4-15-1984

An optometric care flow methodology for the military

Robert John Kish
Pacific University

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An optometric care flow methodology for the military

Abstract
The purpose of this thesis is to design an optometric clinical system for the military to accommodate the increased needs of the active duty dependents, retirees and their dependents. Many factors were considered that affect the delivery of optometric care in the military. These factors include ancillary personnel, space needs, manpower needs, automated refractors, no shows, appointment system, and a screening program. The methodology to be incorporated is the algorithms in the appointment system, placement of the patient into the proper appointment slot, use of a screening clinic, and clinical flow diagrams for the delivery of optometric care. An increase of 20 to 30 percent in the number of patients seen is projected from the use of the new clinical system. Because few middle grade optometry officers have had any formal management training in running the optometry clinic, or dealing with people a management guideline is included. The management style chosen is participative management. This style of management was chosen because of the type of service delivered by the optometry clinic. Recommendations were made on clinical needs and management training of middle grade optometry officers.

Degree Type
Dissertation

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An Optometric Care Flow
Methodology for the Military

Lieutenant Commander Robert John Kish,
Medical Service Corps, United States Navy

Submitted in Partial Fulfillment of the Requirements for a
Master of Science Degree in Clinical Optometry (Management Track)
Pacific University, Forest Grove, Oregon 97116

15 April, 1984

* This work represents the opinions of the author, and not necessarily the
views of the United States Navy, nor the views of the United States Depart-
ment of Defense.
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Acknowledgement

I wish to give special acknowledgement to A. Richard Reinke, Colonel U.S. Army (Ret) for his guidance and invaluable comments. To my family, thank you for putting up with a 40 year old student. And to all those many other people who have helped in countless ways, I again say, thank you.
The purpose of this thesis is to design an optometric clinical system for the military to accommodate the increased needs of the active duty dependents, retirees and their dependents. Many factors were considered that affect the delivery of optometric care in the military. These factors include ancillary personnel, space needs, manpower needs, automated refractors, no shows, appointment system, and a screening program. The methodology to be incorporated is the algorithms in the appointment system, placement of the patient into the proper appointment slot, use of a screening clinic, and clinical flow diagrams for the delivery of optometric care. An increase of 20 to 30 percent in the number of patients seen is projected from the use of the new clinical system.

Because few middle grade optometry officers have had any formal management training in running the optometry clinic, or dealing with people a management guideline is included. The management style chosen is participative management. This style of management was chosen because of the type of service delivered by the optometry clinic.

Recommendations were made on clinical needs and management training of middle grade optometry officers.
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I. INTRODUCTION
A. BACKGROUND

Almost everyone has required some type of medical care in his life. But, when seeking this care, have they ever called for an appointment only to be told it will be four weeks until they can be seen? Or worse, they cannot be seen at all, and they must seek care elsewhere. If they have, then they've experienced what the military dependents, military retiree and their dependents deal with on a daily basis.

The long waiting times, or denial of medical care, especially to the active duty dependent, has been a factor in the low morale and low retention of active duty military members. Reduction of care or no care to retirees and their dependents is the breaking of an "implied promise of continual medical care" given this group on their enlistment into the military. They were told medical care WILL always be available to them and their dependents. Military medical treatment facilities are not built or staffed to handle his enormous eligible patient population. The military must develop new clinical methods and management techniques to handle these patients' needs for care.

The following research will address the problems faced by the military dependents, military retirees and their dependents and will lead to recommendations for solving the problems. These are recommendations to revamp the optometric clinical setting so as to maximize patient flow and minimize vision care waiting lines.

B. PROBLEM

Title 10, chapter 55, section 1076 of the U.S. Codes allows for the use of military medical facilities by dependents of members of the
armed services. Chapter 55, section 1074 and 1076 sets the guidelines for the use of military facilities by retirees and their dependents. BUMEDINST (Bureau of Medicine Instruction - U.S. Navy) 6320.31B section A subparagraph 3, (Appendix A) sets the general restrictions and priorities for all eligible beneficiaries, subject to the capabilities of the professional staff and the availability of space and facilities.

The Navy has 139 optometrists of which 130 (93.5%) are full time clinicians. These 130 optometrists must care for the 3.2 million potential patients. With the number of optometrists in the Medical Service Corps fixed by the number of specialty billets allowed optometry, an increase in staffing is not possible to meet the demands. Because of this and increased patient demands, pressure to reduce the waiting time for a visual examination is brought by administrators. To minimize these pressures the optometrist reduces his time spent with each patient thus compromising the quality of the visual examination. The number of patients to be seen is so great that an optometrist must often disregard his obligation to give each patient a thorough, complete visual examination.

The problems that face military optometry can be divided into two categories: (1) the management of patient demands for vision care, and (2) the need to bring a change in organizational structure and a change in management's behavior as it pertains to military optometry. Each category will be looked at independently to develop the methods for solving these problems.

C. ANALYSIS OF THE PROBLEM

The delivery of optometric care to the large volume of eligible
recipients has become a major problem in the military. With the American Optometric Association and Congress specifying the delivery of quality optometric care\(^5\) and the populace demanding such, the Military's delivery of this care must change.

As of 28 September 1983 there were 551,303 Navy and 198,682 marines on active duty.\(^4\) The Navy Medical Department is responsible for the medical care of the Marine Corps and their dependents. Using a multiple of 1.5 to determine dependent population\(^4\) adds another 1,125,000 people eligible for medical care. Add to that figure the 1.3 million retired servicemen and their dependents\(^4\) and you end up with a potential patient pool of 3.2 million people. These numbers can go even higher when civil service employees who are eligible for care are included.

The American Optometric Association (AOA) suggested ratio of optometrists to patients is one per 8,000. The average optometrist to patient ratio in the United States is one per 7,680. The doctor to patient ratio in the Navy, for the 3.2 million possible patients is one per 24,000. In civilian optometric practice the average optometrist sees between 1200-1400 patients per year. The Navy optometrist is expected to see between 2600-2900 patients per year depending on the type of examination given.\(^6\) Type of examination is either dilated or undilated fundus viewing. The examination times vary from 30-45 minutes. As stated by Col. Billy Green, O.D., MSC, USA,;

"It would be an amazing optometrist who could practice full scope, high quality optometric care with these patient loads, especially as his patient population has
significant numbers of geriatric and pediatric patients and rotate as frequently as do military populations. 19

If the Navy optometrist were to see only active duty personnel the doctor to patient ratio would be one per 5800. This would permit the clinical optometrists to engage in comprehensive full scope optometric care. (Figure 1) The low ratio would allow the visual examination to be equal to that given by his civilian counterpart. A problem with this low ratio is that the Navy optometrist would be seeing only 1100 patients per year, somewhat less than the mean for a solo civilian practice.

With the need to maximize resources in today's military, the commanding officers of medical treatment facilities must insure that clinical facilities are fully utilized. If Navy optometrists were seeing only active duty personnel, their clinics would not be used to maximum potential.

Commanding officers of medical treatment facilities guided by BUMEDINST 6320.31B (Appendix A), set the guidelines of who will be seen in the clinics. They are also responsible for the total utilization of staff resources. To better utilize the optometry clinic the commanding officers expand eligibility requirements to include active duty dependents. The doctor to patient ratio now has increased to one per 14,500 and with this increase the clinic is inundated with appointment requests. If they add the retirees and their dependents the ratio increases to one per 24,000.

Once a commanding officer has decided to allow dependents of active duty service into the system he cannot discriminate within this group to limit the ratio to one per 8000 as AOA recommends. With the dependents allowed into the system for visual care, it is left up to the senior
optometrist to determine when, how and in what priority the dependents will be seen. This added patient group puts tremendous pressure on the visual care system.

A rude awakening is waiting for the newly commissioned optometrist at his first duty station. His only impression of military optometric care has come from the Navy Medical Service Corps booklet.

In the Navy Medical Service Corps booklet 45 optometrists are described as follows, "Optometry officers practice the art and science of optometry in all its manifold aspects. They examine the eyes and related structures to determine the presence of vision impairments and eye diseases, and prescribe measures to correct vision malfunctions and other abnormalities. Optometrists in the Navy also conduct environmental analysis to preserve and improve visual efficiency." The author does not know of any optometric clinic in the Navy that offers full scope care according to state of the art and science of optometry in all its manifold aspects. Nor is he aware of any optometrist conducting environmental analysis to preserve and improve visual efficiency.

Despite their sometimes wide responsibility for patient care, military optometrists point to the fact that often their scope of practice is artificially limited, patient workloads excessive, and facilities inadequate for optometric specialty care. They also believe the treatment of optometrists is often discriminatory in light of what is given other professionals. 47,51

Even with the problem of delivering full optometric services in the military some optometrists completing their three year commitments and others with years of Navy service want to remain on active duty. They see
the tremendous need for their professional service even if limited in scope.

D. METHODOLOGY

There have been many articles in the literature describing the problems experienced by military optometry in the delivery of quality vision care.\textsuperscript{3,13,19,24,42,51} The only articles written to correct any portion of the military vision care problem have to deal with manpower staffing requirements,\textsuperscript{26,46} and optometric space utilization in Air Force Hospitals.\textsuperscript{47} No articles or papers have been written on designing a military optometric delivery system to handle the large patient demands. This thesis will try to develop a new clinical/patient management system that can be used in all military hospitals and dispensaries regardless of size. Organizational management techniques will be used to develop an organizational flow chart system to maximize the efficiency of the military optometrist's delivery of vision care.

Development of a system to manage large patient populations will incorporate the use of many factors. These factors are: (1) determination of the patient population in a given hospital area,\textsuperscript{10,38,69} (2) appointment system used to request vision services,\textsuperscript{1,37,70} (3) use of trained ancillary personnel,\textsuperscript{33,39,53} (4) need for a preliminary workup and screening,\textsuperscript{3,17,19,22,51} (5) using automated screeners and refractors\textsuperscript{5,18,20,36,52,65} and (6) given these factors only then can the optometrist deliver full scope care.\textsuperscript{37,57} When these factors are brought together a more effective and efficient working vision care system may be developed.
Military optometry is structured similar to Health Maintenance Organizations (HMOs). In the past few years optometry has also become a part of the changing public health and hospital care scene in America. Both HMOs and public health care systems are physician dominated and administrator (non-physician) run. By looking at both areas, HMOs and the incorporation of optometry into public health, a determination of how they use optometry could be made. Therefore the management and utilization of optometrists in HMO and public health will be analyzed to see if similar techniques can be applied in the military.

