desired savings. The standardization initiative was actually selected by the MEDCOM and provided the field with an example of an initiative that another organizational element could adopt if they chose, making this a model BSC initiative. As mentioned earlier, each respective level is encouraged to individually assess and modify higher-level initiatives as appropriate before adopting them for use. For advice as to where to reinvest these anticipated savings, one need not look further than within the same financial perspective, where a companion strategic objective exists to increase the amount of financial resources necessary to increase civilian clinical support staff. Had the BSC been in place at that time, projected savings might have been immediately placed against other strategic initiatives requiring additional funding.

This sample strategy map illustrates on a limited scale how to create cause and effect relationships between the perspectives and how to formulate blended MTIs from the strategic objectives to accomplish strategic goals. Although admittedly heavy on terminology, committing to this straightforward, standardized process creates a universal language and provides a shared process for managing strategy that can be used uniformly across the entire organization, leaving more time for planning and executing strategy and decreasing the amount of time spent on defining terms. For a more detailed discussion on constructing a strategy map, refer to the recently-published Kaplan article, "Having Trouble with Strategy, then Map It."

### **Creating a BSC**

During the study phase of the project, an extensive literature review was conducted by the AMEDD ABM research team of BSC applications around the country, and no two scorecards were found that were identical. What all scorecards do contain are MTIs with measures and targets being kept to a minimum but encouraging an infinite number of supporting initiatives. The measures selected will be retrospective, current, and prospective in nature, explaining in part the "B" in BSC. The final scorecard layout contains the MTIs, but will vary from organization to organization. At present, there are three scorecards under development: MEDCOM, RMC, and MTF. In addition to the MEDCOM scorecard, the Great Plains Regional Medical Command and the General Leonard Wood Army Community Hospital, Fort Leonard Wood, MO, are creating BSCs that will double as prototypes for the rest of the command to use. The overall project intent is to "cascade" strategy downward, bringing each level in alignment with the others while providing a dynamic and standardized process for implementing and managing strategy across the AMEDD. Additionally, the AMEDD Center and School is developing a BSC to serve as a model for nonhealth care AMEDD activities to use. Development efforts are currently underway to support the projection of scorecards and related information across the AMEDD using web-enabled technology, which will allow for organization-wide, real-time information sharing both horizontally and vertically.

### **ABM Philosophy: Cooperation – Not Competition**

This author recommends that scorecards not be used to measure facilities or organizations against each other, as this would encourage counter-productive, intra-organizational competition. Instead, the BSC should be used to measure internal performance against internally established targets. The friendly challenge that should exist between AMEDD organizations is not to have the highest score, but should instead be to utilize this system in order to contribute toward meeting AMEDD and local strategic concerns, with each scorecard improving upon the previous one in its level of creativity and sophistication.

### **Best Practices and Lessons Learned**

To fully enable such continuous improvement, the system-wide exchange of scorecards and associated best practices is encouraged. The MTFs with similar initiatives should collaborate and leverage the expertise gained to their mutual benefit. In addition to openly sharing best practices, it is very important to also share lessons learned, or mistakes made. Within a military organization like the AMEDD, where career advancement is often contingent upon performance against like peers or organizations, the open exchange of performance information has the potential to be closely guarded. Individual success is historically not achieved by sharing distinguishing ideas or, in particular, by publicizing mistakes made. To overcome this cultural barrier in order to open communication channels and stimulate knowledge sharing, it is up to leaders at all levels to encourage behavior that places system-wide needs and issues on equal footing with personal interests and intra-organizational concerns.

### **Notes on Measurement**

Although the subject of measurement is reserved for another forum, author Mark Graham Brown delivers a progressive and BSC-friendly philosophy toward strategic measurement. Brown provides a glimpse into the next generation of measurement, with the following summary:

- Fewer (measures) are better: Concentrate on measuring the vital few key variables rather than the trivial many. Measures should be linked to the factors needed for success: key business drivers.

- Measures should be based around the needs of customers, shareholders, and other key stakeholders.
- Measures should start at the top and flow down to all levels of employees in the organization.
- Measures should be changed or adjusted as the environment and strategy changes.
- Measures need to have targets or goals established that are based on research rather than arbitrary numbers.<sup>11</sup>

Attention should be given to choosing complementary measures. For example, to choose to increase productivity, or number of visits, as a measure within a managed care environment where fewer visits are better, could possibly send conflicting messages out to patient care providers. It is also important to note that the measures selected will likely be adopted and become institutionalized quickly, so they should not be chosen unless they satisfactorily answer the "So What?" question. In other words, "If success, is achieved against this measure, what will be achieved?" A thoughtful answer to this question requires a thorough understanding of the existing operating environment along with the ability to visualize opportunities and threats, then choosing objectives and measures that appropriately address each. Lastly, measures should be kept to an absolute minimum to prevent measure overload. A few complementary, well-developed measures will be of considerably more benefit than would a large number of random, conflicting, unrelated measures. The BSCol recommends a maximum of 25-30 measures per BSC.

### **The BSC and the AMEDD – An Update**

It is understood that not all AMEDD personnel fall under the direct supervision of the AMEDD and the operational MEDCOM staff, but the BSC can still provide all AMEDD personnel with the overall strategic direction for this large, diverse organization. A BSC meeting of AMEDD senior leaders was held in October 2000 followed by a subsequent November 2000 off-site meeting, where the AMEDD strategy map was finalized and accountability established for each of the resultant strategic themes and objectives. Work is continuing at the MEDCOM level on the development of MTIs, with the

final AMEDD BSC and two prototypes (RMC and MTF) scheduled for completion in March 2001. The prototype approach is intended to, beginning with this article, share openly with the entire AMEDD how the new BSC process was applied initially, with the expectation that subsequent BSCs will immediately and substantially improve upon these pioneering efforts. The intent is that follow-on BSC development will be facilitated through the examples provided by the prototypes. The ABM research team has also recommended that the AMEDD utilize web-enabled, knowledge sharing vehicles currently in place and under development to project the prototypes and share updates regarding the ABM initiative. Planned is both the web-enabled publication of all BSC prototypes along with follow-on updates regarding the broader AMEDD ABM initiative for the entire AMEDD to view and provide input. Web sites are currently under development to provide on-line information and references to assist with future scorecard projects.

Knowledge transfer has been a stated objective from the outset of the BSC effort, and AMEDD personnel are scheduled for training by BSCol staff to provide the in-house consulting capability needed to assist follow-on BSC efforts within the command. Resident training is also scheduled and available at upcoming leadership conferences and seminars. The AMEDD ABM research team recommended early on that every attempt be made to avoid a scheduled, system-wide BSC "rollout" and to allow MSCs, RMCs, and MTFs to introduce their BSCs using their own timeline and, if desired, their own facilitators. This recommendation was intended to enhance BSC ownership and creativity — vital components of any scorecard system. The BSC should be viewed as a template for each leadership team to take, mold, and implement in a manner that meets their respective objectives and that augments and projects their leadership philosophy and style.

A related research team recommendation was to proliferate BSCs throughout the AMEDD with little to no external (contractor) support. In many BSC implementations around the country, contractor support is not utilized to any degree, as the associated complexity in creating a BSC rests primarily in developing and articulating a clear vision and with identifying the strategic themes and objectives and selecting the right measures and

targets -- not with the BSC process itself. To meet the very aggressive timeline established to produce these three cascaded prototype BSCs, contractor support was introduced. The assumption made was that standardized BSC development at each level would produce complementary examples that could be easily replicated. Lastly, it is important to note that the BSC system envisioned was not intended to be viewed as a new requirement, but was, instead, recommended to assist the AMEDD in improving upon what it already invests considerable time and manpower in doing -- strategic planning and performance measurement. According to the BSCol, some BSC implementers have seen an approximate 20% reduction in work rendered obsolete by the new measurement focus provided by the BSC.

## Conclusion

It should now be apparent that the BSC offers balance in two fundamental ways. First, the four perspectives offer balance by putting the customer, internal processes, and employee/staff concerns on equal footing with financial goals. Second, and equally important, the BSC achieves balance by looking into the future, envisioning where the organization needs to go in specific, achievable terms, and setting discrete future targets to this end that augment current and retrospective performance indicators. Of course, there is much more to both the BSC system and ABM, and supplemental reading is encouraged to fully leverage the potential of this burgeoning management system.

It is hoped that AMEDD managers at all levels accept the challenge of upping the performance ante by no longer merely claiming to be the best, as is sometimes the case, but by instead taking advantage of the immense potential offered by the BSC to substantiate this claim. The potential of the BSC is achieved when every individual within the AMEDD examines these linked scorecards and determines what initiatives they can individually undertake in support of BSC objectives, resulting in action that is consistent with long-term strategic goals. As with any new management system or innovation, the success of the BSC

project is largely contingent upon the willingness and ability of the entire AMEDD to embrace and implement it. Leaders and managers not only have day-to-day responsibilities to address, but also face a never-ending stream of new initiatives and programs they have to sort through and choose from. It is hoped that the pursuit of strategic and operational excellence is facilitated through the use of the BSC, and that the result of its use is noticeable, quantifiable, system improvement. By placing primary emphasis on delivering a quality, intuitive, customer-focused product, the expectation is that the BSC approach will sell itself. This new system has the potential to assist the AMEDD to more fully leverage its workforce of talented, caring professionals to continue in its ongoing effort to improve upon its core mission of providing quality, responsive health care support to the soldier during any contingency.

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# ***The Emotional Cycle of Deployment: A Military Family Perspective***

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*Military families have experienced the emotional trauma of deployment on an unprecedented scale since the end of the Gulf War.<sup>1</sup> Humanitarian missions and peace enforcement have sent our troops to Somalia, Cuba, Haiti, Bosnia, and Kosovo. In the last decade, military downsizing has increased the likelihood that each soldier will eventually participate in an extended mission. The impact of these long separations is of increasing concern with two-thirds of soldiers now married and deployments to the former Yugoslavia entering a fifth year. Differing coping strategies are needed through five stages of deployment. Education of health care providers, military leaders, soldiers, and family members to anticipate these stages is crucial to ensure the soldier's safe return and to minimize familial trauma.*

## **Introduction**

Upon signing the Dayton Peace Accords in 1995, the Implementation Force (IFOR) deployed to Bosnia for 1 year. This multinational effort included 20,000 U.S. troops.<sup>2</sup> Since that time, 6 to 8 month rotations have been the norm for the follow-on Stabilization Force (SFOR). In Mar 00, an estimated 4,600 U.S. troops – commanded by the Texas National Guard – deployed to participate in the seventh such Stabilization Force rotation or SFOR VII.<sup>3</sup> Future deployments to Bosnia are scheduled through SFOR XII ending in Oct 04.<sup>4</sup>

With peace enforcement missions to Bosnia now entering a fifth year, there is a growing body of experience regarding the impact of extended deployment on military families. In this article, the emotional cycle of deployment experienced by family members at home is discussed in detail. In order to provide a common frame of reference, this cycle is divided into five distinct stages closely corresponding to the soldier's experience of deployment: pre-deployment, deployment, sustainment, re-deployment, and post-deployment.<sup>5</sup>

The purpose of this article is to describe the

psychological and event-related aspects of deployments experienced by military families for use as a tool in education, intervention, and research. This article relies on narrative format to describe the process of deployment and its impact on military families. The authors, all military psychiatrists, have integrated their professional and personal experience into a cohesive "story" which is readily identifiable by military leaders, soldiers, and their families. This story has been tempered by numerous presentations of this materiel, as well as modifications provided by military leaders, soldiers, and family members. Whenever possible, relevant literature on deployment stress is cited.

## **The Five Stages**

The emotional cycle of an extended deployment, 6 months or greater, is readily divided into five distinct stages (Table 1). These stages are: pre-deployment, deployment, sustainment, re-deployment, and post-deployment. Each stage is characterized both by a time frame and specific emotional challenges, which must be dealt with and mastered by each of the family members. Failure to adequately negotiate these challenges can lead to

significant strife – both for family members and the deployed soldier. Providing information early about what to expect, especially for families who have not endured a lengthy separation before, can go a long way towards “normalizing” and coping positively with the deployment experience.<sup>6</sup> Furthermore, promoting understanding of the stages of deployment helps to avert crises, minimize the need for command intervention or mental health counseling, and can even reduce suicidal threats.

<b>Stages of Deployment</b>
• Pre-deployment (varies)
• Deployment (1st month)
• Sustainment (months 2 thru 5)
• Re-deployment (last month)
• Post-deployment (3-6 month after deployment)

*Table 1*

### **Pre-Deployment**

The onset of this stage begins with the warning order for deployment. This stage ends when the soldier actually departs from home station. The pre-deployment time frame is extremely variable from several weeks to more than a year.

The pre-deployment stage is characterized alternately by denial and anticipation of loss (Table 2). As the departure date gets closer, spouses often ask: “You don’t really have to go, do you?” Eventually, the increased field

<b>Stage 1. Pre-Deployment</b>
• Anticipation of loss vs denial
• Train-up/long hours away
• Getting affairs in order
• Mental/physical distance
• Arguments
Time frame: first month

*Table 2*

training, preparation, and long hours away from home herald the extended separation that is to come. Soldiers energetically talk more and more about the upcoming mission and their unit. This “bonding” with fellow soldiers is essential to unit cohesion that is necessary for a safe and successful deployment. Yet, it also creates an increasing sense of emotional and physical distance for military spouses.<sup>5,7,8</sup> In their frustration, many spouses complain: “I wish you were gone already.” It is as if their loved ones are already “psychologically deployed.”