This thesis will address some of the problems facing optometry in the Navy today. It will not be a definitive answer, but it will open the door to further research into improved patient care and management techniques in Navy optometry.

E. GOAL OF RESEARCH

The goal of this research is to determine, from the literature, the best possible methods of delivering vision care services. These various delivery methods will be analyzed, altered and packaged into a systematic flow chart of patient care. The flow chart will delineate the various pathways the patient may take depending on the type of visual problem presented by the patient.

This research can be used to redesign the vision care delivery systems at hospitals and dispensaries throughout the Navy. The research can be used to increase efficiency of care and the number of patients seen in their present system. The new organizational flow system for vision
care will not only increase the efficiency of the clinics but will increase the number of patients seen per optometrist, per day. With the increased numbers of patients seen, there will be no degradation of vision services because of the flow design of the system.

This research will also describe the use of sound management techniques for dealing with the patient population, ancillary workers and optometrists. These management techniques will show ways of handling the "people problem" that can exist in any formal organizational structure.
FIGURE 1. Graphic description of optometric examination, diagnosis and treatment services.58
II. EVALUATING OPTOMETRIC CARE
A. WHAT IS AN OPTOMETRIST

To many who read this thesis the question may seem rhetorical, but to the majority just what is an optometrist may be confusing. A Doctor of Optometry (O.D.), an optometrist, is a primary health care professional specifically educated, clinically trained and state licensed to examine, diagnose and treat conditions of the vision system. A working definition of an optometrist from the Journal of Optometric Education states that an optometrist is, "a health care provider who participates as a member of the primary health care team in providing for comprehensive health care, health maintenance, and health education, and a primary vision care provider with the responsibility to prevent, detect, diagnose, treat and/or manage visual and ocular problems, to enhance visual performance, and to provide vision and ocular health education and a continuing program of vision and ocular care."64

A statement about optometry by the Institute of Medicine of the National Academy of Sciences in describing primary health professions, as well as available documentation of the utilization of optometric services, points to optometrist as providers of primary health care services and an entry into the health care system.23,60,61

B. OPTOMETRY AS A PRIMARY CARE PROVIDER

An explanation of primary, secondary and tertiary levels of health care is offered in a 1976 report sponsored by the U.S. Public Health Service. The report defines primary care as "diagnosis and care of the ambulant patient" and "that care rendered at the patient's first point of contact with a wide variety of services," optometry is listed with physi-
cians, clinics, health centers, and pharmacists. Ophthalmology appears at the secondary level, which is distinguished by providing "resources not available at the primary level." 58

Optometry, is considered to supply a "first contact" service where patients seek service for perceived dysfunction or symptoms related to vision performance. Optometrists provide examinations, evaluations, diagnosis and treatment of the great majority of vision/eye problems. In addition, optometrists provide an entry point into the health care system for their patients with ocular disease and ocular manifestations of systemic disease. Management of these problems is through optometric treatment or through consultation with other health care professionals. These activities conform to the concept of primary health care which applies to all those practitioners who by virtue of their state license practice independently.

While optometry does serve as an entry point into primary medical care and has a responsibility to participate as a member of the health care team, by directing to the proper source those patients who are in need of medical care, it cannot be regarded as a primary medical care service. No eye care provider is defined as a primary health care provider in terms of the primary medical care model.

Optometry thus provides a primary health care service, more particularly a primary vision care service, concerning itself with those vision problems that are most prevalent. These conditions include refractive error, presbyopia, binocular dysfunction, and problems related to vision performance. Collectively these account for the overwhelming majority of all vision problems.
C. **SCOPE OF PRIMARY OPTOMETRIC PRACTICE**

Areas in which the primary practitioner of optometry provides definitive diagnosis and full treatment include:

1. Ametropias.
2. Anomalies
3. Common sensory, motor, or perceptual visual anomalies.
4. Common ocular conditions not requiring complex diagnosis or treatment procedures.

Areas in which the primary optometrist makes presumptive diagnosis and seeks consultation or refers include:

1. Oculo-motor and sensory problems of children.
2. Visual and ocular conditions requiring rehabilitative procedures.
3. Ocular disease.

Areas within which the primary optometrist tentatively diagnoses and refers:

1. Complicated strabismus.
2. Learning disabilities.
3. Ocular conditions requiring prosthesis.
5. Problems related to special visual performance demands.
6. Problems involving design of visual environments.
7. Ocular disease requiring surgical or systemic treatment.
8. Neurological disease.

Areas within which the primary optometrist provides advice and
counseling include:

1. Preventive health practices.
2. Appropriate visual environments.
3. Ocular protection and safety.
4. Group vision screening.
5. Optical aids for vocational and avocational uses.

Finally, the general optometrist should be skilled in the application of emergency procedures:

1. Emergency ocular procedures.
2. Emergency general procedures.

All referrals for secondary or tertiary optometric care is to other optometrists specializing in delivery of such care. Optometrists refer to other health care specialties for ocular disease requiring surgical or systemic treatment, neurological disease, systemic disease, behavioral disorders and all emergencies after they have been stabilized.

D. PROBLEMS WITH DELIVERY OF FULL SCOPE CARE IN THE NAVY

If Navy optometrists are not delivering full scope optometric care, what are the compelling reasons? Can it be that the number of optometrists is inadequate to deliver full scope optometric care? Are the needs and demands made of the system so overwhelming that full scope care is not possible? Or is it that those persons who set the number of patients each provider will see does not truly understand what optometry and full scope optometric care is or should be?

Depending on what set of numbers are used, the Navy optometrists to
patient ratio is somewhere between one optometrist per 5,780 (active duty only) or one optometrist per 24,000. The factor affecting this ratio is which group or groups of eligible recipients are to be added to the active duty population. Once a group is added there can be no individual exclusion from within that group.

Optometry is part of the Medical Service Corps of the Navy whose personnel strength is established by Congress. In the military all corps sizes are determined as a given percent of the total fighting force. The medical service corps has 2200 officers and is composed of 11 groups of professionals. Health care administrators account for one-half of all billets (1100), while the other 1100 billets are split among the ten remaining professional groups. Optometry presently is authorized 139 billets, of which 130 are full time clinical positions. For optometry to increase its number of billets either the medical service corps must be increased in size (only by Congressional action) or a medical facility must transfer a billet from another specialty to optometry. Most increases in optometry have been accomplished through the transfer of billets from another profession to optometry.

The need for vision care is that amount necessary to provide all eligible recipients with vision care services. The availability of vision care is that amount that can be provided with the staffing and facilities available. When the demand for vision care exceeds the availability the difference is termed the "unmet need". This later situation is more often the rule rather than the exception. Recipient of vision care may perceive their needs differently than does the administrator or optometrist. As optometrists and health care providers we must attempt to meet the per-
E. HEALTH MAINTENANCE ORGANIZATIONS (HMOs)

Articles written about military optometry by nonmilitary optometrists compare the military optometric practice to that of an optometric practice in an HMO. The similarity comes about by HMOs being a prepaid health care system where the vision needs will be met when needed, at no additional cost to the enrollee. The military optometric care system is similar in that there is no charge to the patient for optometric services.

In HMOs the general level of eye care benefits and the specific types of benefits offered determine the number and type of eye care providers necessary to serve a given population, that is, whether these providers will be optometrists or opthalmologists or a combination of the two. That optometry provides a needed services in HMOs is demonstrated by a 1978 American Optometric Association survey which revealed that two-thirds of all HMOs utilize optometrists on a cost-effective bases, to deliver vision care services. The AOA has recommended a set of qualifications for setting public policy governing HMOs. The AOA recommends that optometrists be utilized as primary eye health care provider. By having access to opthalmological services as well as physician services in family medicine, pediatrics, obstetrics and surgery, the optometrist can provide the management of most vision problems. Studies of referrals for eye and systemic disease within the veteran administration confirms optometry's excellent record in diagnosis and referral. With this excellent record the utilization of optometry as a primary eye care provider allows optometrists to practice the full scope and responsibility provided by their academic credentials, clinical skill and state license.

In a recently completed study, "Eye Care in the HMO Setting: Current
Status and Potential Cost Savings of Alternative Arrangements", 72 three HMOs were selected for an in depth study of eye care benefits delivered. The three HMOs were:

1. Group Health Cooperative of Puget Sound, Seattle, WA (GHC)
2. Kaiser Foundation Health Plan of Oregon, Portland, OR (KAISER)
3. SHARE, Bloomington, MN (SHARE)

The ratio of optometrist to enrollee varied from one per 12,500 at GHC to one per 18,900 at KAISER. Additional optometrists are hired as enrollment increases. This keeps the ratio fairly constant within the HMOs. The services which are included in the comprehensive vision examination are shown in Table 1. There is very little difference in the vision examination given by the different HMOs.

The major differences between the HMOs is in what the optometrists are allowed to do within the group and how they are perceived by the HMO. At GHC most patients seen by the optometrist were for routine visual analysis, vision related problems, eyeglasses, headaches and sore eyes. The most common procedures done by the optometrists in GHC were visual examinations, tonometry, and biomicroscopy. Optometrists may see patients whose chief complaint is red, irritated, uncomfortable eyes. Family practice physicians who see patients with eye disease often refer to optometrist. Once a proper diagnosis has been determined the optometrist will begin treatment that falls within their license, or will manage the patient in consultation with the family physician. Any patient that cannot be handled locally is referred to ophthalmology.

The optometrist and ophthalmologist have their well-defined roles. There is no tension between the two groups. This may be in part because of
Table 1. Comprehensive eye/vision examination

<table>
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<th>GHC</th>
<th>KATSER</th>
<th>SHARE</th>
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<tr>
<td>1. Case History</td>
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<tr>
<td>a. Chief complaint</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>b. Health data pertinent to eyes and vision</td>
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<tr>
<td>c. Vision habits</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>d. Visual demands of occupation and other activities</td>
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<tr>
<td>e. Date of previous examination</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>f. Record of last worn prescription and manner of use and examination</td>
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<tr>
<td>g. Other pertinent data</td>
<td>x</td>
<td>x</td>
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<td>2. Visual acuity unaided and with previous prescription</td>
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<td>x</td>
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<td>3. Examination for eye diseases, ocular manifestations of systemic disease &amp; abnormalities</td>
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<tr>
<td>a. External observation of the eye and adnexa</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>b. Pupillary reflexes</td>
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<td>c. Ophthalmoscopic study of the internal eye</td>
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<td>d. Biomicroscopic exam of anterior eye structure</td>
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<td>e. Field determinations both centrally and peripherally</td>
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<td>f. Ocular motility assessment</td>
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<td>g. Differential color vision</td>
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<td>h. Tonometry (all over 35 years of age)</td>
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<td>i. Dilation and indirect ophthalmoscopy</td>
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<td>j. Other tests when these routine tests indicate need for further study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Visual analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Ophthalmometry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Retinoscopy</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Subjective refraction</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>d. Lateral and vertical phorias</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>e. Lateral and vertical ductions (when indicated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Cross cylinder and/or associated tests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Assessment of accommodation</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>h. Other tests as indicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Visual skills tests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Rotation-pursuit reflex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Versions</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Saccadic movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Steropsis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Fusion ability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Other supplemental tests</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Marks tests done routinely for all patients. Other tests done on a "as Needed".

x Those services performed by each HMO.
the way the two specialties are grouped. Optometrists are grouped with pathology and anesthesiology, while ophthalmology is grouped with surgery. Optometrists are full voting members of the staff except on matters relating to in-house hospital care.

Optometrists at KAISER do not enjoy the same professional freedom as their counterparts at GHC and SHARE. At KAISER the optometrists do only routine visual examinations. Some equipment must be shared between optometrists. Any eye problem that is not routine in nature is seen by ophthalmology. There is a considerable amount of vision care services performed by ophthalmology that could be done by optometry. Only physicians are eligible to be staff members of the HMO at KAISER and optometrists are considered only as employees.

SHARE is midway between GHC and KAISER in its treatment of optometrists. Optometrists see and treat certain acute eye problems. Optometrists are part of the staff and have a seat on the board for the HMO three out of every five years. Optometry and ophthalmology co-chair the eye department, with equal voice on how it will function.

Looking at the study shows that HMOs and the military are quite common in many aspects of vision care delivery. Both HMOs and the military have large patient populations. The level of care given depends on whether there is more dedication to quality vision care (GHC) or quantity of patient care (KAISER). A major and important difference is optometric manpower. If the patient pool on HMOs becomes too large and recipients cannot be seen in a timely manner, another optometrist is hired. Not so in the military. The military system does not acquire additional optometrists simply because patient demand has increased.
The HMO study also showed a high degree of overlapping of services provided between optometry and ophthalmology. When ophthalmology performs services that could be done by optometrists the cost of providing that particular service increases. This is also true in the military. If ophthalmologists are performing "optometry type" vision services, they are not performing their primary specialty. The cost to provide these patient services increases due to the pay differential between the optometrist and ophthalmologist. It may also be an indication that the need for ophthalmology services was overestimated with a resulting underutilization of this specialty. If the patient care requirement could be provided by an additional optometrist instead of an ophthalmologist a considerable cost savings to the hospital and military would result.
III. NEW CLINICAL METHODOLOGY
A. NEW CLINICAL METHODOLOGY

When designing any new system all parts of the system must be looked at objectively and carefully. For any clinic the first contact point for the patient is the appointment system. This is where the system starts, and where it is most important to insure the patient is directed to where they belong with the minimum amount of inconvenience. How the appointment system determines where the patient belongs is important for both the patient and the clinic. The patient must not be inconvenienced and the clinic should not see patients that do not require their care. Most appointment systems in the military are central appointment systems where appointments are made for many clinics. There must be some assistance given to the appointment system personnel by the clinic to help in determining the proper placement of the patients. The author proposes here the use of algorithms. An algorithm is a series of questions asked of people with one word answers. The answer directs the questioner to another question and so on until a determination or final answer is made. It is analogous to using a road map. The proper turns lead you to your destination and you do not have to be skilled in its use to get to the final destination. A member of the central appointment system staff can ask the caller a series of questions and from the answer determine where in the system the caller should be placed (Figure 2). There are those occasions when a simple answer is not sufficient. In these instances additional algorithms must be used.

The areas of contact lenses, headaches, and double vision can have problems that require pertinent additional questions to be asked for determination of where in the system the caller should be placed. Algorithms in
Figure 2. ALGORITHM FOR APPOINTMENT DESK.

ARE YOU HAVING ANY PROBLEMS WITH YOUR EYES?

WHAT SEEMS TO BE THE PROBLEM

THINGS ARE GETTING BLURRED

EYES ARE RED AND ITCHY

PAIN IN/OR AROUND MY EYES

GOT HIT/SOMETHING IN MY EYES

I'M SEEING DOUBLE

MY CONTACTS ARE BOTHERING ME

GETTING HEADACHES

RECENT
FOR A WHILE

RECENT
FOR A WHILE

RECENT
FOR A WHILE

RECENT
FOR A WHILE

RECENT
FOR A WHILE

RECENT
SEE FIG. 2c.

RECENT
SEE FIG. 2a.

RECENT
SEE FIG. 2b.

URGENT VISION CARE

SCREENING CLINIC ROUTINE CARE

FOLLOW-UP CARE

WHY DO YOU WISH TO MAKE AN APPOINTMENT

JUST TO MAKE SURE EVERYTHING IS ALRIGHT

NEED NEW PRESCRIPTION TO GET NEW GLASSES

DRIVERS LICENSE CHECK

WANT MY CONTACTS CHECKED NEED PRESCRIPTION WHEN I REMOVE THE CONTACTS

WANT TO GET CONTACTS

DOCTOR TOLD ME TO MAKE AN APPOINTMENT

VISION CHECK FOR SCHOOL

DOCTOR TOLD ME TO COME BACK FOR A CHECK
Figures 2a, 2b, and 2c are the additional algorithms to be used by the appointment desk. A feature of the algorithms is that it does not require an ocular trained technician to make the determination of patient placement. A non-trained person can make these determinations by the caller's answers, and error will only be generated by the caller not giving the proper response.

The major portion of appointment requests will be directed to the screening clinic. Processing of the patient into the screening clinic will start prior to the patient's actual appointment time. Their records will be pulled from records section and sent to the optometry clinic one day prior to their appointment. At the optometry clinic an ocular technician will do two things. First, the patients will be called to remind them of the screening appointment. At this time if the patient will not be able to make their appointment, alternative times may be given and another patient inserted into the open slot. Second, the technician will examine the patient's record and record on the screening form (Table 2) the last examinations final prescription and disposition. With this complete the patient's screening form will be ready for the patient's arrival.

When the patients arrive for their screening appointment, their record will be available with the screening form attached. An ocular technician will greet the patient and begin the screening process shown in Figure 3. After the technicians have completed their portion of the screening they will direct the patient to the optometrist. The optometrist will review the findings, do the external and internal examinations and determine the disposition of the patient, Figure 3.

A final disposition will be made of all patients going through the
Figure 2a. ALGORITHM FOR "MY CONTACTS ARE BOTHERING ME," APPOINTMENT DESK.

MY CONTACTS ARE BOTHERING ME

IS THERE PAIN/REDNESS

YES NO

IS THE PAIN/REDNESS ONLY WHEN LENSES IN

YES NO

REMOVE LENSES MAKE APPOINTMENT WITH THE SCREENING CLINIC

REDNESS AND PAIN ALWAYS PRESENT

SCREENING CLINIC

IS THERE A BLUR OR COMFORT PROBLEM

NO YES

MAKE APPOINTMENT WITH SPECIALITY CLINIC

SUBSIDES X TIME AFTER LENSES REMOVED

MAKE APPOINTMENT FOR URGENT VISION CARE
Figure 2b. ALGORITHM FOR “GETTING HEADACHES,” APPOINTMENT DESK.

HAVE YOU HAD ANY HEAD OR NECK INJURIES

NO

HOW LONG HAVE YOU HAD THE HEADACHES

A WHILE

RECENT

NO

MORE THAN ONE YEAR

LESS THAN ONE YEAR

HOW LONG HAS IT BEEN SINCE YOUR LAST EXAM

NO

DO YOU WEAR GLASSES

YES

SCREENING CLINIC

NO

DO YOU GET THE HEADACHES WITH GLASSES ON/OFF

ON

OFF

DO YOU GET THE HEADACHES DOING YOUR JOB OR READING

NO

YES

SCREENING CLINIC

DO YOU HAVE ANY MEDICAL PROBLEMS

NO

ARE YOU ON MEDICATION

YES

NO

HAS IT CHANGED RECENTLY

YES

NO

DID THE HEADACHES START WITH THE MEDICINE CHANGE

YES

NO

INTRAPROFESSIONAL REFERRAL

NO

YES

DID HE RECOMMEND YOU GET YOUR VISION CHECKED

NO

DID HE REQUEST IMMEDIATE CARE

YES

NO

URGENT VISION CARE

SCREENING CLINIC

NO

YES

WERE YOU SEEN BY A PHYSICIAN

INTERPROFESSION REFERRAL

NO

YES

DID THE HEADACHES START WITH THE INJURY

NO

YES

HOW SEVERE ARE THE HEADACHES

VERY

MILD

URGENT VISION CARE

SCREENING CLINIC
Figure 2c. ALGORITHM OR "I'VE BEEN SEEING DOUBLE," APPOINTMENT DESK.

HAVE YOU HAD ANY INJURIES TO THE HEAD OR NECK

NO  YES

DOUBLE VISION STARTED OCCURRING AFTER THE INJURY

YES  NO

URGENT VISION CARE  INTRAPROFESSION REFERRAL
Table 2. Proposed screening clinic form.