As the reality of the deployment finally sinks in, the Soldier and family try to get their affairs in order. Long “honey-do” lists are generated dealing with all manner of issues including: home repairs, security (door and window locks, burglar alarms, etc), car maintenance, finances, tax preparation, child care plans, and wills, just to name a few. At the same time, many couples strive for increased intimacy. Plans are made for the “best” Christmas, the “perfect” vacation, or the “most” romantic anniversary. In contrast, there may be some ambivalence about sexual relations: “this is it for 6 months, but I do not want to be that close.” Fears about fidelity or marital integrity are raised or may go unspoken. Other frequently voiced concerns may include: “How will the children handle the separation? Can I cope without him or her? Will my marriage survive?” In this very busy and tumultuous time, resolving all these issues, completing the multitude of tasks, or fulfilling high expectations often falls short.

A common occurrence, just prior to deployment, is for soldiers and their spouses to have a significant argument.<sup>5,9</sup> For couples with a long history, this argument is readily attributed to the ebb-and-flow of marital life and therefore not taken too seriously. For younger couples, especially those experiencing an extended separation for the first time, such an argument can take on “catastrophic” proportions. Fears that the relationship is over can lead to tremendous anxiety for both soldier and spouse. In retrospect, these arguments are most likely caused by the stress of the pending separation. From a psychological perspective, it is easier to be angry than confront the pain and loss of saying goodbye for 6 months or more.<sup>5,6</sup>

However, the impact of unresolved family concerns can have potentially devastating consequences. From a command perspective, a worried, preoccupied soldier is

easily distracted and unable to focus on essential tasks during the critical movement of heavy military equipment. In the worst-case scenario, this can lead to a serious accident or the development of a soldier stress casualty who is mission ineffective.<sup>2,10,11</sup> On the home front, significant spousal distress interferes with completing basic routines, concentrating at work, and attending to the needs of children. At worst, this can exacerbate children's fears that the parents are unable to adequately care for them or even that the soldier will not return. Adverse reactions by children can include inconsolable crying, apathy, tantrums, and other regressive behaviors. In response, a downward spiral can develop – if not quickly checked – in which both soldier and spouse become even more upset at the prospect of separating.

Although easier said than done, it is often helpful for military couples, in the pre-deployment stage, to discuss in detail their expectations of each other during the deployment. These expectations can include a variety of issues, to include: freedom to make independent decisions, contact with the opposite sex (fidelity), going out with friends, budgeting, child-rearing, and even how often letters or care packages will be sent. Failure to accurately communicate these and other expectations is frequently a source of misperception, distortion, and hurt later on in the deployment. It is difficult, at best, to resolve major marital disagreements when face-to-face, let alone more than six thousand miles apart.

## Deployment

This stage is the period from the soldier's departure from home through the first month of the deployment.

A roller coaster of mixed emotions is common during the deployment stage (Table 3). Some military spouses report feeling disoriented and overwhelmed. Others may feel relieved that they no longer have to appear brave and strong. There may be residual anger at tasks left undone. The soldier's departure creates a "hole," which can lead to feelings of numbness, sadness, being alone, or abandonment. It is common to have difficulty sleeping and anxiety about coping. Worries about security issues may ensue, including: "What if there is a pay problem? Is the house safe? How will I manage if my child gets sick? What if the car breaks down?" For many, the deployment

stage is an unpleasant, disorganizing experience.

<b>Stage 2. Deployment</b>
<ul style="list-style-type: none"><li>• Mixed emotions/relief</li><li>• Disoriented/overwhelmed</li><li>• Numb, sad, alone</li><li>• Sleep difficulty</li><li>• Security issues</li></ul>
Time frame: first month

Table 3

On the positive side, the ability to communicate home from Bosnia, or any other site, is a great morale boost. The Defense Satellite Network provides soldiers the ability to call home at no cost, although usually for a 15-minute time limit. For some soldiers, who are unwilling to wait in line, using commercial phone lines is an option. Unfortunately, it is common for huge phone bills to result, which can further add to familial stress. Another potential source of anxiety for families is that several weeks may pass before soldiers are able to make their first call home.

For most military spouses, reconnecting with their loved ones is a stabilizing experience. For those who have "bad" phone calls, this contact can markedly exacerbate the stress of the deployment stage and may result in the need for counseling.<sup>5</sup> One possible disadvantage of easy phone access is the immediacy and proximity to unsettling events at home or in theater. It is virtually impossible to disguise negative feelings of hurt, anger, frustration, and loss on the phone. For example, a spouse may be having significant difficulty (children acting up, car breaking down, finances, etc) or a soldier may not initially get along with peers or a supervisor. Spouse and soldier may feel helpless and unable to support each other in their time of need. Likewise, there may be jealousy towards the individual(s) whom the spouse or soldier do rely on, or confide in, during the deployment. These situations can add to the stress and uncertainty surrounding the deployment. Yet, military families have come to expect phone (and now even video) contact as technology advances. However, most report that the ability to stay in close touch – especially during key milestones (birthdays,

anniversaries, etc) – greatly helps them to cope with the separation.

### Sustainment

The sustainment stage lasts from the first month through the fifth (penultimate) month of deployment.

Sustainment is a time of establishing new sources of support and new routines (Table 4). Many rely on the Family Readiness Group (FRG), which serves as a close network that meets on a regular basis to handle problems and disseminate the latest information.<sup>12</sup> Others are more comfortable with family, friends, church or other religious institution as their main means of emotional support. As challenges come up, most spouses learn that they are able to cope with crises and make important decisions on their own. They report feeling more confident and in control. During the sustainment stage, it is common to hear military spouses say: “I can do this!”

#### Stage 3. Sustainment

- New routines established
- New sources of support
- Feel more in control
- Independence
- Confidence (“I can do this”)

Time frame: months 2 thru 5

Table 4

One challenge, during this stage, is the rapid speed of information provided by widespread phone and e-mail access. In the near future, one can even expect that individual soldiers will have the ability to call home with personal cellular phones. Over long distances and without face-to-face contact, communications between husband and wife are much more vulnerable to distortion or misperception. Given this limitation, discussing “hot topics” in a marriage can be problematic and are probably best left on hold until after the deployment when they can be resolved more fully. Obvious exceptions, to this rule, include a family emergency (the critical illness of a loved one) or a joyful event (the birth of a child). In these situations, the ideal route of communication is through the

Red Cross so that the soldier’s command is able to coordinate emergency leave if required.

On a related note, many spouses report significant frustration because phone contact is unidirectional and must be initiated by the soldier. Some even report feeling “trapped” at home for fear that they will miss a call. Likewise, soldiers may feel forgotten if they call – especially after waiting a long time in line to get to a phone – and no one is home. This can lead to anger and resentment, especially if an expectation regarding the frequency of calls is unmet. Now that the Internet and e-mail are widely available, spouses report feeling much more in control as they can initiate communication and do not have to stay waiting by the phone. Another advantage of e-mail, for both soldier and spouse, is the ability to be more thoughtful about what is said and to “filter out” intense emotions that may be unnecessarily disturbing. This is not to say that military couples should “lie” to protect each other, but rather, it helps to recognize that the direct support available from one’s mate is limited during the deployment.

Furthermore, rapid communication can lead to unanticipated rumors, which then circulate unchecked within the FRG.<sup>5</sup> The most damning rumor involves an allegation of infidelity that is difficult to prove true or false. Other troubling rumors may include: handling the deployment poorly, accidents or injuries, changes in the date of return, disciplinary actions, or even who calls home the most. Needless to say, such rumors can be very hurtful to soldier, spouse, the FRG. At its worst, unit cohesion and even mission success can suffer. Limiting the negative impact of such rumors is a constant challenge for unit leaders and chaplains. It is extremely important to keep soldiers and family members fully informed and to dispel rumors quickly. In fact, rumors lose their destructive power once the “secret” is exposed:

There was a rumor that a commander’s wife reported that a deployed soldier was having an affair. Members of the FRG, who were very upset, related the details to their deployed spouses. Senior unit leaders decided not to tell the commander because the allegations were deemed too inflammatory. Unfortunately, unit morale and cohesion began to suffer greatly as the rumor spread throughout the

ranks. A month later, the commander finally learned of this destructive rumor, which had been undermining his authority to lead. He immediately confronted his wife, senior leaders, and the soldier about whom the allegation had been made. Evidence about the validity of these allegations, or how the rumor started in the first place, could not be found. In response, the commander issued a very firm policy regarding exposing all rumors – whether they be true or false. Unit morale and cohesion, although badly bruised, then began to recover.

mother or father who is the one leaving – especially when children are very young. If the “nondeploying” parent is coping well, they will tend to do well. The converse is also true. If the primary caregiver is not coping well, then toddlers may become sullen, tearful, throw tantrums, or develop sleep disturbance. They will usually respond to increased attention, hugs and holding hands. The “non-deploying” parent may also benefit from sharing their day-to-day experiences with other parents facing similar challenges. In particular, it is important for the primary caregiver to balance the demands for caring for children along with their own needs for time for self.

The response of children to extended deployment of a parent is very individualized and also depends on their developmental age: infants, toddlers, preschool, school age, and teenagers.<sup>13-15</sup> It is reasonable to assume that a sudden negative change in a child’s behavior or mood is a predictable response to the stress of having a deployed parent (Table 5).

Preschoolers (3-6 years) may regress in their skills (difficulty with potty training, “baby talk,” thumb sucking, refusal to sleep alone) and seem more “clingy.” They may be irritable, depressed, aggressive, prone to somatic complaints, and have fears about parents or others leaving. Caregivers will need to reassure them with extra attention and physical closeness (hugs, holding hands). In addition,

Negative Changes in Children				
	Ages	Behaviors	Moods	Remedy
<b>Infants</b>	<1 yr	Refuses to eat	Listless	Support for parent, pediatrician
<b>Toddlers</b>	1-3 yrs	Cries, tantrums	Irritable, sad	Increased attention, holding, hugs
<b>Preschool</b>	3-6 yrs	Potty accidents, clingy	Irritable, sad	Increased attention, holding, hugs
<b>School Age</b>	6-12 yrs	Whines, body aches	Irritable, sad	Spend time, maintain routines
<b>Teenagers</b>	12-18 yrs	Isolates, uses drugs	Anger, apathy	Patience, limit-setting, counseling

Table 5

Infants (<1 year) must be held and actively nurtured in order to thrive. If a primary caregiver becomes significantly depressed then the infant will be at risk for apathy, refusal to eat, and even weight loss. Early intervention becomes critical to prevent undue harm or neglect. Pediatricians can perform serial exams to ensure growth continues as expected on height/weight charts. Army Community Services and Social Work can assist with parenting skills and eliciting family or community support. Lastly, the primary caregiver may also benefit from individual counseling.

it is important to avoid changing family routines such as sleeping in their own bed, unless they are “very” scared. Answers to questions about the deployment should be brief, matter-of-fact, and to the point. This will help to contain the free-floating anxiety of an overactive imagination.

Toddlers (1-3 years) will generally take their cue from the primary caregiver. One issue is whether it is the

School age children (6-12 years) may whine, complain, become aggressive, or otherwise “act out” their feelings. They may focus on the soldier-parent missing a key event, for example: “will you (the soldier) be here for my birthday.” Depressive symptoms may include: sleep disturbance, loss of interest in school, eating, or even playing with their friends. They will need to talk about

their feelings and will need more physical attention than usual. Expectations regarding school performance may need to be a little lower, but keeping routines as close to normal is best for them.

Teenagers (13-18 years) may be irritable, rebellious, fight, or participate in other attention-getting behavior. They may show a lack of interest in school, peers, and school activities. In addition, they are at greater risk for promiscuity, alcohol, and drug use. Although they may deny problems and worries, it is extremely important for caregivers to stay engaged and be available to talk out their concerns. At first, lowering academic expectations may be helpful; however, return to their usual school performance should be supported. Sports and social activities should be encouraged to give normal structure to their life. Likewise, additional responsibility in the family, commensurate with their emotional maturity, will make them feel important and needed.

Unfortunately, some children may have great difficulty adapting to the stress of a deployed parent. If they are unable to return to at least some part of their normal routine or display serious problems over several weeks, a visit to the family doctor or mental health counselor is indicated. Children of deployed parents are also more vulnerable to psychiatric hospitalization – especially in single-parent and blended families.<sup>16</sup>

Despite all these obstacles, the vast majority of spouses and family members successfully negotiate the sustainment stage and begin to look forward to their loved ones coming home.

### Re-Deployment

The re-deployment stage is essentially defined as the month before the soldier is scheduled to return home.

The re-deployment stage is generally one of intense anticipation (Table 6). Like the deployment stage, there can be a surge of conflicting emotions. On the one hand, there is excitement that the soldier is coming home. On the other, there is some apprehension. Some concerns include: “Will he (she) agree with the changes that I have made? Will I have to give up my independence? Will we get along?” Ironically, even though the separation is almost

over, there can be renewed difficulty in making decisions. This is due, in part, to increased attention to choices that the returning soldier might make. Many spouses also experience a burst of energy during this stage.<sup>5,6</sup> There is often a rush to complete “to-do” lists before their mate returns – especially around the home. It is almost inevitable that expectations will be high.

#### Stage 4. Re-Deployment

- Anticipation of homecoming
- Excitement
- Apprehension
- Burst of energy/“nesting”
- Difficulty making decisions

Time frame: months 5 thru 6

Table 6

### Post-Deployment

The post-deployment stage begins with the arrival to home station (Table 7). Like the pre-deployment stage, the time frame for this stage is also variable depending on the particular family. Typically, this stage lasts from 3 to 6 months.

#### Stage 5. Post-Deployment

- Honey moon period
- Loss of independence
- Need for “own” space
- Renegotiating routines
- Reintegrating into family

Time frame: 3 to 6 months after deployment

Table 7

This stage starts with the “homecoming” of the deployed soldier. This can be a wonderfully joyous occasion with children rushing to the returning parent followed by the warm embrace and kiss of the reunited couple. The unit then comes to attention for one last time,

followed by words of praise from the senior commander present. Lastly, weapons are turned in, duffel bags retrieved, and the family goes home.

Homecoming can also be an extremely frustrating and upsetting experience. The date of return may change repeatedly or units may travel home piece-meal over several days. Despite best intentions, the spouse at home may not be able to meet the returning soldier (short notice, the children might be sick, sitters cannot be found in the middle of the night, unable to get off work, etc). Soldiers may expect to be received as a "heroes" and "heroines" only to find that they have to make their own way home.

Typically, a "honeymoon" period follows in which couples reunite physically, but not necessarily emotionally. Some spouses express a sense of awkwardness in addition to excitement: "Who is this stranger in my bed?" For others, however, the desire for sexual intimacy may require time in order to reconnect emotionally first.

Eventually, soldiers will want to reassert their role as a member of the family, which can lead to tension.<sup>6</sup> This is an essential task, which requires considerable patience to accomplish successfully. Soldiers may feel pressure to make up for lost time and missed milestones. Soldiers may want to take back all the responsibilities they had before. However, some things will have changed in their absence: spouses are more autonomous, children have grown, and individual personal priorities in life may be different. It is not realistic to return home and expect everything to be the same as before the deployment.<sup>17</sup>

During this period, spouses may report a lost sense of independence. There may be resentment at having been "abandoned" for 6 months or more. Spouses may consider themselves to be the true heroes (watching the house, children, paying bills, etc) while soldiers cared only for themselves. At least one study suggests that the stay-at-home parent is more likely to report distress than the deployed soldier.<sup>18</sup> Spouses will also have to adapt to changes. Spouses may find that they are more irritable with their mates underfoot. They may desire their "own" space. Basic household chores and routines need to be renegotiated. The role played by the spouse in the marriage must be re-established.

Reunion with children can also be a challenge. Their

feelings tend to depend on their age and understanding of why the soldier was gone.<sup>18</sup> Babies less than 1 year old may not know the soldier and cry when held. Toddlers (1-3 years) may be slow to warm up. Pre-schoolers (3-6 years) may feel guilty and scared over the separation. School age children (6-12 years) may want a lot of attention. Teenagers (13-18 years) may be moody and may not appear to care. In addition, children are often loyal to the parent that remains behind and do not respond to discipline from the returning soldier. They may also fear the soldier's return: "Wait till mommy/daddy gets home!" Some children may display significant anxiety up to a year later ("anniversary reaction"), triggered by the possibility of separation. In addition, the soldier may not approve of privileges granted to children by the nondeployed parent. However, it is probably best for the soldier not to try to make changes right away and to take time renegotiating family rules and norms. Not heeding this advice, the soldier risks invalidating the efforts of his or her mate and alienating the children. Soldiers may feel hurt in response to such a lukewarm reception. Clearly, going slow and letting the child(ren) set the pace goes a long way towards a successful reunion.

Post-deployment is probably the most important stage for both soldier and spouse. Patient communication, going slow, lowering expectations, and the taking time to get to know each other again is critical to the task of successful reintegration of the soldier back into the family.<sup>5,6</sup> Counseling may be required in the event that the soldier is injured or returns as a stress casualty. On the other hand, the separation of deployment – unlike civilian couples – provides soldier and spouse a chance to evaluate changes within themselves and what direction they want their marriage to take. Although a difficult as well as joyful stage, many military couples have reported that their relationship is much stronger as a result.

## Lessons Learned

There are many challenges for military families to overcome during the five stages of deployment (see Tables 8 and 9). Anticipating these challenges is important to minimize the emotional trauma caused by extended deployment.<sup>1,5,6</sup> It is important not to over-interpret arguments which are often caused by the pain and loss of separation. Resolving marital issues that precede

deployment is very difficult to accomplish over long distances and is probably best left until the soldier's return. Dates of departure and return often "slip" forwards and backwards. Establishing or maintaining a support network helps families cope. Rumors are hurtful and are best not repeated. If they cannot be resolved, then contact the chain of command to find out the truth or put a stop to them. Breaking up the time is a useful technique to prevent being overwhelmed. This can include: weekly get-togethers with other families, monthly outings for the children (a favorite restaurant, the park, a picnic, etc), and a visit to, or from, parents and in-laws around mid-deployment, just to name a few. In order to maintain their sanity, parents – now "single" because of the deployment – will need time without their children. Scheduling a regular "mommy's (daddy's) day out" can be achieved by daycare or sharing sitting with someone you trust. Overspending or increased alcohol use may provide short-term relief; but in the long-term, they will only exacerbate the stress of deployment. Lastly, and most importantly, soldier, spouse, and children will change and grow during the deployment. It is critical to go slow, be patient, and allow several months to reestablish family bonds.

### Pitfalls

- Over-interpreting arguments
- Hot topics/long distances
- Rumors/loss of trust
- Investment in date of return
- Not accepting changes in marriage

Table 8

### Helpful Hints

- Establish a base of support
- Make plans to break up time
- E-mail/phone calls/letters
- Avoid overspending/alcohol
- "Single" parents need time without kids

Table 9

## Discussion

Several questions remain to be answered regarding the impact of extended deployments on soldiers and their families.

Many family members complain of the emotional distance during the pre-deployment stage. How long is the optimal time for families to be notified in advance of a deployment? What is the impact on soldiers who may feel torn between their family and their unit? How much time do commanders need to get their units ready to deploy?

In addition, there are many questions about the remaining stages of deployment. What is the relative impact on families with 4 month (most Air Force deployments) versus 68 months (SFOR, Navy Sea Duty) versus 1 year (IFOR, the initial Bosnia deployment)? Do families of different services cope better with separation? Why? What is the minimum recovery time in which a family needs to be stabilized from moves, military schools, or even routine field training after a soldier returns home? What is the impact on children? How about their school performance or disciplinary problems? What if a spouse is pregnant or delivers during the deployment?<sup>19</sup> What if the spouse works versus stays at home? How about single parents? What if both spouses are in the military and deploy? What is the impact of extended deployments on marital longevity, spouse and child abuse when compared with civilian families? What about soldier retention? What about the families of soldiers who have had multiple or back-to-back deployments? How about the Reserves or National Guard who may not have as extensive support as their counterparts on Active Duty?<sup>20</sup> Is there sufficient notice for them to transition from their civilian roles in anticipation of deployment? What about the potential economic dislocation to include: loss of job and loss of income? How about the loss of unit cohesiveness when Reserves or Guard deploy as individual augmentees assigned to other units? Delineating the five stages of deployment is a reasonable starting point for answering some of these questions and the challenges they present to soldiers and their families.

## Conclusion

Over the past 8 years since the Gulf War, soldiers and

their families have had to adapt to a major shift in U.S. foreign policy and the role of the Army in extended multinational deployments. Now entering its fifth year, the Bosnian experience has provided new insight into the different skills needed to minimize familial trauma. Furthermore, family well-being is not only essential to mission success with two-thirds of soldiers now married, but also to the future health of the Army through retention of trained soldiers.<sup>21,22</sup> Health care professionals (including civilian providers accepting TRICARE insurance) and military leaders must be prepared to support soldiers and their families through five stages of deployment. Providing information early, about what to expect, will help families cope with the deployment experience. More research is needed, about the impact of deployment on soldiers and their families, to ensure that our forces are better prepared and ready for the challenges of the next century.

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# ***Medical Malpractice and the U.S. Army***

SFC Tommi Gaillard†

Medical malpractice is an unfortunate fact of life, even in the Army. We are fortunate to have excellent medical staffs and up-to-date, state of the art medical centers; however, bad things can happen no matter what the staff does. Sometimes mistakes are made; after all, we're only human. The Federal Tort Claims Act (FTCA) provides a vehicle that allows patients to file for medical malpractice compensation.

The FTCA, 28 U.S. Code 1346, was passed by Congress in 1946. The FTCA applies to incidents occurring in the U.S., its commonwealths, territories and possessions. It does not apply overseas (Germany, England, etc) Medical staff working for the U.S. Army, either active duty or civilian, do not carry personal malpractice insurance. If a claim is filed, it is filed against the U.S. Army and not the doctor personally. It does not, however, cover employees who act outside the scope of their employment. In other words, an employee who commits an intentional act, such as assault and battery, would likely be responsible for their own legal defense.

Medical malpractice claims arise from incidents of negligence on the part of government employees (civilian or active duty) in the performance of their job that lead to a loss or damage. The medical malpractice claims procedure was created to compensate for those damages that occur as the result of medical negligence.

There are four elements required to establish medical malpractice: (1) A legal duty (obligation) to care for the patient within the standard of care; (2) Negligence – treatment that falls below the standard of care; (3) Proximate cause – a relationship between the negligence and the cause; and (4) Damages. If there is negligence but no bad outcome or no damage, there is no malpractice. All

four elements are required to establish medical malpractice under the FTCA.

Retirees, veterans, family members – anyone receiving medical care at U.S. Army medical facilities may file a claim under the FTCA with the exception of active duty soldiers. Any claim filed as a result of care given to an active duty soldier is barred by the Feres Doctrine. It is considered incident to service and therefore will not be payable. This also excludes family members from filing for compensation as a result of care given to the active duty soldier.

The Feres Doctrine was created by case law (court decisions) which prevents active duty members from suing for loss/injury as a result of an incident that occurs while on active duty. The courts have cited several reasons to justify the Feres Doctrine. An injured service member can seek compensation through the Veteran's Administration, medical retirement, etc. Further, the courts found it could jeopardize the good order and discipline needed in the military if its members were allowed to sue. The courts also found that the states varied in their recovery. Because the military assigns members in many different states, the individual state laws would apply and therefore different recoveries would be applied. For the above reasons, active duty personnel are prevented from filing medical claims pursuant to the FTCA.

Medical malpractice claims are handled by Medical Claims Offices. The Medical Claims Office is part of the Judge Advocate's Office at the U.S. Army's major medical centers such as Tripler Army Medical Center and Walter Reed Army Medical Center. Medical Claims personnel are responsible for identifying potential claims, processing and investigating claims filed, recommending

the settlement or denial of claims, and preparing cases for litigation (court).

Claimants have 2 years from the date of loss/damage (or when they should have known the loss/damage occurred) to file a claim. An administrative claim must be filed first. A claimant cannot directly file a lawsuit under the FTCA. Once a claim is filed at the Medical Claims Office, a comprehensive investigation is performed. The patient's relevant medical records from all health care providers, civilian and military, are copied. Medical records at Government facilities are secured. The records are then closely reviewed and summarized. Medical staff involved with the care at the time of the incident are located and interviewed about the care. Medical and legal issues are researched. Medical experts are consulted concerning the medical care, causation issues, and the alleged damages.

When the investigation is complete, the local Claims Judge Advocate (CJA) can approve a settlement up to \$25,000 or recommend to the U.S. Army Claims Service (USARCS) a settlement more than \$25,000. The CJA can also recommend to USARCS that a claim be denied. The CJA has no authority to deny medical claims. Reasons for denying claims include failure to file the claim within the 2-year statute of limitations, absence of any negligence, and application of the Feres Doctrine. The USARCS requires close involvement with the claims offices during the case work-up and its attorneys thoroughly review each case before settling or denying a claim.

Six months after filing a claim in which no settlement has been reached, or upon denial, a claimant can file a lawsuit in a Federal District Court. When a suit is filed, the Medical Claims Office prepares a litigation (lawsuit) report for the Assistant U.S. Attorney (AUSA) and the

U.S. Army Litigation Division, who will defend the hospital's care. The Medical Claims Office assists the AUSA in collecting evidence, preparing the case, locating and interviewing witnesses, arranging for witness depositions – anything to ensure a zealous defense of the case. A medical malpractice lawsuit can be settled by the AUSA before it goes to trial. If it does go to trial, the case is heard by a federal judge. There is no jury trial under the FTCA.

Medical Claims is a very interesting aspect of both medicine and law. There are nine Medical Claims Investigator (MCI) positions Army-wide (Sergeant First Class, Legal Noncommissioned Officer [MOS: 71D]). The MCI works directly with the Medical Claims Attorney in the medical center CJA office. It is a medically technical field requiring considerable on-the-job training. Medical terminology, anatomy, and physiology are used on a daily basis, especially when summarizing medical records and interviewing medical staff. It is a challenging and rewarding field.

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# ***Obstetrical Pre-Packs: Improving Quality, Efficiency, and Cost***

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## **Introduction**

Today's economic environment is forcing cost-efficiency upon health care organizations. The goal for Department of Defense (DOD) health care managers and providers is to spend money wisely and improve quality. The Birth Product Line: Quality Management Review 11, Civilian External Peer Review Program (CEPRP), raises the concept and sets the example for evidence-based "Best Clinical Practice Profile" for cesarean deliveries which is associated with the optimal clinical outcome and most effective resource management.<sup>1</sup> The incidence of cesarean section at our institution is consistent with the optimal practice profile identified by the CEPRP.<sup>2</sup> Our cesarean section rate is 18.7% overall, 13% primary and, includes a 60% successful vaginal birth after cesarean section. Even with a relatively low cesarean section rate, less than the national average (21.8% in 1995), we perform almost 400 cesarean sections per year with approximately 2,200 total deliveries per year.<sup>3</sup> At Madigan Army Medical Center (MAMC) we decided to approach the matter more directly at the bedside, expanding the scope of cost improvement to include vaginal deliveries.