**SCREENING CLINIC**

<table>
<thead>
<tr>
<th>PRESCREENING: Previous Rx</th>
<th>OD</th>
<th>VA 20/</th>
<th>20/</th>
<th>VA 20/</th>
<th>20/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Last Exam:</td>
<td>OS</td>
<td>VA 20/</td>
<td>20/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposition:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CHIEF COMPLAINT:**

**SCREENING: (MODIFIED CLINICAL TECHNIQUE)**

<table>
<thead>
<tr>
<th>Visual Acuity</th>
<th>OD 20/</th>
<th>20/</th>
<th>OS 20/</th>
<th>20/</th>
<th>Limits:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With Rx</td>
<td>Without Rx</td>
<td>20/50 or less Group I (Priority referral)</td>
<td>15/30 to 20/50 Group II (Routine referral)</td>
<td></td>
</tr>
<tr>
<td>Auto Refractor</td>
<td>OS</td>
<td></td>
<td></td>
<td>Limits:</td>
<td></td>
</tr>
<tr>
<td>Cover Test</td>
<td>With Rx</td>
<td>Without Rx</td>
<td>Astigmatism 1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ESOPHORIA</td>
<td>EXOPHORIA</td>
<td>HYPERPHORIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIST Limits:</td>
<td>8</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEAR Limits:</td>
<td>8</td>
<td>12</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Stereopsis | PASS/FAIL | Test Used |       |
| Color      | PASS/FAIL | Test Used |       |
| Tonometry  | Apl. NCT | mm/Hg | Blood Pressure | 140/90 mm/Hg |
| External Findings: |       |       |

**Internal Findings:**

(Dilated/Non-Dilated)

**Disposition:**

**NAME:** ____________________ | **SSN:** ____________________

**TECHNICIAN:** Signed | **OPTOMETRIST:** Signed

Stamp: ____________________ | Stamp: ____________________
Figure 3. SCREENING CLINIC FLOW DIAGRAM.

APPOINTMENT DESK

SCREENING CLINIC

DISPOSITION OF PATIENT

DIRECT REFERRAL TO SPECIALITY CLINIC

OPTOMETRIC PROBLEM

ROUTINE/URGENT INTRAPROFESSION REFERRAL

FURTHER VISION CARE NOT NEEDED

FOLLOW-UP CARE NEEDED

PRIORITY VISION CARE NEEDED

INTRAPROFESSION REFERRAL

OPTOMETRIC TREATMENT

ADVICE TO THE PATIENT FOR CONTINUED CARE
screening clinic. The patient will be placed into one of the six categories listed below:

1. priority vision care (first available appointment)
2. routine/urgent intra-professional referral (non-emergency)
3. routine vision care (next regular appointment)
4. no further care needed (no change in prescription)
5. no further care needed at this time (return in "X" number of months for further check. For problems such as progressive myopia and higher than normal intraocular pressures)
6. referral to specialty clinic (if available).

The screening clinic could be scheduled for ten patients per hour or 70 patients per day. Screening clinics could run the same number of days per week as there are optometrist. This assures that each optometrist will have patients scheduled for them that are in need of vision care. Each optometrist will spend one day each week working in the screening clinic. The optometrist will see every patient going through the screening clinic and will explain their final disposition to them. In this way each patient will have been seen by an optometrist. It is important to restate that the patient must not be misled into believing that they have just been given a comprehensive visual examination. The patient must be made aware that they were given only a screening. This is one reason why an optometrist must see all the patients who are examined in the screening clinic.

When an urgent request for care is determined to be needed the patient is given an immediate appointment with an optometrist. Each clinic will determine what a visual emergency is and develops a procedure for the scheduling of the patient. The patient may be worked in during the day, scheduled after the last patient for that day or told to come in the next
morning and be seen as the first patient for that day. How the patient is handled will be determined by the individual clinics.

How the patient will be cared for once it is determined that urgent vision care is needed, is shown in Figure 4. An optometric differential diagnosis is made and the patient is directed to the proper professional source for required care. When seen by the optometrist, it is possible that the urgent request for vision care will be determined to be not a valid need at this time. In this instance the patient is advised of the findings and told what care, if any, is required next. For the patients who do have an urgent visual problem, the optometric management of their problem puts the patient in contact with the proper professional for such care.

Contact lens patients can disrupt the screening process by making requests of the screening clinic that it cannot possibly perform. One such request is a prescription for glasses to wear after removal of contacts at night. This type of prescription requires much more time and analysis than that given at the screening clinic. When the request for an appointment is made, and the request is from a stated contact lens wearer, a phone interview must be conducted. The most important question is, "for what purpose do you request this examination?" The patient's response then directs the appointment desk to enter the contact lens wearer into the system, Figures 2 and 2a. Other than to check visual acuity through the contact lenses, the contact lens patient usually needs a contact lens appointment. Depending on what the contact lens patient's request, the time required for this patient could be anywhere from 30 to 90 minutes. Of course, not all the time will be spent with the optometrist.

Patients seen by scheduled appointments in the optometry clinic re-
Figure 4. FLOW DIAGRAM FOR URGENT VISION CARE.

URGENT REQUEST FOR VISION CARE

DIAGNOSTIC OPTOMETRIC EXAMINATION DIFFERENTIAL DIAGNOSIS

HEALTHY, WELL FUNCTIONING VISION SYSTEM OPTOMETRIC PROBLEM OCULAR HEALTH OR GENERAL HEALTH PROBLEM

ADVICE TO THE PATIENT

OPTOMETRIC MANAGEMENT FOR TREATING CONDITIONS OF THE VISION SYSTEM

INTRAPROFESSIONAL REFERRAL OPTOMETRIC TREATMENT INTERPROFESSIONAL REFERRAL

ADVICE TO THE PATIENT FOR CONTINUING CARE
ceive these appointments in three possible ways. The appointment can come from the screening clinic in the form of an urgent request for vision care or by intra-professional referral. How the clinic functions and what care should be given is found in Figure 5.

After receiving fullscope optometric care the disposition of the patient falls into one of five categories. There can be a need for ancillary testing, intra-professional referral, directed to secondary care specialty clinics or tertiary care with advice to the patient for continual care and with referral to the proper specialty clinic. A small percentage of patients will require additional ancillary testing or intra-professional referral. Tertiary care would be limited and be available only at larger medical treatment facilities, such as San Diego or Bethesda, or by referral to a civilian source.

Secondary care optometric specialty clinics receive their patients from four sources — screening clinic, intra-professional referral, urgent request for vision care and routine referral from the optometry clinic. The possible reasons for referral to the specialty clinics is shown in Figure 6. Each specialty clinic has listed those problems normally requiring the care offered by the specialty clinic.

All follow-up care should be scheduled by the optometry clinic rather than the central appointment system. The optometrist is the best judge of how much time will be needed for the follow-up care. In this way variable times can be set depending on the type of follow-up care needed.

This proposed methodology for delivering vision care is a basic design and should be modified to fit the needs of different optometry clinics. It may work well for some clinics and poorly, or not at all, for others. It
Figure 5. OPTOMETRY CLINICAL TREATMENT FLOW DIAGRAM.

1. Entrance VA's
2. Confrontation fields, Hirschberg, stereopsis testing pupil response, phorias
3. External adnexa examination
4. Keratometry
5. Ophthalmoscopy (Undilated)
6. Retinoscopy
7. Subjective refraction
8. Binocular function testing
9. Muscle balance testing
10. Accommodative facility testing
11. Slit lamp examination
12. Determination if vision problem requires further specialized testing, visual fields, fundus photography, or anterior segment photography
13. Ophthalmoscopy (Dilated)
14. Tonometry

SECONDARY CARE
1. Contact lens analysis and fitting
2. Low vision
3. Orthoptic visual therapy
4. Learning disability testing and analysis

TERTIARY CARE
1. Electrodiagnostics
2. Fitting contact lenses to correct medical problems of the cornea
3. Fitting low vision devices on degenerative maculopathy patients

INTRAPROFESSION REFERRAL
1. Ophthalmology
2. Primary care physician
3. Internal medicine

* Only if not previously done.

** Not Normally Offered
Figure 6. SECONDARY CARE SPECIALITY CLINICS FLOW DIAGRAM.

REASONS FOR REFERRAL TO SPECIALITY CLINICS

<table>
<thead>
<tr>
<th>CONTACT LENS</th>
<th>VISION THERAPY</th>
<th>LOW VISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Strabismus</td>
<td>2. Oculomotor</td>
<td>2. Binocular Dysfunction</td>
</tr>
</tbody>
</table>
should be seen as a beginning and could be incorporated into the ideas of other optometrists to develop more efficient and effective optometry clinics.

B. MANAGEMENT GUIDELINES

"Only a clear definition of the mission and purpose of the business makes possible clear and realistic business objectives. It is the foundation for priorities, strategies, plans and work assignments. It is the starting point for the design of managerial jobs and above all for the design of managerial structure. Structure follows strategy. Strategy determines what the key activities are in a given business. And strategy requires knowing what our business is and what it should be."

The primary mission of the military health service system is the maintenance of the military force in a physically and mentally combat-ready status. Other objectives are:

1. The assurance of the timely availability of trained manpower and other health resources required to support combat mobilization and contingency plans of the armed services.
2. The provision of health care as part of the military pay benefit.
3. The maintenance of these functions as effectively and efficiently as possible within the constraints of assigned missions and responsibilities.

Optometry being part of the health care service knows that its mission and purpose is to give the Navy and Marine personnel the best possible vision care for the performance of their duties.

The proposed optometric clinical system was designed to alleviate some
of the demands put on the vision care system by beneficiaries other than active duty personnel. The proposed optometric clinical system is, "the foundation for priorities, strategies, plans and work assignments" needed to meet the demands on the present system, organizational structure.

For the optometric clinical system to function it must have a sound organizational structure. Peter Drucker in his book on Management: Task, Responsibilities, and Practices gave seven points that are needed to satisfy minimum requirements with respect to organizational structure.12 His seven points can be carried over directly and used to set the minimum requirement for the clinical optometric organization. The seven points are clarity, economy, the direction of vision, understanding by the individual of his own task and the task of the whole, decision making, stability and adaptability, and perpetuation and self-renewal.

1. Clarity. Each managerial component, and each individual within the organization needs to know where they belong, where they stand, where they go for whatever is needed, whether information, cooperation, or decision, and how to get there.