Previous practice at MAMC required several operative packages to be opened at the time of a cesarean section or vaginal delivery. A process action team composed of physicians, nursing services, logistics, and

administrative personnel convened to find the best way to attack the problem. In our evaluation of the cost-effectiveness of our cesarean section and vaginal delivery process, we examined several opportunities to improve the quality of patient care in addition to cost savings. Much of what was contained in the packs served no purpose, expired, and contained latex impregnated materials. We tracked actual use, designed a standard set of cesarean and vaginal delivery pre-packs, tested several prototypes for physician and nursing approval, received competitive bids and brought down the cost from \$110 to \$86 per cesarean pack and from \$37 to \$20 per vaginal delivery pack.<sup>4,5</sup>

## **Materials and Methods**

A continuing improvement process was initiated with the use of a process action team which tracked the actual usage of the standard operative and vaginal delivery equipment, supplies, and pre-packs. Time management factors and in-service training concerns were also collected during this data acquisition phase. We discovered that much of the standard supplies were not used, and that some of the commonly used items needed retrieval from other areas. Furthermore, review of the expiration dates of the supplies used in the previous pre-packs meant that the entire pack was vulnerable to loss due to a single item.

The next step involved the contemporaneous survey of the practicing obstetricians preferences. Each item

requested was then submitted to a group evaluation of its relative necessity versus luxury value. This evaluation survey provided the basis for our labor and delivery operative room technician and nurse to set-up several prototypes for approval of all obstetrical providers. These prototypes were then tested for a month to choose the best cesarean and vaginal delivery pre-packs. (see Table 1 for list of items in the cesarean delivery prototype and Table 2 for vaginal delivery prototype.) The final phase involved the coordination of the acquisition plan with cost containment and time management considerations as the differentiating forces. Pre-packs with the essential supplies were designed to provide maximal efficiency during an urgent case. Our logistical division was then able to determine the most cost-effective acquisition plan for stocking the cesarean and vaginal delivery pre-packs in the supply system.

Quantity	Item	Cost
1	C-section set	N/C
1	Knife blade No. 10	.26
1	Knife blade No. 20	.09
1	Bovie	2.41
1	Suction	7.50
1	Asepto syringe	.67
1	Mini kit devon	3.75
1	Syringe 30 cc	.32
4	Lap sponges	7.84
1	Dress sponge	.92
1	Xerofoam	.59
1	Prep set	2.67
1	Double basin	N/C
1	3/4 drape sheet	1.91
1	Hand towels	N/C
1	C-section abdominal drape	61.00
1	gown/towel	3.27
1	skin stapler	7.50
1	ground pad	2.92
3	18 gauge needles	.09
2	vicryl sutures	.72
3	dexon sutures	.36
1	umbilical tape	.11
<b>Pre-pack Total</b>		<b>\$104.90</b>
2	Blood gas kits	2.64
6	Surgeon gloves	2.58
<b>Grand Total</b>		<b>\$110.12</b>

Table 1. Items Included in Prototype for Cesarean Section (25 previously individualized line items)

Quantity	Item	Cost
2	Drapes (abdominal/under)	20.69
4	Sponges (large lap type)	7.84
1	30 cc Syringe	.32
1	Organ tray (placenta pan)	1.50
2	Obstetrical peripads	2.14
1	Bulb syringe	.52
1	Vaginal pack	N/C
10	Sponges (4x4)	.09
1	18 gauge needle	.03
1	21 gauge needle	.45
1	27 gauge needle	1.27
1	Umbilical tape	.11
1	Cord clamp	1.05
2	Paper hand towels	N/C
1	Drape towel	.91
<b>Total</b>		<b>\$36.92</b>
1	Prep tray	2.67
2	Blood gas kits	2.64
1	Gloves	.43
<b>Grand Total</b>		<b>\$42.66</b>

Table 2. Items Included in Prototype for Vaginal Delivery (25 previously individualized line items)

## Conclusion

The cost savings generated by this continued improvement effort is \$9,600/year for cesarean sections and \$30,000/year for vaginal deliveries at MAMC. This does not factor in the other important advantages. There is a significant reduction in medical waste and storage space. Instead of individually stocking 25 line items and opening 40 separate items for each cesarean section, only six line items were stocked and 12 items were opened under the new system (see Table 3). For vaginal deliveries we reduced our number of line items opened from 15 to 4 (see Table 2). The simplification of the pre-packs decreases supply personnel and set-up times. Crude time-motion studies done by our technicians noted a 10-minute time savings for each cesarean pre-pack used and 5 minutes for each vaginal delivery pre-pack used. This led to approximately 67 hours/year of operating technician time saved for cesarean deliveries and 150 hours/year saved for vaginal deliveries by simple consolidation of supplies. The latex-free pre-packs are easier to use, and therefore more rapid and safe in emergencies. Since no item in the pre-packs expire, they have an indefinite shelf life. Specific procedural equipment and supplies may be packed separately. We use what we open and open what

we use. Applying these simple cost saving methods across the DOD, we estimate a \$257,208 and 1,736 hours saved in cesarean deliveries and \$843,829 and 4,136 hours saved in vaginal deliveries for a total estimated savings per year of over \$1.1 million with 5,872 technician hours/year recaptured. Coupled with the enhanced logistic ease of use, nonexpirability, decreased space utilization, and latex free packing, the MAMC pre-packs demonstrate how basic quality improvements drilled down to the end user levels with a process action team may accomplish significant cost savings while improving patient care.

Quantity	Item	Cost
1	C-section set	N/C
1	Cesarean custom pack	77.40
(all items listed in Table 1 except below)		
2	Blood gas kits	2.64
6	Surgeon gloves	2.58
1	Ground pad	2.92
1	Double basin	N/C
<b>Total</b>		<b>\$85.54</b>

Table 3. Custom Cesarean Pre-Pack

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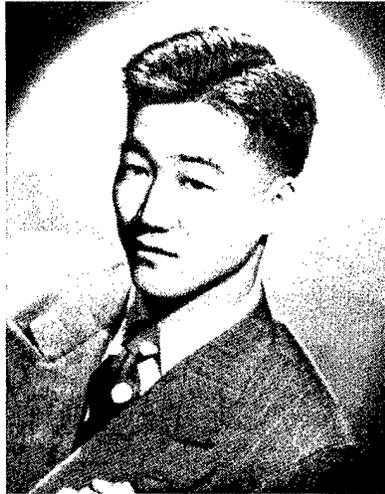
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# ***Above and Beyond the Call of Duty***

*Congressional Medal of Honor Winners from the Army Medical Department*



*Technician Fifth Grade James K. Okubo*

On 21 June 2000, the Medal of Honor, our nation's highest military tribute, was posthumously awarded to the family of Technician Fifth Grade James K. Okubo for heroism during World War II.

James Kazuo Okubo was born in Anacortes, Washington, and raised in nearby Bellingham. Following the Japanese attack of Pearl Harbor in 1941, the Okubo family was moved to the Tule Lake relocation camp in California. On 20 May 1943, at the age of 22, Mr Okubo volunteered for service in the United States Army. He became a medic and was assigned to the legendary 442nd Regimental Combat Team, one of the most decorated units in American history. The Team was comprised of Japanese-American citizens who fought in eight major campaigns throughout Central Europe during World War II.

Technician Fifth Grade Okubo distinguished himself through several acts of heroism in the fall of 1944, near Biffontaine, France. He repeatedly risked his life in order to administer aid to wounded soldiers from the Texas "Lost Battalion," encircled by German forces and threatened with immediate annihilation. In this hard-fought engagement, the 442nd suffered about 800 casualties to save 211 Texans. On 28 October, Technician Fifth Grade Okubo crawled 150 yards under intense enemy fire to within 40 yards of enemy lines to save 17 wounded comrades. The following day he rescued eight more soldiers, at times using his own body to protect the wounded men from further injuries. On 4 November, Okubo again saved the life of a soldier whose tank had come under bazooka fire. He ran 75 yards through enemy gunfire directed at him, pulled the seriously injured crewman from the burning wreckage, carried him to safety, and administered first aid.

After the war, Mr Okubo and his family settled in Detroit, Michigan, where he received a Bachelor of Arts degree from Wayne State University, followed by a Doctor of Dental Surgery degree from the University of Detroit Dental School. Doctor Okubo later taught at the school while maintaining a private dental practice and serving his community. Tragically, Dr Okubo died in an automobile accident in 1967 at the age of 47. He is survived by his wife, Nobuyo, who lives in Michigan; three children; and four grandchildren.

# Large Non-Painful Exophytic Lesion of the Lower Lip

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*Lesions on the lips should be evaluated clinically and with biopsy to rule out malignancy. Capillary hemangiomas are common lesions in children and adults. Age of the patient, size, and location of the lesion are important when considering treatment options. Presented here is a case of a capillary hemangioma in an adult, which was removed surgically.*

## Case Report

A 55-year-old white male presented to the Oral and Maxillofacial Surgery Clinic with a large exophytic ulcerated lesion on the lower lip. (Figure 1) According to the patient, the lesion appeared after he had bitten his lip approximately 3 weeks earlier. The lesion was slightly painful and interfered with mastication. The patient's chief complaint was to have lesion removed because it interfered with mastication.

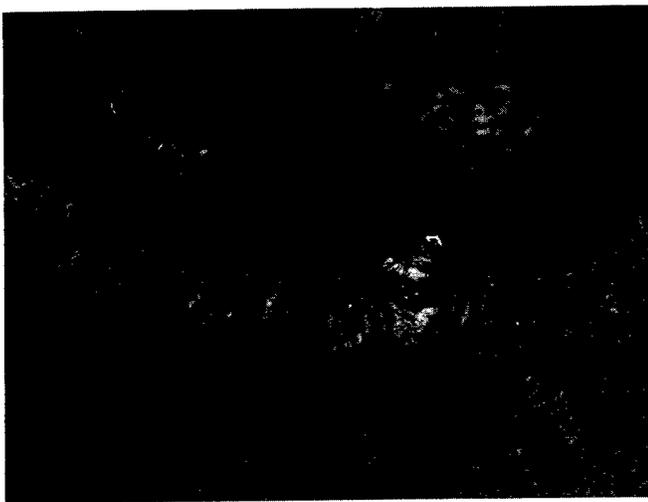


Fig 1. Lesion on left lower lip.

A clinical examination of the lesion was 1.5 cm in

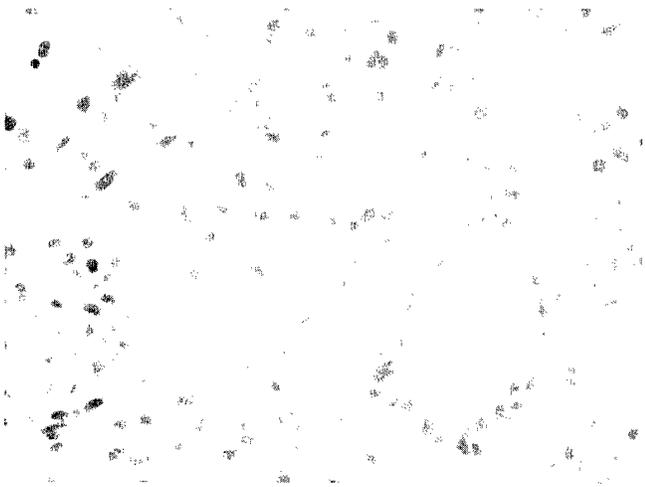
diameter, slightly tender, and an exophytic discolored mass, which was soft to palpation. The lesion was on the vermilion border of the lip in close proximity to the left commissure. The overlying mucosa was discolored with areas of ulcerations most likely secondary to trauma. The patient had a full complement of teeth with good oral hygiene and a history of routine dental treatment. Initially, we suspected a malignant lesion due to a history of tobacco use, actinic changes on the lip, and patient's age.

His past medical history was positive for coronary artery disease, which lead to a coronary artery bypass graft 1-year earlier. He had no shortness of breath or chest pain. He denied any other medical problems. The patient has no known drug allergies and was taking lisinopril 20 mg and aspirin 325 mg once a day. He did not use tobacco or alcohol but has a previous 30-year history of smoking. He has not used tobacco since the cardiac surgery.

An incisional biopsy of the lesion was performed and submitted for histopathology. Microscopic examination showed chronic inflammatory cells and numerous endothelial lined capillaries within a connective tissue stroma (Figures 2 and 3). This histopathologic pattern was consistent with a diagnosis of capillary hemangioma. Based on the diagnosis and nuisance to the patient, the lesion was removed (Figure 4).