2. Economy. The minimum effort should be needed to control, to supervise, and to coax people to perform.

3. The direction of vision. Organization structure should direct the vision of individuals and of managerial units toward performance rather than toward effort.

4. Understanding one's own task and the common task. An organization should enable each individual, especially each manager and each professional to understand his own task.

5. Decision-making. An organization design, needs to be tested as to
whether it impedes or strengthens the decision-making process. Decisions have to be made on the right issues, and at the right level, and have to be converted into work and accomplishment.

6. Stability and adaptability. An organization must be able to work in turmoil. It must build on its performance and achievement of yesterday, and be able to plan for its own future and continuity. An organization must be able to adapt to new situations, new demands, new conditions, new faces and personalities for it to survive.

7. Perpetuation and self-renewal. An organization must be able to produce from within tomorrow's leaders. It must have the ability to prepare and test a man on each level for the next level above, and especially to prepare and test today's junior and middle managers for senior and top managerial positions.

The seven points described by Drucker if understood and implemented by senior optometrist and administrators can directly lead to a smoother functioning optometric organizational structure, clinically.

But even with the best possible organizational structure success is not guaranteed. There must be an effective manager in place to direct and guide the optometric clinical organization.

A poignant point about professionals and management was found in a masters thesis by Lieutenant Richard Blanchette USN. In a telephone interview with Dr. Count Gibson, Chairman of the Department of the School of Medicine at Stanford University, Blanchette asked, "why physicians failed to observe the basic principles of management?" Dr. Gibsons reply was, "students come to us blissfully ignorant of management. Four years later they leave here as physicians still blissfully ignorant of management."6
The statement is true for optometrist as well as physicians. The four year didactic curriculum is crammed with courses for the development of an optometrist. Management is not considered except in a course called, "Optometric Practice Management." This course simply teaches an optometry student the basics of running a solo practice. There is no management theory or management principles taught. In the military as you advance in rank and responsibility management of people and running of a clinic is inevitable. The optometrist would not have had any formal education or training in the management of people or running clinics. Their management skills (if any) are learned from their senior optometrist. How can an optometrist be required to show good managerial skills if they were never taught managerial skills or had access to learning any management?

Some optometrists may not be good managers, but may be excellent clinicians. Because of the military structure where with rank comes responsibility the optometrist may get thrust into management positions whether they want it or not. If they fail as managers they fail as military professionals and this may hinder their chances of promotion. Clinical expertise carries little weight when managerial ability is the expected norm.

With such great emphasis on management those optometrists selected to become the heads of a large clinic should be required to attend management courses so as to acquire the skills they need to properly carry out their assignment. If good managers are what is desired then train the personnel to become good managers. The only course available to military optometrists in management is at Pacific University, College of Optometry where a Masters Degree is offered in Clinical Optometric Management. All middle
grade optometrist who are slated to become the chief of a large clinic should attend this type of management training. This will give them the necessary skills to become effective clinical managers.

Before describing the type of management system that would best work in the clinical setting let's briefly look at the overall management scheme of the military care facility.

The decision-making function belongs primarily to top-level management, commanding officer, but it can also involve interaction among several groups and individuals in the hospital organization. Normally no major decision is made by any one department manager (clinical department heads). The hospital care facilities organization hierarchy determines the pattern of participation in any decision making process. Top-level managers make the pervasive, critical, non-programmed, root decisions, such as selection of goals and development of major policy guidelines. The health care facility organizational structure limits the decision-making ability of all other managers in terms of authority and responsibility. As such clinical department heads make decisions for their departments within the framework set by the commanding officer.

For optometry in the Navy there are complexities in the decision making process. Naval optometrists are medical service corps officers in a clinical specialty and this can cause difficulties imposed by the mixed authority (administrative and clinical) that optometrists must answer to in the military health care organization. Regardless of the difficulties experienced with mixed authority the commanding officer sets clinical policy and it is the senior optometrists duty to see that his policy is carried out.
What type of management style would be most effective in running optometry clinics? In the author's opinion the management style is that of a participative manager. The reason for selecting participating type of management is that optometrist are still clinicians and as such spend most of their time with patients. They rely on the other staff optometrist and technicians for input as to how the clinic is functioning overall. The senior optometrist must be aware of the different values, feelings and perceptions of the other optometrists and staff. His values, feelings and perceptions may not necessarily be the same as theirs. Personal style of an individual has a lot to do with how they manage. In most instances the other optometrists are younger and trained at various schools of optometry. There are usually philosophical differences that arise in the delivery of optometric care. The newer optometrists are trained in state of the art optometry and wish to practice those methods. Therefore an understanding of how the other optometrists and staff perceives the importance of what they are doing is beneficial to the running of an efficient and effective optometry clinic.

The senior optometrist must also cope with the different personalities of the other optometrists and staff. As a participative manager the senior optometrist would allow the members of the clinic to operate as a team. The clinical team together then pursues a shared goal to which each staff member is presumed to have a potential contribution. Whenever progress toward achieving the clinical goal is perceived to be thwarted a conflict could arise.

One of the hardest things about becoming a participative manager is the occasional need to sacrifice the best solution or approach to a problem
just to sustain staff involvement. People whose ideas are always turned down will eventually become turned off. Experiment with ideas, keep the ones that work, disregard those that don't. 7

For those managers brought up without formal management skills it may be difficult operating under a new set of guidelines. A manager trained (on the job) in an autocratic management style will have great difficulty changing to a participative management style. With participative management staff optometrist and technicians can have a share of the action rather than feeling blocked or frustrated by a rigid bureaucracy. The results, both in quantifiable terms of productivity improvement and in less measurable terms of work climate and quality of innovation, can be extremely positive.7

Having a participative management program in itself is not sufficient. Once the management style is in place the optometrist and technicians must understand it, accept it and be willing to use it, particularly if they helped design it.

Remember also, the simplest organizational structure is the one that will do the job the best. What makes an organization "good" is the problems it does not create. Some design principles are more difficult and problematical than others, but none are without difficulties and problems. Design principles are tools that can be used properly or improperly. The person using the design must keep in mind the purpose of the design. Regardless of the health, clarity, or perfection of an organizational design it is useless without the performance of its people.
IV. FACTORS ASSOCIATED WITH MILITARY CLINICAL OPTOMETRIC CARE
A. **DETERMINATION OF OPTOMETRIC MANPOWER NEEDS**

The vision care needs of a population have customarily been described in terms of the manpower required to deliver a given level of service to that given population. Ratios of practitioners to population have been determined by using historical data, or estimated utilization rates, morbidity rates, or time allocations worked into a model for the delivery of the health care.

To illustrate how manpower indices or ratios can be determined the following figures are used. Presently there are 551,300 Navy and 198,700 marines on active duty with 130 optometrist rendering patient care. These figures work out to an optometrist to patient ratio of one per 5,780. The optometrist to patient ratio in the United States is one optometrist to every 7,680 people. Does this lower ratio in the Navy indicate an excess of optometrists, or just an improper use of data in the determination of the optometrist to patient ratio?

The Navy medical department has historically used morbidity rates as its bases for determining their health manpower needs. This method is not totally accurate in determining the number of optometrists needed because of the lack of complete input information needed for accuracy on the morbidity report, section VI. (Figure 7) Optometrists do many professional tasks in addition to routine visual examinations. Optometrists fit contact lenses, do low vision analysis, visual screening, rehabilitative optometry, visual fields, photography, and consultation. None of these are part of a routine visual examination but they all must be counted on the present morbidity forms. A more accurate method of determining the true work load of the optometrist and the optometry clinic is by logging the type of services provided to the patients.
## SECTION I - GENERAL WORKLOAD

<table>
<thead>
<tr>
<th>LINE</th>
<th>DESCRIPTION</th>
<th>ACTIVE DUTY - U.S. UNIFORMED SERVICES</th>
<th>DEPENDENTS</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A NAVY</td>
<td>B MARCORS</td>
</tr>
<tr>
<td>01</td>
<td>OUTPATIENT VISITS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>INPATIENT VISITS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>ADMITTED TO QUARTERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>QUARTERS PATIENT DAYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEPENDENTS</td>
<td>SPECIAL CATEGORIES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A ARMY</td>
<td>B AIR FORCE</td>
<td>C OTHER U.S.</td>
</tr>
<tr>
<td>05</td>
<td>OUTPATIENT VISITS</td>
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<tr>
<td>06</td>
<td>INPATIENT VISITS</td>
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## SECTION II - ADJUNCT SERVICES

<table>
<thead>
<tr>
<th></th>
<th>A OUTPATIENT</th>
<th>B INPATIENT</th>
<th>C OUTPATIENT</th>
<th>D INPATIENT</th>
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</thead>
<tbody>
<tr>
<td>07 LABORATORY TESTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08 PULMONARY FUNCTION STUDIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09 AUDIOGRAMS</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10 COBALT/CESIUM</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11 ECGs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 RADIOISOTOPE STUDIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 OTHER DEEP THERAPY</td>
<td></td>
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</table>

## SECTION III - OTHER SERVICES

### OPHTHALMOLOGY

<table>
<thead>
<tr>
<th>A REFRACTION</th>
<th>B REFRACTION</th>
<th>C SINGLE</th>
<th>D BIFOCAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td>MC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MISCELLANEOUS

<table>
<thead>
<tr>
<th>E FABRICATED SINGLE VIS</th>
<th>F FLIGHT PHYS EXAM</th>
<th>G OTHER COMP PHYS EXAM</th>
<th>H IMMUNIZATIONS</th>
<th>I LIMITED SERVICES</th>
</tr>
</thead>
</table>

## SECTION IV - SELECTED DATA

<table>
<thead>
<tr>
<th>A FETAL DEATH</th>
<th>VASECTOMIES</th>
<th>D PEAK CENSUS</th>
<th>E NAVY</th>
<th>F MARCORS</th>
<th>G ARMY</th>
<th>M AIR FORCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD NMC</td>
<td>OTHER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SECTION V - ACTIVE DUTY AVERAGE STRENGTH

<table>
<thead>
<tr>
<th>D LIMITED SERVICES</th>
<th>E OUTPATIENT</th>
<th>F INPATIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANESTHESIOLOGY</td>
<td>CHEST DISEASE</td>
<td></td>
</tr>
<tr>
<td>Emergency Room</td>
<td>GASTROENTEROLOGY</td>
<td></td>
</tr>
<tr>
<td>General Practice</td>
<td>GYNECOLOGY</td>
<td></td>
</tr>
<tr>
<td>Neurology</td>
<td>OBSTTRICS</td>
<td></td>
</tr>
<tr>
<td>Thoracic Surgery</td>
<td>OPTOMETRY</td>
<td></td>
</tr>
<tr>
<td>Physical Therapy</td>
<td>PHYSICAL THERAPY</td>
<td></td>
</tr>
</tbody>
</table>
Most optometry clinics in the Navy see patients that are not active duty. Their patient loads consist of active duty dependents, retirees, and retiree dependents. When optometry clinics see these recipients other factors must go into the determination of optometric manpower. Age and the associated percentage having visual defects is one such factor. (Table 3)

An increase in the optometrist to patient ratio to one optometrist to 24,000 when other than active duty are seen as patients is another factor. If you have a large retiree population between 45 and 65 years of age eighty-three percent of the population will have some visual dysfunction. For this given population you would need a higher ratio of optometrists because the examinations would require more time. The reverse is true with a young family population under the age of thirty-five. In this population only twenty-three percent are likely to have a visual dysfunction, therefore not as many optometrists would be needed.