*Fig 2. Low power Hematoxylin and Eosin stain of lesion.*



*Fig 3. High power Hematoxylin and Eosin stain of lesion showing endothelial lined capillaries in a connective tissue stroma.*



*Fig 4. Lesion removed.*

## Discussion

Vascular tumors and tumor-like conditions of the skin and soft tissues are common.<sup>1</sup> Hemangiomas are one of the most common soft tissue neoplasms constituting 7% of all benign tumors at this site.<sup>1,2</sup> The hemangioma is characterized by the proliferation of blood vessels and, in many instances, represents a hamartoma or malformation rather than a true neoplasm.<sup>3,4</sup> The capillary hemangioma is the most common type named because of the capillary size of the blood vessels.<sup>4</sup> Capillary hemangiomas account for 75% of the hemangiomas seen in children and adults.<sup>5</sup> Proliferative vascular lesions can present as benign or malignant with capillary hemangioma and angiosarcoma showing a predilection for the head and neck region.<sup>1</sup>

Clinically there are numerous ways these lesions can be treated depending on location and size. In many patients, nonoperative conservative management of congenital capillary hemangiomas is recommended since a very significant percentage of these will regress spontaneously.<sup>6,9</sup> It has been estimated that 60% to 90% of hemangiomas involute spontaneously within 5 years with approximately 80% to 90% by age 6.<sup>5</sup> Other than cosmetic concerns to the patient, many of these lesions require no special treatment.

Presently there are many options available for the treatment of hemangiomas. In some cases, systemic corticosteroids and embolization have been used to decrease the size of larger lesions.<sup>4</sup> Today, lasers offer great promise in the treatment of hemangiomas; the most effective and applicable lasers in use include the argon, carbon dioxide, yttrium aluminum garnet, and tunable dye.<sup>5</sup> Injection of sclerosing agents such as sodium morrhuate have been used in the past but may result in scarring.<sup>4</sup> Smaller, easily accessible lesions may still be removed surgically.

## Summary

Capillary hemangiomas are common lesions that, depending on the location and symptoms, may not require treatment. Any suspicious lesion on the lip should be biopsied and investigated. Once a diagnosis of capillary hemangioma is made, an appropriate treatment plan can be formulated. In this case, the lesion interfered with the

patient's lifestyle and was removed. These patients should be placed on a regular follow-up basis to evaluate for recurrence.

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# Case Reports: Cold Weather Injuries in an Arctic Environment

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*The cases of eight Special Forces soldiers who sustained cold weather-related injuries while conducting winter training as part of Operation Arctic Saber in the Northwest Territories and Arctic Circle are reported. Environmentally related injuries can represent difficult diagnostic and treatment challenges in the field. Moreover, they may compromise the overall mission if they are not identified and treated early. Cold weather injuries can also result in long-term disfigurement and disability that may limit a soldier's future worldwide deployability. Mission requirements, equipment utilization, and environmental exposure place soldiers at particular risk for cold weather-related injuries in such austere settings. Nonetheless, with appropriate education and safety precautions, these potentially life-threatening risks can be greatly minimized.*

## Introduction

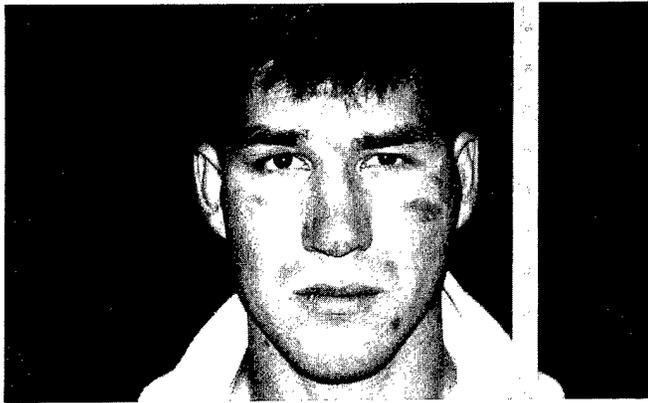
The largest effect on a fighting force is that from the historical disease nonbattle injury. The different medical threats that confront soldiers are legion. Some are rare and others are omnipresent. Climate belongs in the latter category, for the soldier is its constant prey. Because a soldier's innate defense mechanisms against the cold climate are limited, he or she must rely primarily on shelter or protective clothing. When these are lacking for any reason, the ensuing bodily damage is often major and can quickly cripple a fighting force. The fact that more than 100,000 U.S. soldiers suffered cold injuries during World War II and the Korea War emphasizes the fact that cold weather injuries may be a substantial draw on a fighting force.<sup>1,2</sup>

The effect of cold weather injuries on soldiers dates back to circa 400 BC, when General Alexander of Macedonia noted his Army's movement through the Armenian mountains: "The third day's march was a hard one, with a north wind blowing into their faces, cutting into

absolutely everything like a knife and freezing people stiff."<sup>3</sup> In the civilian peacetime setting, however, cold injuries are only sporadically encountered in cold climates. The infrequency of these injuries is notable when one considers that millions of people live in remote areas where temperatures reach below freezing. The paucity of civilian cold weather injuries is probably attributable to the fact that most civilians seldom spend more than 10% of the day away from a sheltered setting. In contrast, the mission requirements of a tactical fighting force may require a soldier to spend more than 30% of each day unsheltered and exposed to the severe cold.<sup>4</sup> Eight patients from such a setting are presented here. They were exposed during a 5-day, 300-mile, deep penetrating, tactical, open tundra snow machine movement from the Northwest Territories into the Arctic Circle in temperatures ranging from 0 to 40°F (0 to -120°F with wind chill). These soldiers were members of two separate 14-man mobility teams that initiated their movement into the Arctic Circle from a staging area more than 100 miles north of the forward operating base.

## Case Reports

A 24-year-old male was noted to develop swelling and paraesthesia over the left zygomatic arch during extraction. This soldier had removed his full-face helmet for 2 hours before the extraction process and during his team's rapid, "hot" (propellers turning) snow machine extraction onto a C-130 aircraft. The approximate temperature was  $-30^{\circ}\text{F}$ , with wind chill temperatures reaching below  $-100^{\circ}\text{F}$ . Initial examination of the area revealed a taut, cold, hypopigmented plaque, 3 cm x 2 cm, over the left zygomatic arch that was partially covered by the patient's full-face balaclava. During the 2-hour return flight to base, swelling had continued in the area, which began to weep during rewarming with a topical chemical heat pack. Tenderness developed as the tissue lost tautness and became erythematous. Twenty-four hours after the initial rewarming and dressing of the area with topical aloe vera ointment, the edema with bulla formation



*Fig 1. Anterior view of edema and bulla of second-degree frostbite injury 24 hours after rewarming.*



*Fig 2. Left lateral view of edema and bulla of second-degree frostbite injury 24 hours after rewarming.*

peaked (Figures 1 and 2). The patient was continued on ibuprofen and daily wound care. Two weeks after redeployment, his wound was re-epithelized and slightly erythematous. Six weeks later, no visible or palpable defect was observed in this second-degree frostbite injury.

During the mission, six other patients were noted to have first-degree frostbite injuries. Each was identified during periodic stops and buddy checks. All reported the development of tenderness along the top line of their protective face gear, which had slipped down with movement, but was not observable through the helmet. This small opening, where wind ripped through the seal between the visor and the chin bar of the helmet, allowed direct contact with the unprotected skin (Figure 3). All six patients were treated with topical aloe vera ointment, with complete clinical healing in 7 to 10 days after desquamation of the frostbitten epidermis (Figures 4 thru 6). In addition, there was no evidence of cold weather injury to the feet or the hands in any of the soldiers.



*Fig 3. Individual equipment configuration on snow machine.*



*Fig 4. Anterior view of first-degree frostbite injury.*



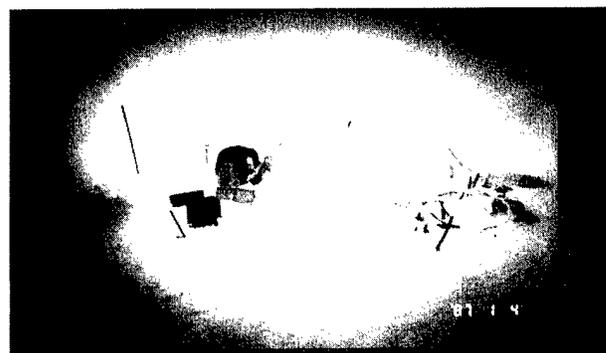
*Fig 5. Right anterior lateral view of first-degree frostbite injury.*



*Fig 6. Anterior view of first-degree frostbite injury.*

The last patient sustained a second-degree, thermal contact injury secondary to handlebar heaters on a snow machine. During a night movement, the soldier became damp and cold and had turned his handlebar heater setting too high. In his early hypothermic state, because of white-out conditions, he failed to realize he was injuring his hands until they halted their movement (Figure 7). There was no history of direct contact with hydrocarbon fuels or

frozen surfaces. On presentation, 4 days after the initial injury, the patient was noted to have multiple, 1-cm, nonhemorrhagic bulla on the contact points of the palmar surface of his hands (Figure 8). The bulla were sterilely evacuated with an 18-gauge needle and dressed until they healed approximately 2 weeks later.



*Fig 7. Two man bivouac configuration during blizzard on the open Arctic tundra.*



*Fig 8. Second-degree contact thermal burn on the palmar grip surfaces.*

## **Discussion**

Frostbite is currently the most common cold weather freezing injury encountered by our armed forces. Clusters of frostbite injuries occur in austere operations, as noted in this report. Frequently, they are the result of poor planning or inattention to control measures. Nonetheless, these injuries can occur in the severe environments our forces are required to operate in despite effective control measures.<sup>5</sup>

Frostbite occurs when destructive ice crystals form within tissues that have cooled to  $-3$  to  $-4^{\circ}\text{C}$ . Initially, these injuries appear the same: cold, taunt, and blanched. The digits, ears, nose, and exposed facial skin are the most commonly injured areas. Frostbite is classified by the depth of injury. First-degree frostbite is limited to epidermal injury, whereas fourth-degree frostbite involves the epidermis, papillary and reticular dermis, and all underlying tissues, including bone. Except in minor and severe cases, the degree of injury is not evident for 24 to 72 hours after the tissues have been rewarmed.<sup>2,5,6</sup> This prognostic delay has been a stumbling block for years, and there continues to be no field expedient method to determine the extent of the damage.

Management of frostbite injuries in a field environment has advanced during the past 20 years. The faster rewarming is initiated, the more complete it will be. Hence, subsequent morbidity decreases. Rapid rewarming of the affected area, by total immersion in  $102$  to  $105^{\circ}\text{F}$  water for 30 to 40 minutes, has become normal practice. However, one must ensure that the patient is in a secure setting without a risk of refreezing the affected area. In addition, warmed intravenous normal saline should be initiated to correct the underlying dehydration and hypovolemia so often associated with cold weather injuries and to aid in the rewarming measures.<sup>5,7</sup> Maintaining an emergency supply of warmed intravenous fluid in an Arctic field environment may be accomplished by attaching an ammo can over the exhaust manifold in the engine compartment of the snow machine, as was done in this mission. Three liters were carried by each man, which were subsequently transferred to their sleeping bags to be maintained at body temperature during down time. After rewarming is addressed, tetanus prophylaxis should be considered, for frostbite wounds are prone to tetanus.<sup>8</sup> Analgesia should be provided by nonsteroidal anti-inflammatory drugs (NSAID) and narcotics as needed. In addition to pain control, NSAID reduce the release of eicosanoids that may aggravate injury-induced dermal ischemia and have been shown to reduce overall morbidity. Topical aloe vera ointment is also used on wounds to reduce the local production of eicosanoids and to facilitate healing of the epidermis in an occlusive environment.<sup>9,10</sup> More advanced therapeutic protocols involve continuous infusions of vasodilators to reduce the frostbite effects on the microcirculation. Ketanserin, a

serotonin S2 receptor antagonist with platelet antiaggregant activity, has also shown promise.<sup>7</sup> Measures to counter infection are of prime importance. Secondary infection is clearly the most significant complication of frostbite injuries. As with thermal burn injuries, prophylactic antibiotics are not routinely prescribed but are initiated at the first indication of compromise.<sup>2,5,7</sup>

Cold weather injury is usually preventable with proper planning and education. In a recent Norwegian exercise, only one cold weather-related injury was reported among 3,000 soldiers.<sup>11</sup> However, their fairly limited movement of 50 miles between fixed facilities was conducted by means of the enclosed tracked oversnow vehicle BV 206 and ski-juring, (movement of multiple personnel by a vehicle that only holds 5 to 6 people; the remaining personnel are pulled along behind the vehicle on skis), which allowed soldiers to be removed from the environment when necessary. Nonetheless, certain mission profiles will place our soldiers at increased risk, especially those that require remote maneuvers away from support bases. Therefore, it is incumbent on team members to continually watch each other for the earliest signs of injury or break in barrier protection. Any one of the lesions described here could have had grave consequences if it were not for the diligent and watchful eyes of fellow team members during their planned buddy aid checks. Buddy aid, in which soldiers examine each other for signs of cold weather injury, is imperative so that an early intervention can take place to reduce the extent of the injury.

In conclusion, as medical officers, our duties and obligations are to provide the best educational support to the line unit commanders as well as to provide the best treatment for injuries. Future mobility missions in this type of setting should be conducted without the required safety helmet. After discussions with the local physicians and observing the Eskimo scouts, we found the incidence of head injuries as a result of not wearing the protective gear was minimal to nonexistent. In addition, team members reported difficulty with verbal communications and a limited field of vision. The removal of the helmet would allow rapid identification of unprotected surfaces and improve fields of vision and verbal communications. The teams reported excellent cold weather protection using their standard Arctic equipment issue with the substitution of the Sorel Glacier Boot, which was supported by the lack

of other injuries, especially on the hands and feet.

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# Endodontics on the Canine Teeth of Military Working Dogs

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*When a military working dog's canine tooth is fractured, endodontic therapy is often the preferred treatment over extraction. This article will outline the basic indications and treatment procedures used by the dentist/veterinarian team to complete root canal therapy for the canine teeth of working dogs.*

## Introduction

The Ancient Assyrians are believed to be the first people to utilize dogs in their military, although the Romans were the first to have designated "War-Dog" units.<sup>1</sup> In modern history, the Germans used as many as 30,000 dogs during World War I.<sup>1</sup> In 1942, the U.S. opened its first training center for military working dogs at Fort Royal, VA. In 1958, the training center moved to Lackland Air Force Base where the dogs are still trained today.

The role of the military working dog has evolved over the last 58 years. During the 1940s, the dogs were used as sentries, scouts, messengers, casualty collectors, pack dogs, and for laying wire. In the 1950s, their duties centered on being scouts and sentries. As the Vietnam War broke out, mine and tunnel detection was added to their duties. Since 1971, military working dogs are trained as attack/drug detection dogs or as attack/explosive detection dogs. For reasons of size and aggressiveness, German Shepherds and Belgian Malinois are the primary breeds used by the U.S. Armed Forces.

Due to their aggressiveness, these dogs chew on just about anything. Unfortunately, the metal fences and posts used to cage the dogs, are the most frequent cause of the wear and fracture of their canine teeth. When the teeth fracture, the dogs experience discomfort from the infected

or exposed nerve tissue within the teeth, usually causing a decrease in appetite and willingness to work. To alleviate the dog's discomfort, the veterinarian/dentist can either extract the tooth or perform root canal therapy. When these dogs have their canine teeth extracted, they have a significantly decreased ability to grab and hold on to objects when they bite. Even if part of the tooth can be saved, the dogs seem to perform their attack duties more effectively than when the tooth is removed. In this article, we describe how to perform root canal therapy on the canine teeth of military working dogs.

## Indication for Root Canal Therapy

We have found three indications for performing root canal therapy on the canine teeth of working dogs. The first is when a dog presents with a fractured tooth with pulpal involvement. The second and third, respectfully, is when the dog presents with a tooth that has caries impinging on the nerve or is severely worn. As the canine teeth wear, they become narrower mesial-distally which decreases its strength, thus leaving it susceptible to fracture. By performing elective endodontics on these teeth, we are avoiding a potential emergency situation of having a fractured tooth with a painful exposed nerve.

## Anatomy of the Canine Tooth

The canine tooth of both breeds (German Shepherd

and Belgian Malinois which often weigh more than 80 lbs) range in length from 50 mm to 55 mm from cusp tip to apex compared to the average human canine tooth which is usually about 25 mm in length.<sup>2</sup> The apex of the maxillary and mandibular canine teeth of dogs are located in an area distal and apical to their 1st premolar.<sup>2</sup> The canine tooth and its root canal system are both banana shaped with a wide canal chamber in the mesial-distal dimension. A unique feature of the canine is an apical delta/constriction located approximately 3 mm to 5 mm from the radiographic apex. Multiple small foramina exit the tooth from this apical delta. The presence of an apical delta allows for a definite stop which aids in cleaning and shaping as well as obturation. The canine tooth of a dog is rotated 90 degrees toward the mesial (Figure 1) from what is seen with human canine teeth. For discussion in this article, we will refer to the mesial and facial surfaces as they present on the working dog patient and not how they would appear on a human.



*Fig 1. Mesial access preparation.*

### **Special Instruments**

For all practical purposes, the instruments used in veterinary endodontics are the same as those used on our human patients with the exception that all the instruments are 50 mm to 55 mm in length. These extra long instruments include files, spreaders, gutta-percha points, and paper points. These instruments can be purchased from Henry Schein Company, Veterinary Division at 1-800-472-4346, ext 2405. Size No. 3 occlusal radiograph

film is recommended for radiographic working length determination.

### **Dog Position/Anesthesia**

Endodontic procedures on dogs have been performed both in the dental and veterinarian clinics. The determining factor is whose equipment is the most mobile. We found that it is most convenient to perform our procedures at the veterinarian clinic due to the difficulty in moving the equipment used during anesthesia and monitoring. If the veterinarians have mobile anesthetic equipment, the dental clinic is a viable site for treatment.

The dog's positioning must ensure easy access for the practitioner and also allow for the veterinarian to perform the anesthesia procedures. The technique we have used is to lay the dog on its side so that the tooth to be worked on is easily accessed. We also position the head slightly depressed so that irrigation flows out of the mouth instead of down the dog's throat. There is no local anesthetic necessary for this procedure. Instead, the veterinarian will induce and maintain general anesthesia throughout the entire procedure.

### **Access Preparation**

The two access preparations described in the literature, to perform root canal therapy on dogs, are from the mesial surface (Figure 1) and through the fracture site (Figure 2).<sup>2,3</sup> In addition to the two traditional types of access, we have also attempted a third which is from the facial (Figure 3). The best straight-line access is achieved by accessing through the fracture site or from the mesial. When performing an access preparation the goals are to find the canal, allow straight line access, and to preserve structure. With this in mind, we believe if the tooth is fractured the most conservative approach is to access the chamber through the fracture site, thus preserving any circumferential tooth structure that may be present. On the other hand, when a tooth is very worn but not fractured, it is easier and more conservative to enter the chamber from the mesial. When performing the access from the mesial it is important to begin the preparation 4 mm to 5 mm above the gingiva. This allows for the best straight-line access and decreases the file working length.



*Fig 2. Occlusal access preparation via fracture site.*



*Fig 3. Facial access preparation.*



*Fig 4. Working Length Radiograph with file to length.*

### Determining Working Length

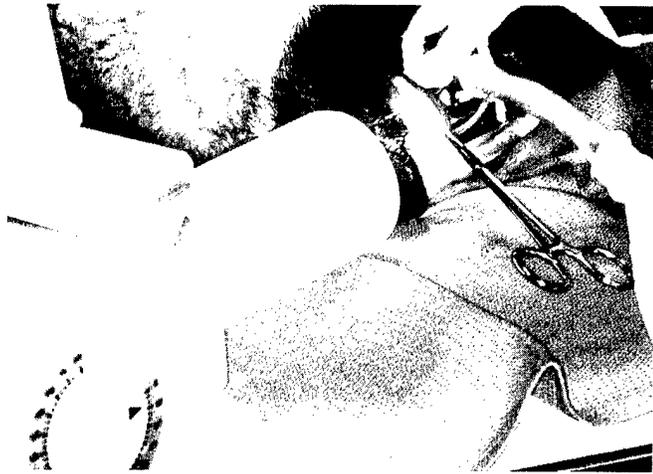
Working length determination is actually easier than with our human patients. A size No. 20 or 25 file can be advanced down the canal until a stop is felt. This stop is provided by the apical delta discussed earlier. Once the stop is felt, expose a radiograph (Figure 4) to evaluate the file position. When reviewing the working length, the practitioner must keep in mind that the ideal length will actually be about 3 mm to 5 mm from the radiographic apex due to a stop at the apical delta.

Radiographs can be made by an intra-oral or extra-oral technique. The extra-oral technique is performed by placing an occlusal size No. 3 film against the cheek on the

opposite side of the mouth from the tooth being worked on. The film is secured in place by wrapping gauze around the entire mouth (Figure 5). This may be the easiest technique to get a diagnostic radiograph, but it is more difficult to read due to the fact that teeth from both sides of the arch are present on the film. The intra-oral technique (Figure 6) is similar to that which we use for our human patients. The practitioner is able to use a periapical size No. 2 or occlusal size No. 3 film and place it to the lingual or palatal to the tooth undergoing treatment. Although this technique may give a better view of the individual tooth, it is sometimes difficult to get the film properly positioned and stabilized while getting the X-ray machine cone angled correctly to get a radiograph of the apex of the tooth. This may include repositioning the dog's head which may compromise the airway being maintained by the intubation tube.



*Fig 5. Extra-oral radiograph film position.*



*Fig 6. Intra-oral radiograph film position.*

The settings for kVp, mA, and time are dependent on which radiographic technique is used. A typical setting for a human canine periapical radiograph is approximately 60 kVp, 15 mA, and 24/60th of a second with a focal length of 8 inches. The intra-oral technique used on dogs necessitates an increased amount of exposure due to the increased thickness of the dog's canine tooth when compared to humans. An initial setting can be 60 kVp, 15 mA, and 36/60th of a second with focal length of 8 inches. The extra-oral technique exposure needs to be increased due to the fact that the X-rays need to penetrate both sides of the arch. An initial setting for the extra-oral technique is 70 kVp, 15 mA, and 1 second. The increase in kVp is to increase the penetrating ability of the X-rays. Once the initial radiograph is made, the exposure time may need to be adjusted to obtain an acceptable radiograph. If the film is too light (white), the time must be increased; conversely, if the film is too dark, the exposure time needs to be decreased. Using these starting settings and then adjusting the time for the technique and type of X-ray equipment will allow the practitioner to quickly find the proper settings for successful radiographs.

### **Canal Preparation (Cleaning and Shaping)**

The goals of canal preparation are to debride the canal of existing or potential irritants and to provide optimal shape and smoothness of canal walls to aid in obturation. Files and rotary instruments are used to perform this procedure. After preparing the access opening, Gates Glidden files on a slow speed hand piece

are used to enlarge the coronal portion of the canal while the hand files are used closer to the apex. Recently, rotary files are being used to replace traditional hand files, but due to the expense associated with these rotary systems and the limited number of procedures performed, it may be most cost-effective to continue to use Gates Gliddens and traditional hand files for these cases.

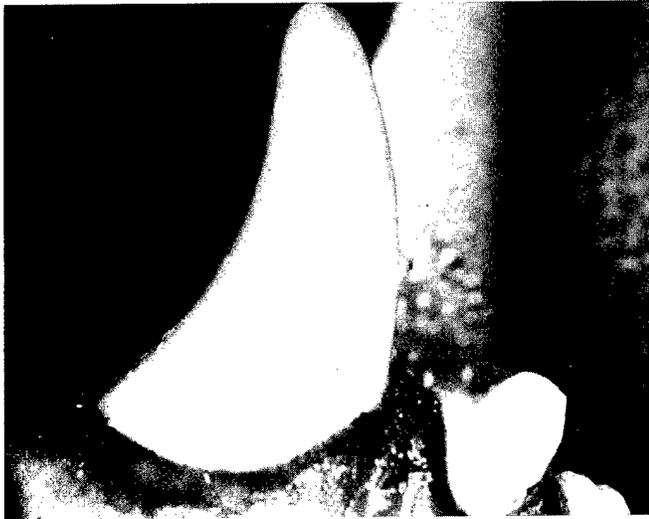
Standard of care for human patients during root canal therapy includes the use of a rubber dam. It is possible to use a rubber dam for dogs but it is not mandatory. The determining factor on whether a rubber dam is needed will depend on the type of irrigating solution used. If the practitioner uses sodium hypochlorite, it is best to utilize a rubber dam to protect the intra-oral structures that would otherwise come in contact with the sodium hypochlorite. We have successfully performed our procedures without a rubber dam by using saline for irrigating which will not irritate the surrounding structures. The final step in cleaning and shaping is to dry the canal with absorbent paper points.

### **Obturation**

Obturation is filling the canal space created by the cleaning and shaping process. We successfully obturated canals with lateral condensation using Roth sealer and gutta-percha. An alternative technique has been described by Schinder and Doral using an angiocatheter to place Intermediate Restorative Material (IRM L.D. Chaulk Co Milford, DE) in the canal as the obturation material. It may also be possible to use one of the new heated gutta-percha techniques if long enough tips can be located.

### **Restoration**

Amalgam, composite, and even crowns can be used for the final restoration. For access preparations on the mesial of the tooth we recommend either an amalgam or composite Class V type restoration (Figure 7). When the crown is fractured, it is still possible to place an amalgam or composite Class I restoration similar in appearance to those used for over-denture abutment teeth. Crown fracture also invites the opportunity to restore a portion of the missing tooth structure with a post/core and crown (Figure 8) as described by Emily.<sup>4</sup> The fabrication of a crown includes laboratory time and mandates that the dog be put to sleep at a second appointment for cementation.



*Fig 7. Class V mesial amalgam restoration.*



*Fig 8. Crown restored canine tooth.*

## Conclusion

Over the years, endodontics has been successfully performed by both dentists and veterinarians on many military working dogs. Often utilizing a team approach where the veterinarian performs the anesthesia and the dentist performs the root canal therapy. This article raises the awareness level with dentists and veterinarians to the opportunities for performing root canals on dogs as well as providing guidance in the clinical steps used to successfully complete root canal therapy on working dogs.

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# ***Running Shoe Design, Selection, and Care: Does it Make a Difference?***

CPT Allyson E. Prichard, SP†

## **Introduction**

A running shoe, is a running shoe, is a running shoe, right? Wrong! Perhaps there was some truth to that statement back in 1873, when the term “sneaker” was first used to describe shoes worn for athletic participation, but choices were few with regard to shoe gear materials and manufacturers. Since the late 19th century, and particularly within the past 25 years, the athletic shoe industry has grown by leaps and bounds. Today, we, the consumers, have our choice of styles, colors, air-filled soles versus special shock absorbing polymers, and a price range that can exceed \$100. We can select shoes based upon factors such as our foot type and body type, and on how often, how far and what type of terrain we run. As a result, we are faced with more choices than ever and find ourselves pondering over questions such as “Why are there so many choices?” and “How do I know which shoe is the right one for me?”