Table 3. Visual defects per age group.10

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>% Having Vision Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5</td>
<td>10</td>
</tr>
<tr>
<td>5 - 13</td>
<td>15</td>
</tr>
<tr>
<td>14 - 17</td>
<td>20</td>
</tr>
<tr>
<td>18 - 20</td>
<td>25</td>
</tr>
<tr>
<td>21 - 24</td>
<td>30</td>
</tr>
<tr>
<td>25 - 34</td>
<td>40</td>
</tr>
<tr>
<td>35 - 44</td>
<td>60</td>
</tr>
<tr>
<td>45 - 54</td>
<td>70</td>
</tr>
<tr>
<td>55 - 64</td>
<td>85</td>
</tr>
<tr>
<td>65 and over</td>
<td>95</td>
</tr>
</tbody>
</table>

To increase optometric manpower to accommodate all recipients of care would be above the normal manning requirements for a given clinic. If a
hospital's active duty population requires two optometrists but allows a large dependent and retiree population to be seen, an additional two optometrists may be needed to handle the demand. Those optometrists seeing the dependents and retiree population would normally see less patients per day than the optometrists seeing active duty because of increased visual problems associated with the age group. Thus the examination requirements for the two groups are not the same with the dependent and retiree population requiring a more extensive examination.

An analysis of the demographic data of a given patient drawing area along with more accurate data input to the morbidity report can be used for the determination of more accurate optometric manpower needs. This data used in conjunction with type and mode of optometric care available further refines the optometric clinical manpower needs.

For those who prefer a mathematical model one was developed by Lieutenant Colonel William Richardson, United States Army. In his masters thesis, "A Manpower Formula for U.S. Army Optometric Clinics" he generated a formula for determining optometry officer manpower needs for the Army optometry clinics. (Figure 8) It would seem appropriate to use this formula as a possible guide in determining what the Navy's optometric manpower needs may be.

The formula is based on all factors presented in a given geographical area. It allows for the adding or subtracting of eligible recipient groups so as to agree with the hospital care directives. The formula should not be used when rapid changes in population occur or when there is a rapid fluxuation in the patient group to be seen. The optometry manpower requirement formula could be used in determining if present staffing is
Figure 8. Formula for determining optometry officer manpower.

Optometry officer manpower requirement

\[ 21.5(AD) + 18.1(ADD) + 30.2(R) + 24.5(RD) = 94,980 \text{ (Productive minutes per optometrist per year)} \]

Where:

- AD = Active Duty Population
- ADD = Active Duty Dependent Population
- R = Retired Population

21.5 = weighted time factor for active duty
18.1 = weighted time factor for active duty dependents
30.2 = weighted time factor for retired
24.6 = weighted time factor for retired dependents

Note: Where ophthalmology services are present, multiply the results by .9.

correct or if a naval base area has growth potential (Bangor, Washington, new submarine base) and how many optometrists will be needed to meet the projected demand for optometric services.

B. MILITARY DEFINITION OF OPTOMETRIST

Each service has its own definition of optometrists and exactly what their functions are, and within what limitations they can provide care. Each definition is different and the degrees of freedom in which to practice optometry are not the same.

ARMY - Hospital privileges requested for assigned Optometry Officers (68K) are consistent with the following functions statement. The optometry officer: examines, diagnosis, and treats conditions of the vision system. Conducts vision examinations for detecting and evaluating refractive er-
rors, ocular motility, binocular function, disease, and other conditions. Engages in teaching and research, and provides optometric consultant services. Performs necessary procedures for prescribing contact lenses, including required follow-up care, and evaluates ocular problems associated with their use. Performs cycloplegic and manifest examinations for physical examinations. Utilizes optometric procedures including drugs and ophthalmic instruments to investigate manifestations of disease and injury. Refers manifestations of ocular and systemic disease or injury for further evaluation and treatment as required. Provides treatment in the form of ophthalmic lenses, contact lenses and authorized ocular therapeutics, and administers orthoptic and visual training. Monitors, provides consultative services and participates in occupational vision and community health programs. Supervises optometry clinics and services. Conducts examinations related to ocular surveillance of ionizing and nonionizing radiation workers.

**AIR FORCE - Duties and Responsibilities**

a. Conducts examinations of eye: With or without the use of diagnostic drugs, examines eye to ascertain presence or absence of defects or visual anomalies which can be corrected, remedied, or relieved by use of lenses, prisms, orthoptics, contact lenses, or other ophthalmic devices. Performs external and internal examination of the eyes and refers suspected and detected pathology to the appropriate medical specialties. Determines refractive errors such as myopia, hyperopia, or astigmatism and prescribes appropriate treatment for these and other visual problems. Ascertains through clinical tests, range of
vision and ability and ease with which eyes maintain clear, comfortable, binocular vision at any distance of fixation.

b. Prescribes treatment to conserve or improve vision: Prescribes appropriate lenses to correct various errors of refractions. Prescribes and administers orthoptic or visual training in those instances where such procedures are indicated, as in ocular muscle imbalances, fusional problems, and as an adjunct in treatment of strabismus. Refers for medical treatment or surgery, those cases characterized by disease or injury. Examines and tests lenses for proper workmanship and conformance to prescription.

c. Conducts research: Plans and conducts research in broad areas of clinical optometry and physiological optics; such investigative studies to include, among others, physical standards, protective and corrective eye wear, examining methods and techniques, and perceptual problems associated with aeronautics and space flight.

d. Directs optometry personnel: Plans work assignments for optometry personnel including preparation and maintenance of optometric records. Observes and reviews the performance of technicians to determine compliance with procedures governing optometric activities. Instructs optometry technicians in local operational procedures, and in the use and maintenance of ophthalmic instruments.

e. Plans and directs occupational vision programs: Plans, supervises, and participates in eye protection programs in accordance with AFR 161-31 and AFR 167-3. Participates in the identification of eye hazardous areas and occupations, and supervises visual screening of personnel in such areas. Arranges for professional services, and
procurement and dispensing of safety eye wear for military personnel and civilian employees of the Department of the Air Force.

NAVY – 0880 OPTOMETRIST (OPTOMETRIST) – Examines eyes and adnexa, determines their conditions, and, when appropriate, prescribes corrective treatment. Determines, by means of ophthalmic instruments and optometric techniques, vision abnormalities which may be corrected or improved by lenses, prisms, or other ophthalmic devices; prescribes corrective lenses, and orthoptic training; refers patients for medical treatment or surgery when ocular manifestation of disease is present; directs eye protection programs; supervises optician technicians in fabricating and dispensing spectacles; manages ophthalmic service unit or lens laboratory.

Related Codes: NOBC – None; DOD Group – 6H Allied Medical

Each of the services definition of optometrist is different and yet they are the same. They all basically say the same thing and vary only in the degree of explicitness.

C. ANCILLARY/PARAOPTOMETRIC PERSONNEL

Recent studies have shown that the use of ancillary personnel is necessary for the efficient operation of today's modern practices. The use of ancillary/paraoptometric personnel to perform routine and specialized tasks frees the doctors to perform their required special tasks. Efficient use of ancillary/paraoptometric personnel can result in an increase in productivity and better utilization of skilled manpower. In optometry like other specialties there are a number of tasks that can be delegated to ancillary personnel without any adverse effects on the quality
of care provided to patients.

The task delegation in optometry was shown to be effective by Haf­fner. He devised two models showing alternatives in utilization of ancillary/paraoptometric personnel. (Table 4) The time-motion study showed that delegation of task can save up to one-half the normal examination time, (model B). It is noted that the paraoptometric personnel require the same amount of time as the optometrist to complete the same tasks. Hypothetically it is possible with model B to increase productivity 100 per cent. A 100 per cent increase, however, is not actually because of many unknown factors. Some of the unknowns could be patient mix, patient past history, present complaint, and requirement for additional testing. In the authors opinion a more realistic figure for increased productivity is forty per cent.

Table 4. Time study for use with paraoptometric personnel.

<table>
<thead>
<tr>
<th>Task</th>
<th>Existing Allowances</th>
<th>Model A O.D. Ass't</th>
<th>Model B O.D. Ass't</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Visual Acuity Measurements</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Lensometry</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>External Examination</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Ophthalmoscopy</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Keratometry</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Retinoscopy</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Subjective Examination</td>
<td>5-15</td>
<td>5-15</td>
<td>5-15</td>
</tr>
<tr>
<td>Binocular Coordination Testing</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Visual Analysis</td>
<td>2-10</td>
<td>2-10</td>
<td>2-10</td>
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<tr>
<td>Patient Explanation</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Frame Selection</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Prescription Verification</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Dispensing</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Return problems (1 out of 10)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Tonometry (1 out of 2)</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Field Screening (1 out of 2)</td>
<td>3</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>
In the military the increased use of ancillary/paraoptometric personnel is dependent on manning allowances of the clinic and hospital. At times throughout the military there are shortages of certain skills. There can be long time delays from the realization of need for the skill until the arrival of the new replacement. In some skill areas the shortages can last from a matter of weeks to many months. A stopgap measure used in the military hospital care system is the use of OJTs. OJTs are people who are trained on-the-job. It is possible to be short of ocular technicians but in excess of general duty corpmen. In this instance it may be possible to acquire a general duty corpman to train and use as an ocular technician. In most instances this works favorably for both the corpman and the clinic.

In a study done by University of Florida Department of Ophthalmology it was found that ocular technicians properly trained, "should be able to substitute for ophthalmologist in a substantial portion of the general examinations without sacrificing quality of care". It should be fair to say that a properly trained ocular technician could also substitute for an optometrist in doing some optometric procedures without sacrificing quality of care.

Unfortunately the values, attitudes, and beliefs held by the professional can manifest themselves as significant barriers to increased utilization of ancillary/paraoptometric personnel. With the increase use of paraprofessional personnel in the vision care delivery system the potential for increased productivity and high quality care cannot be minimized. However any change in the organization and delivery of vision care must be accepted by the professionals involved. The optometrist, and at times the ophthalmologist, must be sensitized in their professional training to the
increased quality and productivity of care the ancillary/paraoptometric can provide.

With the increase in ancillary personnel to increase the efficiency and effectiveness of the optometry clinic another important factor arises. To be efficient and effective there must be adequate space. Without adequate space the increase in personnel and the tasks that they perform would become counterproductive. Space at most medical treatment facilities is at a premium and extra space is not readily available. This factor must be dealt with and solved if increased productivity is desired.

D. OPTOMETRIC SPACE REQUIREMENTS

The military optometrist cannot generally obtain what they feel to be adequate space to deliver optometric care. It is only when a new or remodeled facility is in the planning stated that they may have any input for their allotted workspace. The University of Florida, Department of Ophthalmology study stated, "the interrelationships between productivity, skill level, number of rooms (underline added) and staffing problems are complex and if not properly understood, employing technicians could be counterproductive". Number or rooms is space and this space may not be available in the military health care facility. To further complicate matters Congress in a U.S. House of Representative report stated that "the amount of space so programmed shall be limited to that amount determined by the Secretary concerned to be necessary to support teaching and training requirements in uniformed service facilities, except that space may be programmed in areas having a large concentration of retired members and their dependents where there is also a projected critical shortage of
community facilities. Prior to this statement to care for the needs of the retiree and their dependents, the determination of hospital size depended on only the need to provide care for active duty members and their dependents, plus any additional space the service Secretaries determined necessary for teaching and training. How much space is necessary for the delivery of good vision care by military optometry?

Elmstrom and Mercer suggest deciding on what the optometric services and needs are, deciding the square footage that can meet the needs of those services, and designing the office around this total. They also suggest the designing of the vision care area around an eight foot wide by twenty-three foot long refracting lane. The types of rooms and space needed are listed in tables 5 and 6. At the author's previous command the total area used by the vision department (optometry/ophthalmology) was 1,040 square feet. Breakdown of spaces are listed in table 7. The area of the vision department corresponds closely to Elmstrom's minimum space requirements, except that it was used by two optometrist and two ophthalmologists with four technicians. The waiting and reception areas were shared by Urology and ENT.

Table 5. Minimum optometric office room sizes according to Elmstrom, 1974

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Size in Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting/Reception room</td>
<td>198</td>
</tr>
<tr>
<td>Secretary's Office</td>
<td>60</td>
</tr>
<tr>
<td>Refraction Lane</td>
<td>200</td>
</tr>
<tr>
<td>Vision Training Room</td>
<td>100</td>
</tr>
<tr>
<td>Fields Room</td>
<td>100</td>
</tr>
<tr>
<td>Contact Lens Room</td>
<td>50</td>
</tr>
<tr>
<td>Treatment Room</td>
<td>85</td>
</tr>
<tr>
<td>Dispensary (per table)</td>
<td>65</td>
</tr>
<tr>
<td>Private Office</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>933</td>
</tr>
</tbody>
</table>
Table 6. Minimum optometric office room sizes according to Mercer28, 1979

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Size in Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting/Reception room</td>
<td>198</td>
</tr>
<tr>
<td>Secretary's Office</td>
<td>60</td>
</tr>
<tr>
<td>Refraction Lane/Office combined</td>
<td>200</td>
</tr>
<tr>
<td>Vision Training Room</td>
<td>100</td>
</tr>
<tr>
<td>Field Room</td>
<td>100</td>
</tr>
<tr>
<td>Contact Lens Room</td>
<td>50</td>
</tr>
<tr>
<td>Treatment Room</td>
<td>85</td>
</tr>
<tr>
<td>Dispensary (per table)</td>
<td>65</td>
</tr>
<tr>
<td>Private Office</td>
<td>75</td>
</tr>
<tr>
<td>Data Collection Center</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>1,133</td>
</tr>
</tbody>
</table>

Table 7. Ophthalmology/Optometry Eye Care Department, Author's previous duty station.

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Size in Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting Area (Opt/Ophth, Urology, ENT)</td>
<td>100</td>
</tr>
<tr>
<td>Reception Area (Opt/Ophth, Urology, ENT)</td>
<td>240</td>
</tr>
<tr>
<td>Refracting Lane/Office (Ophth)</td>
<td>180</td>
</tr>
<tr>
<td>Refracting Lane/Office (Ophth)</td>
<td>100</td>
</tr>
<tr>
<td>Refracting Lane/Office (Opt)</td>
<td>150</td>
</tr>
<tr>
<td>Refracting Lane/Office (Opt)</td>
<td>190</td>
</tr>
<tr>
<td>Fields/Camera Room</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>1,040</td>
</tr>
</tbody>
</table>

A recent study by Utech, "A Minimum Space Guideline for U.S. Air Force Optometry Services," 62 suggest a minimum space allocation for optometry clinics of 654 square feet for every optometrist and technician. (Table 8) If a second optometrist is present the needed increase in space would be for an examination/office and waiting room space for his patients. For the author's previous duty station the allocated space as proposed by Utech should have been 1,542 square feet.

The proposed guidelines of Table 8 should be used as minimum requirements in any new clinic being designed or remodeled. A variable that must be looked at in each clinic location is the demographic patient data. This
Table 8. Proposed space allocation guidelines for Air Force optometry services with one optometrist plus one assistant.47

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Size in Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting Area</td>
<td>94</td>
</tr>
<tr>
<td>Reception Area</td>
<td>35</td>
</tr>
<tr>
<td>Administrative Office</td>
<td>60</td>
</tr>
<tr>
<td>Dispensary Area</td>
<td>50</td>
</tr>
<tr>
<td>Screening Test Area</td>
<td>50</td>
</tr>
<tr>
<td>Combined Office/Refracting Lane</td>
<td>200</td>
</tr>
<tr>
<td>Visual Fields/Dark Room</td>
<td>100</td>
</tr>
<tr>
<td>Special Procedure Room</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>654</strong></td>
</tr>
</tbody>
</table>

Data may require the need for additional space over and above the proposed space needs.

E. AUTOMATED EQUIPMENT - AUTOREFRACTORS

Autorefractors have been around since the early 1970's when Basuch & Lomb, Acuity Systems, and American Optical introduced the first generation of autorefractors. Since then the state of the art has increased to include infrared optical systems, increased speed in analysis, and the ability of an assistant to collect the patient data. Autorefractors are divided into two categories, subjective or objective refractors. Subjective refractors all require some type of subjective response from the patient. Objective refractors requires the examiner to align the instrument target with the patient's pupil, then activate the system to perform a rapid monocular refraction. Subjective refractors require a cooperative and responsive patient. In the objective refractor the patient can be passive, requiring only that they view a target. Objective refractors are rapid, can give repetitive readings, accurate and with less fatigue, and less demand of the patient compared to the subjective refractors. Both
instruments can be used for overrefraction information. The only limitation being the specular reflection from the front surface of the spectacles.

Examination time varies from 30 seconds to 4 minutes on the objective refractors. Subjective refractors require more time because of patient response. Their time varies from 5 to 20 minutes.

With what is required of each instrument in the performance of its task the subjective refractors have many more controls than the objective refractor. A trained technician is needed for the running of subjective refractive instruments.

Both instruments have good accuracy, but neither instrument can replace the need for the optometrist. The findings of either instrument can be used as a starting point, but refinement is necessary for the final prescription.

For the best results with subjective refractors the binocular visual acuity (BVA) must be 20/40 or better. Objective refractors are a little better in that the patient needs only 20/60 or better acuity.

Patient cooperation is a must if subjective refractors are used. Objective refractors require minimal patient input and have a wider variety of uses in military type settings. An advantage of automated refracting equipment is that in the military clinical setting they can be used in the screening process of patients. Overrefraction data allows the optometrist to judge whether or not a full examination is necessary. The rapid nature of the objective refractor is valuable when traditional methods of examination are not possible. These include young children, noncommunicative patients, patients on medication, and patients that have fixation difficul-
ties often associated with reduced visual acuity. Use of these instruments have their greatest advantage in the high volume practice, typical of military optometry clinics. The instrument of choices for use in these settings is the objective refractor.

F. HEALTH CARE APPOINTMENT SYSTEM

Health care in the Navy is given at no cost to eligible recipients. Only cost to dependents, retired and their dependents is for in-patient hospital meals. With the financial barrier of the fee for service removed, the demand for health care services is greater causing many delays. The delays can be on the phone waiting to make an appointment, long lead times till the scheduled appointment, and long waits for the doctor in the clinic.

Initial entry into the optometric care system is usually by phone to a central appointment desk. There are possibilities that at some bases or clinics entry into the optometry clinic is made directly with the optometry clinic. The appointment system must be able to determine the "urgency" of care needed by the patient, and yet be able to recognize and deal with the frustration associated with waiting for the care. The appointment system should be sensitive to sudden changes in procedures, and service capabilities such as, the loss of an appointment clerk or health care provider.

To assist the appointment desk there could be a series of algorithms that when used would allow the appointment desk operator to place the patient properly into the optometric clinical system. The algorithm question would have simple one word answers, that requires no special training on the part of the appointment desk. Even with algorithms there will be
instances where doubt will exist on where the patient should be placed. For these cases the appointment desk could either contact the clinic for further instructions or refer the patient to phone the client directly. With the importance of correct patient placement into the vision care system, time must be taken to developing the most effective appointment system possible for each individual clinic.