Part of the growth in the athletic shoe market has been spawned by the aerobic fitness craze, of which running is one of the most popular activities. As the popularity of running has grown over recent years, so has the number of musculoskeletal injuries incurred by runners. Reported annual injury rates range from 35% to 85%.<sup>1,2</sup> Additionally, it is estimated that 50% to 70% of runners are likely to sustain at least one running related injury throughout their careers.<sup>3</sup> Most of the reported injuries are overuse lower extremity injuries which affect the knee, leg, ankle, or foot.<sup>2,4</sup> Runners may also sustain traumatic injuries, which can account for up to 27% of all reported running injuries.<sup>5</sup> Lateral ankle sprains are the most common traumatic injury experienced by runners,

especially among those with a history of a previous ankle injury.<sup>5</sup>

In a recent epidemiological survey, musculoskeletal injuries accounted for 24% of all visits to a clinic by active duty Army personnel.<sup>6</sup> It is not surprising that the incidence of these injuries is high among soldiers, given that running and road marching are integral parts of the physical training regimen.

## **Running and Injuries**

The etiology of running injuries is multifactorial. Several risk factors have been implicated in the onset of running injuries, to include high weekly running mileage, a history of a previous running injury, sudden change in running habits, both fast and slow running speeds, running hills, training surface, insufficient warm-up, footwear (shoe type and age of the running shoe), foot type, running biomechanics, age, and gender. Of these variables, high running mileage, previous history of a running related injury and a sudden change in running habits are generally undisputed as risk factors for running injuries.<sup>1-5, 7-12</sup>

Although evidence supporting the contribution of running shoe construction in the reduction of injuries is inconclusive to date, human kinematic studies show that shoes can significantly influence lower extremity movement.<sup>13,14</sup> If this is the case, then well designed and properly fit running shoes should theoretically assist in the reduction of overuse injuries. Manufacturers are making hundreds of models from which to choose, but in order to reduce running injuries, researchers believe that shoes need to provide cushioning, stability, and motion control.<sup>3</sup> In

order to comprehend the reasoning behind running shoe design and selection, a basic understanding of foot structure, running mechanics and distribution of impact forces is necessary.

### When the Foot Hits the Ground

On the average, a runner's foot strikes the ground 50-70 times per minute with a force upwards of 2-3 times his or her body weight!<sup>15</sup> For example, a 150 lb person, running 2 miles, will strike the ground approximately 1600 times with each foot at a peak force between 300 and 450 lbs of pressure. (These figures may be influenced, however, by such factors as running speed, terrain and/or foot contact pattern.) During walking and running, there is a period of time in which each foot is in contact with the ground (stance phase) as well as in the air (swing phase). While running, less time is spent in single leg stance, thus the impact force must be absorbed by the body in 1/3 the time as compared to walking. For runners who initially contact the ground with their heel, (which accounts for 80% of runners), the impact force peak is imparted on the calcaneus, between the first 30 and 50 milliseconds of the stance phase.<sup>15,16</sup> The remaining 20% of runners initially contact the ground with the midfoot or forefoot, thus the impact forces are primarily dispersed across the longitudinal arch and/or ball of the foot in less time, as compared with the heel striker. (See Figure 1 for comparative distribution patterns between heel and midfoot strikers.) Interestingly, approximately 50% less stress is imparted to the lower extremity when impact with

the ground is initially made with the midfoot/forefoot.<sup>18</sup> However, this "savings" has additional "costs" elsewhere, to include increased knee flexion angle to assist the dispersion of impact load forces and increased oxygen consumption.<sup>18</sup>

Once the foot strikes the ground, it must initially be able to dissipate the impact forces and then provide a rigid platform from which the body can propel itself forward. Pronation (inward rolling of the foot and ankle) is the motion that occurs initially to help the body absorb forces at impact. It is followed by supination (outward rolling of the foot and ankle) which provides increased rigidity or stiffness to the foot so that the forces generated by the muscles can be transferred into propulsion. Keeping these concepts in mind, there are runners who exhibit excessive degrees of pronation or supination, which may predispose them to injuries. For example, runners with pes planus (flat feet) may be predisposed to overpronation, while those with pes cavus (high arches) may be predisposed to underpronation.<sup>16,19</sup> According to some researchers, runners exhibiting pes planus may, therefore, be at greater risk for developing patellofemoral pain syndrome, tibial stress syndrome, Achilles tendinitis, plantar fasciitis, and metatarsal stress fractures.<sup>3,13,16,20</sup> Those runners with pes cavus exhibit an increased relative risk for the development of tibial and femoral stress fractures, Iliotibial Band Syndrome, trochanteric bursitis, plantar fasciitis, and peroneal tendinitis.<sup>16,18,20</sup>

Theoretically, excessive or insufficient motion and/or excessive impact forces may result in the development of overuse injuries. Shoe manufacturers attempt to control unwanted motion when designing shoes in order to minimize the relative risk for injury among runners. Based on the structural and biomechanical differences among runners, shoes will vary considerably with regard to the amount and type of shock absorption, motion control and support in order to meet the individual needs of runners.

### Anatomy of a Running Shoe

The initial step toward properly selecting and fitting a running shoe is becoming familiar with the "anatomy" or basic components of a shoe. Simplistically, the shoe can be divided into four parts: the *upper*, the *insole*, the *last*, and the *sole*. The *upper* can be subdivided into the *toebox*,

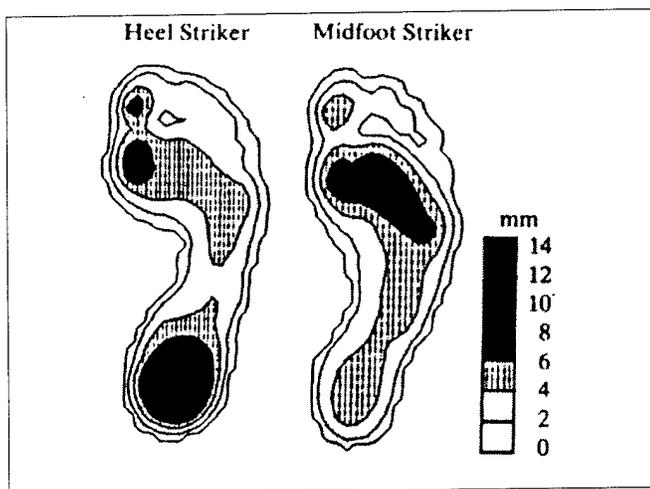
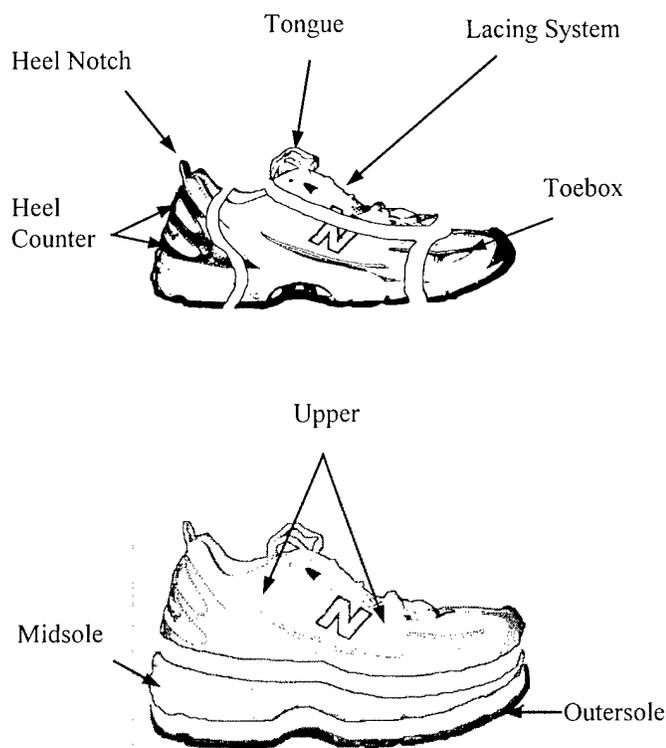


Fig 1. Force distribution patterns.<sup>17</sup>

tongue, lacing system, heel notch, and heel counter (Figure 2). The sole can likewise be further divided into the midsole and outersole (Figure 3).



Figs 2 and 3. Anatomy of a running shoe.  
(New Balance: 828)

The construction of the shoe must conform to the shape of the runner's foot and is thus based on the *last* (the template on which shoes are made). One aspect of last design, is the shape of the running shoe from heel to toe. It may be *curved*, *semicurved*, *semistraight*, or *straight*. These range from an inward curve of approximately 8° from heel to toe (*curved last*) along a continuum to virtually little or no curve (*straight last*).

Another feature to last design is the actual method of lasting (ways of pulling the upper over the last). The most common methods include *board*, *slip*, and *combination lasting* (Figure 4). Board lasting involves attaching the upper to a thin innersole board. Its purpose is to provide greater stability/rigidity to the shoe and is typically recommended for runners who have more flexible feet, such as overpronators and/or those with pes planus.<sup>16,18,21</sup> Slip lasting involves closed stitching of the upper and "slipping it onto the last." This design generally adds flexibility to the

shoe and has been recommended for runners with pes cavus, since their feet are inherently more rigid.<sup>16,21</sup> Combination lasting unites board and slip lasting techniques. This design was created for runners requiring both forefoot flexibility and rearfoot stability.<sup>21</sup> Although many recommendations have been made with respect to matching a person's foot type with a particular lasting technique and shape, this author has not come across any research to suggest that running shoe lasts influence foot motion. In fact, it is not uncommon in today's shoe market to see a motion control shoe with a slip last. It is important, however, that the last fits the shape of the runner's foot.

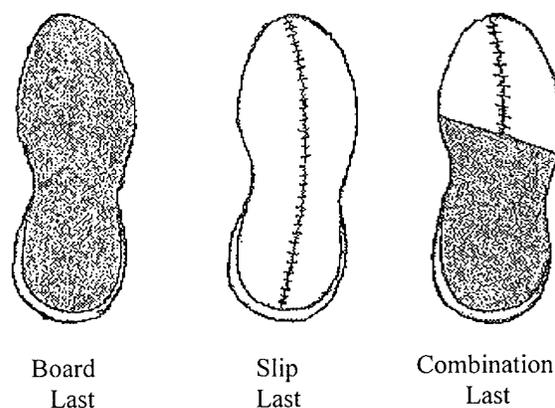


Fig 4. Methods of lasting.

The *upper* of a typical running shoe is usually a synthetic or nylon mesh with leather trim. Compared to the old canvas or leather shoes, the synthetic materials are lightweight, breathable, durable, and water-resistant. In conjunction with a well-padded *tongue* and secure *lacing system*, the upper should provide a snug fit across the midfoot, while leaving ample room in the *toebox*. The *toebox*, as the name implies, is the forward area of the upper. In terms of width, it needs to provide enough room for the toes and metatarsals to spread apart, which naturally occurs during the stance phase. Additionally, the height and length of the *toebox* need to provide sufficient room for toe clearance. The recommended minimal distance is 1/2" between the end of the longest toe and tip of the shoe and from the top of the highest toe to the upper. The *heel notch* is the slight depression located in the rear of the upper, designed not only to improve fit, but more importantly, to reduce irritation along the Achilles tendon.

Immediately below the heel notch is the *heel counter*, a firm, cup-shaped structure designed to mold around the heel. By confining the calcaneus in the heel of the shoe, the heel counter improves the shock absorption capacity of the calcaneal fat pad (the body's natural "shock absorber") by 50% at heel strike and the shock absorbency of the heel/shoe complex by 19% (Figure 5).<sup>22</sup> The other important function of the heel counter is stabilization. It is designed to prevent slippage and rotation of the heel, thus stabilizing the subtalar joint and theoretically minimizing pronation.<sup>13</sup> Since it can be short, medium, or long, a runner requiring rearfoot motion control should seek a longer heel counter.<sup>3,23</sup> As an added bonus, the presence of a heel counter has been correlated with a 2.4% reduction in oxygen consumption compared to running barefoot or in shoes lacking a heel counter.<sup>22</sup> This translates into improved running efficiency.

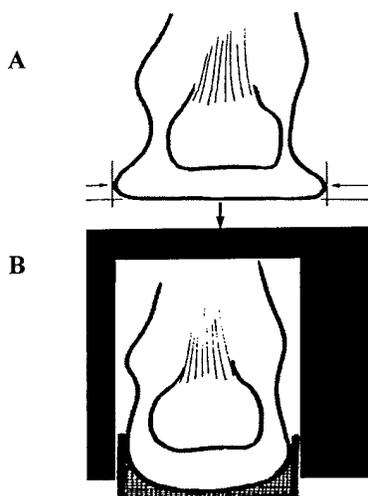


Fig 5. Heel counter effect.<sup>24</sup>

A: Depiction of the heel pad, unconfined, while standing.  
 B: Heel pad confinement as produced by the heel counter.

Insoles, which line the inside of shoes, are either removable or permanently attached. They are made of various materials and provide varying degrees of support along the longitudinal arch. A removable insole is more desirable, as it can be readily replaced when worn out or exchanged for an individually molded orthosis. (Discussion of orthotics is beyond the scope of this article.)

The midsole of the shoe, the area sandwiched between the upper and outsole, has received the most

attention with regard to changes in design and fabrication. Its two primary functions are to provide cushioning and stability. The most common materials used to create the midsole are ethyl vinyl acetate (EVA) or polyurethane. The EVA is lighter and less expensive than polyurethane, but is also less resistant to compaction. Midsoles come in varying degrees of density and firmness. Often, the midsoles are dual or tri-density, with the firmer densities being easily identifiable as a darker color (Figure 6). Multidensity midsoles are generally firmer on the medial aspect of the shoe and softer on the lateral aspect. The reason for this design is to provide greater cushioning upon heel strike, while attempting to control excessive pronation between loading response and midstance. Often times, manufacturers will incorporate other cushioning materials, such as gas, gel, or fluid, into the midsole for improved cushioning. Naturally, the effects of these enhancements are dependent upon their location in the shoe in relation to the runner's impact zone.

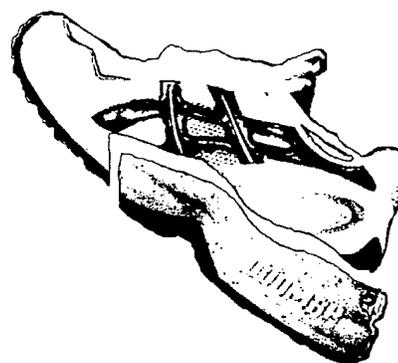


Fig 6. Dual-density midsole.  
 (Asics: GT-2040)

Multiple materials are also used in the fabrication of outsoles, providing varying degrees of traction and durability. With the durable compounds used today, including carbon rubber, blown rubber, styrene butadiene rubber and EVA, the runner should realize that other vital components of the shoe will typically "wear out" before the outsole.

Finally, the runner should inspect the grooves on the outsole of the shoe. They include *flex grooves* (those running transversely across the sole) and *split grooves* (those that run longitudinally). In addition to providing

density to the midsole, these grooves contribute to the overall flexibility of the shoe (Figure 7).

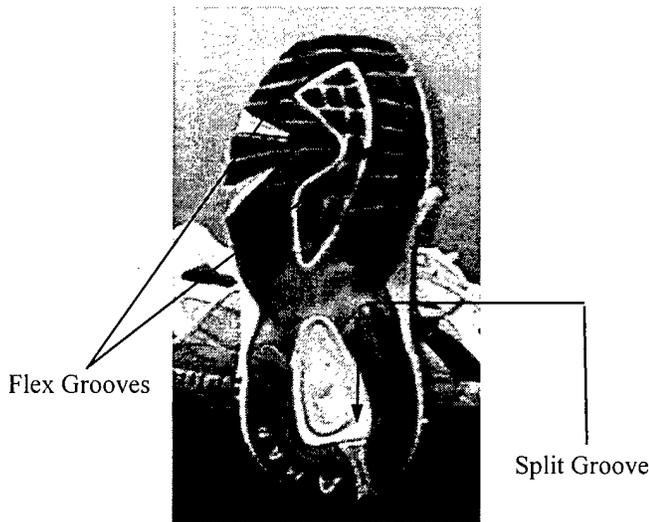


Fig 7. Flex and split grooves.  
(Asics GT-2040)

### Categories of Shoes

For the purpose of this article, four shoe categories will be addressed: *cushioned, motion control, stability, and trail* (Table 1).

### Determining your Static Foot Type

The next step in the shoe selection process is to

determine your foot-type. This is accomplished easily by performing "the wet test," which involves three simple steps:<sup>25</sup>

- Place a piece of paper, that is large enough to accommodate the size of your foot, on a flat, hard floor.
- Wet the bottom of your foot and stand up on the piece of paper, making an imprint with your foot. The foot should be damp enough to make an imprint, but not so wet that the imprint of the foot is obliterated.
- Match your footprint, as best you can, to one of the three most common foot types pictured in Figure 8.



Fig 8. Wet test.<sup>25</sup>

Cushioned	Motion Control	Stability	Trail
Designed to reduce impact forces.	Designed to limit excessive pronation.	Cross between cushioned and motion control shoes, with different models providing varying degrees of both.	Designed for running on rugged terrain. Usually possess special construct features such as a rugged outsole, gortex, etc.
Recommended for runners who impact the ground in a neutral position, underpronators, or runners with pes cavus.	Recommended for moderate to severe overpronators and some runners with pes planus.	Recommended for runners exhibiting mild or no overpronation.	Recommended for trail or off-road runners.

Table 1. Categories of Running Shoes

## Matching Your Foot Type to a Shoe

Now, match your foot type to the appropriate type of shoe. Refer to Table 2 for assistance.

Pes Planus/Flat Feet	Normal Arches	Pes Cavus/High Arches
Motion Control shoe or Stability shoe with a firm midsole	Stability shoe or Cushioned shoe for neutral runners (those who neither overpronate nor underpronate)	Cushioned shoe with a flexible midsole

Table 2. Matching Running Shoes to Foot Type

Note: A midfoot striker has unique needs and should consider a shoe well cushioned in the midfoot/forefoot section of the shoe, with good midsole flexibility. When a large, torsional moment is allowed between the forefoot and midfoot, pronation is reduced.<sup>26</sup>

## Where to Purchase Running Shoes

As of 1 October 2000, Army and Air Force Exchange System and Military Clothing Sales Store officially launched its "Fit-the-Foot" Program. Running shoes are now displayed by category (motion control, stability, and cushion) and educational pamphlets to assist customers in the selection process are available in all shoe departments. Although running shoe model availability varies from store to store, additional models may be ordered through catalog sales or the special orders department.

Local running specialty shops and even web sites specializing in running gear may offer additional assistance and selection. There are, of course, advantages and disadvantages to purchasing shoes through these venues and it is up to the consumer to determine the best course of action.

## Some Helpful Buying Tips

- Choose from among "training" shoes as opposed to "racing" shoes.

- Try on more than one pair of shoes and don't restrict yourself to shoes manufactured by one company. Fit and feel are just as important as the shoe category.

- When trying on the shoes, wear the same socks you wear when you run.

- Buy your shoes in the evening, when your feet tend to be a little bit larger. Since the long bones in your feet spread out slightly when you run, buying shoes later in the day will help ensure that the shoe is not too constrictive.

- To ensure comfort and proper fit:

- Allow approximately 1/2" (roughly equivalent to the width of one fingernail) between the end of your longest toe and the tip of the shoe, as well as 1/2" between the top of your highest toe and the upper of the shoe. (You should be able to wiggle your toes without restriction.)

- Ensure that the widest portions of your feet match the widest portion of the shoe.

- Walk and run in the shoe on a hard surface (not carpeted surface).

- The heel should be snug and not slip when you walk or run; there should be sufficient clearance between the shoe and the medial and lateral malleoli (inside and outside ankle bones).

- If the shoes feel uncomfortable on your feet while you are still in the store, it is unlikely that they will feel better "after breaking them in." Don't buy them.

- If the shoes exhibit poor stitching or obvious flaws, request another pair.

- Place the shoes on a flat counter to check for balance. In other words, they should rest flat and not tilt (See Figure 9).

- The best shoe is not necessarily the most stylish, most popular, or the most expensive. In fact, shoe price has been cited as a poor predictor of running injuries.<sup>5</sup> However, it is unlikely that you will find an adequate shoe in the \$20 - \$30 price range, so common sense must prevail. On the average, expect to spend in the neighborhood of \$60-\$90.

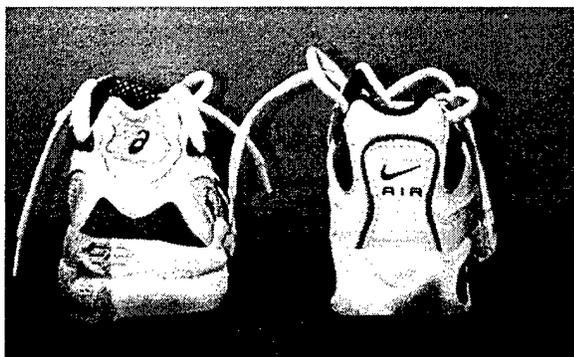


Fig 9. Running shoe heels – no tilt.

Left: Asics GT 2040  
Right: Nike Converge Triax

of wear and tear, yet still need to be replaced.<sup>27</sup> It is generally agreed upon that running shoes should be replaced after 400-600 miles of running or after 6-12 months.<sup>28</sup> Although shoes may “appear” to be fine after several hundred miles of running, their capability of absorbing the impact force has been significantly compromised. According to one study, shoes retained only 55% of their initial shock absorption capacity after 500 miles (equating to a 45% loss).<sup>29</sup> The same author reported a 15% loss of shock absorption at 50 miles and a 33% loss at 100-150 miles.<sup>29</sup> Although an in-vivo study did not demonstrate as drastic a loss after 500 miles of running, the shoe still lost 30% of its shock absorption capacity. Since improved cushioning in footwear has been associated with the reduction of stress fractures and lack of cushioning has been implicated in the onset of stress injuries in the lower extremity, shoes with several hundred miles on the pedometer may predispose a runner to injury.<sup>17,28</sup> Similarly, older shoes, specifically between 6 and 12 months of age, were associated with a greater incidence of stress fractures among marine recruits. For these reasons, shoe replacement is recommended sooner versus later.<sup>22</sup>

### When to Replace Your Running Shoes

If your shoes resemble the one pictured on the far left in Figure 10, consider yourself due for a new pair. In fact, all three pair of running shoes pictured in Figure 10 are due for replacement. Shoes often fail to show any visible signs

Asics: Tiger Marco  
Age: 18 months  
Mileage: ~800 miles



Nike: Air Converge Triax  
Age: 12 months  
Mileage: ~200 miles



Asics: GT 2040  
Age 9 months  
Mileage: ~400 miles



Fig 10. When to replace your running shoes.

Both fortunately and unfortunately, running shoe manufacturers introduce new models frequently and thus discontinue older models. On the upside, new, innovative and technically advanced shoes are introduced, but consequently, old favorites are sent to the running shoe graveyard. If this is the case, no need to worry since you will know how to venture forth and select a new pair by the conclusion of this article. Keep in mind that as models change, you may find a shoe by another manufacturer equal to or better than your worn out shoe.<sup>30</sup> If you don't care for this solution, then upon finding the shoe that fits you best, stockpile one or two pair in your closet for future use.<sup>30</sup> (Be aware that stocking several pair may not be in your best interest since some rubber compounds will begin "breaking down" with time.)

### Wear and Care of Your Running Shoes

- Wear your running shoes *exclusively* for running.
- Don't "kick-off" your shoes by scraping the heel off of one foot with the toes of the other. This may lead to early "breakdown" of the heel counter.
- Follow the cleaning instructions as provided by the manufacturer. If no instructions are provided, consider the following tips:
  - Do not machine wash, dry-clean, or tumble-dry your shoes.
  - Wash them using a soft brush, mild detergent and water. Allow them to air dry.
- Do not expose your shoes to intense heat for extended periods of time (leave in your trunk on hot summer days).
- Do not run in wet shoes, as this significantly lowers the shock absorption capability of the shoe.<sup>29</sup>

### Seeking Additional Information

Finally, there are several running magazines available nationally, regionally, and/or locally which may be able to provide additional information regarding running shoe selection. (Just a few are listed in Table 3.) In fact, Runner's World magazine publishes a Shoe Buyer's

Guide semiannually, (usually Spring and Fall), to assist runners with the shoe selection process and to update them with information concerning the most current product line available from each running shoe manufacturer. In addition to magazines, there is also a wealth of information available via the world wide web. Some of the sites are listed below and provide multiple links to other related sites, including the major running shoe manufacturers (Table 3).

Magazines	URLS
Runner's World	www.runningnetwork.com
American Track and Field	www.runnersworld.com
Northwest Runner	www.runnersweb.com/running.html ↳ shoes → links to manufacturers
Runner's Gazette	www.roadrunnersports.com
Running Journal	
Track and Field	

Table 3. Additional Resources

**Disclaimer:** The U.S. Army does not endorse or recommend one running shoe manufacturer versus another or a specific running publication. The magazines and Internet web sites listed in this article are merely a sample of resources available to readers to assist them in gathering additional information on this topic.

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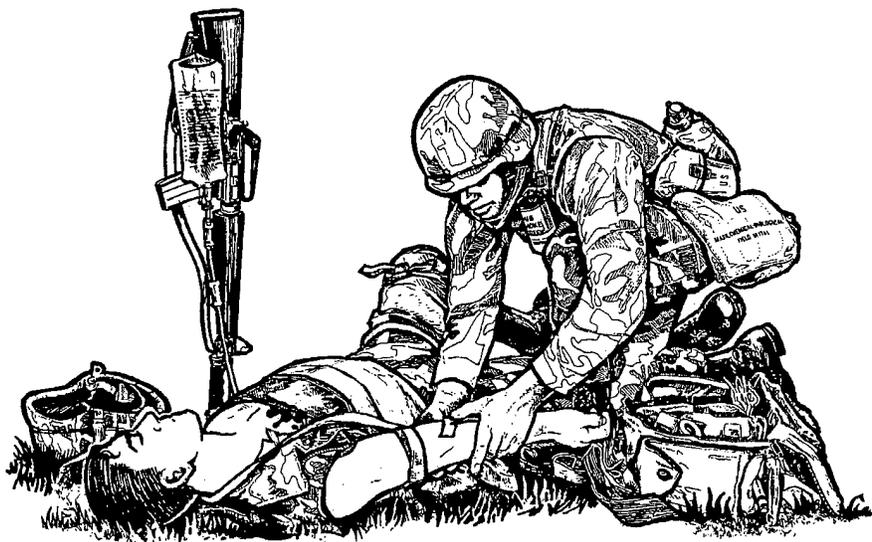
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