G. NO SHOWS FOR APPOINTMENTS

No shows are a problem in any system that requires a waiting period from the time a request is made for an appointment until the appointment. The longer the delay the greater the probability of a no show.

The author did a survey in 1983 of the optometry clinics in and around the Portsmouth, Virginia naval area. The survey included the main naval hospital in Portsmouth, Virginia and the surrounding six clinics. Data collected from the clinics were for the time period January, 1982 till January, 1983. For the Portsmouth, Virginia area the number of no shows was in excess of 5,000 or 12.1 percent of all the patients scheduled. This resulted in 1.1 man years of lost time. When patients do not show for their scheduled appointment, the results are lost time for both the optometrist and technician, causing an under utilization of the clinical facilities.

If a no show is an active duty member there is a method of recourse by notifying the offender's command. At the member's command the appropriate measure can be taken to discourage a repeat no show for an appointment. But if the patient is a dependent, retiree or their dependent such directing disciplinary action usually cannot be taken. For a chronic offender
revoking of hospital privileges may sometimes happen.

To reduce the no show rate at the optometry clinics a couple of easy steps can be taken. All the optometric appointments can be made directly from a screening clinic, with a minimal waiting time from screening until appointment. The waiting time would 12-14 working days. Secondly, the optometric technician could call the next day's patients reminding them of their upcoming appointment. Using this method the clinic can fill in an appointment if the patient cancels. These suggestions may not eliminate the no shows but it should keep the number to a minimum.

H. MILITARY OPTOMETRY CLINICAL SCREENING PROGRAM

It is rare in the military treatment facility that one does not have to wait a prolonged period of time for a routine health care appointment. This holds true for the vision care clinics as well as the medical and dental clinics. Is there a way to minimize the wait and yet give good vision care? Is a screening clinic the answer?

The present types of appointment systems in the military are as follows:

1. A first-come-first-served booking system with an unlimited backlog (appointment could be months in the future).
2. A first-come-first-served booking system with a limited backlog (waiting time is arbitrarily set).
3. Accepting calls and request for appointments on a given day per week to limit backlog (waiting time is usually two to four weeks maximum).
4. A walk-in screening clinic with subsequent booking for a complete visual analysis if indicated.
If there is a large patient population that is demanding vision care services, regardless of the type care needed, then only example 4, a screening clinic could eliminate the excess demand for vision care services. A screening clinic could decrease the wait for an appointment, while maintaining quality vision care services.

But exactly what is a vision screening? The American Optometric Association Board of Trustees stated, "Vision screening is a limited process of surveying certain aspects of vision problem areas. The purpose of vision screening is intended to identify those people who need vision care from those who probably do not need further vision care, according to predetermined objective criteria". 62

Colonel Billy Greenc, USA (Ret.) stated that, "20 to 30 percent of all patients seen by optometrists in the military do not need to be seen by the optometrist". 19 If by screening the patients we eliminate this 20 to 30 percent that do not need to be seen by an optometrist then their appointments can be utilized by a patient who does need vision care. We could essentially see 20 to 30 percent more patients in a given amount of time than before the screening program.

An ideal vision screening clinic is one that would recommend referral of every person requiring professional attention and none who did not. However, no screening program results in achieving this ideal. Therefore, every vision screening program results in four classifications:

1. Correct Referrals – person who fails the screening and subsequently is found to need comprehensive vision care.

2. Over Referrals – persons failing the screening and subsequently found not to be in need of comprehensive vision care.
3. Under Referrals - person passing the screening but is found to need comprehensive visual care.

4. True Non-referral - person passing the screening and found not to need comprehensive vision care.

The criteria for referral should be set by the individual clinics. A set of guidelines (table 9) used by Lt. Col. D.E. Johnson at Fort Belvoir, Virginia, and guidelines suggested by the American Optometric Association (table 10) are included for use by those clinics with screening programs.

For those who oppose screening clinics it must be understood and accepted that all screening programs will miss some persons needing some form of vision care. The patient population must be informed as to the limitations of any screening program and must not be led to believe that they have received a complete visual examination. If any person returns for a second time within six months to the screening program they will automatically be scheduled for a complete visual examination. This will minimize the number of underreferrals that go on undetected.

The only type of clinic where some form of screening program may not work well is the one optometrist, one technician clinic where screening takes place the optometrist and the technician away from needed comprehensive care.
Table 9: Guidelines for screening at Fort Belvoir, Virginia (22)

Priority I

a. Best distance and/or near visual acuity of 20/70 or poorer in either eye.

Priority II

a. Best distance and/or near visual acuity between 20/30 and 20/60 inclusive in either eye.
b. Esophoria of 7 prism diopters or more at distance and/or 14 prism diopters or more at near.
c. Exophoria of 8 prism diopters or more at distance and/or 14 prism diopters or more at near.
d. Hyperphoria of 2 prism diopters or more.
e. Lack of fusion for children between the ages of 5 and 12 inclusive.
f. Any significant complaint.

Priority III

a. Best distance and near visual acuity in each eye of 20/25 or better and no significant complaint.

1. Priority I and II patients were given appointments for a complete visual examination. Priority I was given the earliest possible appointment time.

2. Priority III patients were advised of the results of their visual screening and told that a complete examination was not indicated at that time.
Table 10: Modified Clinical Technique for Screening Recommended by the American Optometric Association

<table>
<thead>
<tr>
<th>Condition Screened</th>
<th>Recommended Procedures</th>
<th>Recommended Criteria for Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ametropia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myopia (Nearsightedness)</td>
<td>Retinoscopy or objective equivalent.</td>
<td>-0.75 diopter with VA loss</td>
</tr>
<tr>
<td>Hyperopia (Farsightedness)</td>
<td></td>
<td>+2.00 diopter</td>
</tr>
<tr>
<td>Astigmatism</td>
<td></td>
<td>1.00 diopter</td>
</tr>
<tr>
<td>Anisometripia</td>
<td></td>
<td>1.00 diopter</td>
</tr>
<tr>
<td><strong>Binocular Vision Dysfunctions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strabismus (Crossed eyes)</td>
<td>Cover test, Hirschberg or equivalent.</td>
<td>Any manifest strabismus</td>
</tr>
<tr>
<td>Heterophoria</td>
<td></td>
<td>DISTANCE NEAR</td>
</tr>
<tr>
<td>(Eye muscle imbalance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esophoria</td>
<td>Cover test, Maddox Rod or equivalent.</td>
<td>8 prism diopters</td>
</tr>
<tr>
<td>Exophoria</td>
<td></td>
<td>8 prism diopters</td>
</tr>
<tr>
<td>Hyperphoria</td>
<td></td>
<td>10 prism diopters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 prism diopters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 prism diopters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 prism diopters</td>
</tr>
<tr>
<td><strong>Sensory Perception</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual acuity</td>
<td>Snellen visual acuity or equivalent.</td>
<td>Age 5 and over 20/40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than 5 20/50</td>
</tr>
<tr>
<td><strong>Color Vision Deficiency</strong></td>
<td>Standard Isochromatic or anomalososcopic color vision test</td>
<td>Failure of any standard color vision test rendered under conditions specified by the manufacturer.</td>
</tr>
<tr>
<td><strong>Organic Eye Health</strong></td>
<td>External observation and ophthalmoscopy</td>
<td>Evidence of organic disease, redness, swelling, congenital or traumatic dysfunction or abnormality absence of or abnormal retinal light reflected through an undilated pupil or fundus abnormalities.</td>
</tr>
</tbody>
</table>

* Tested only once at school entry age or upon initial screening.

** Requires assistance of a vision specialist (optometrist or ophthalmologist).
V. SUMMARY AND RECOMMENDATIONS
A. SUMMARY AND RECOMMENDATIONS

With an increase in demand for optometric services, and with the limited supply of optometrists and appointments, a new approach to delivering optometry care was developed. Not every clinic, nor senior optometrist would want to use the system carte blanche, but the new clinical methodology can be a very useful starting point. The reluctance to change from their present clinical system to an untried new clinical system must be overcome. There are two important points of the new clinical methodology that should be incorporated in clinics. The two factors are the author's generated appointment system algorithms, and the screening clinical program. These two factors would, (1) place the patient into the system where both the patient and clinic would be most effective, (2) by use of the screening clinic program reduce the need for patients to undergo unnecessary examination procedures and allows the optometrist to perform examinations on individuals more in need of vision care. Both the appointment system and screening clinic would reduce the waiting time for the patient, in terms of delay from time of requesting an appointment till the scheduled appointment.

All navy optometrists who are programmed to become clinical heads must have management skills. Rank and time in service is not an adequate method for picking optometric managers. All navy optometry officers should have access to management skills similar to their Army counterparts. The Army sends all officers through the Officer Career Course and most through the Staff and Command program which gives the army optometry officers knowledge of management. There are programs available for the navy optometry officers and for those selected early in their careers as having management potential it should be part of their career path progression.
VI. APPENDIX A
ee. **Routine Care.** Medical and dental care necessary to maintain health or dental functions other than care of an emergency or elective nature.

ff. **Supplemental Care or Services.** When medical or dental management of a patient is retained by a naval MTF and required care is not available at that facility, any additional material, professional diagnostic or consultative services, or other personal services ordered by qualified uniformed service providers, and obtained for the care of that patient are supplemental. Responsibility for payment for such care or services depends upon the category of beneficiary being treated (see section A, subparagraph 4z).

gg. **Uniformed Services.** The Navy, Marine Corps, Army, Air Force, Coast Guard, Commissioned Corps of the Public Health Service, and the Commissioned Corps of the National Oceanic and Atmospheric Administration.

hh. **United States.** The 50 States and the District of Columbia.

ii. **USMTF.** Uniformed services medical treatment facility.

3. **General Restrictions and Priorities.** Naval MTF's shall provide care to all eligible beneficiaries subject to the capabilities of the professional staff, and the availability of space and facilities. In those instances when care cannot be rendered to all eligible beneficiaries, the following priorities shall prevail. No distinction as to the sponsoring uniformed service will be made when providing care or deciding priorities.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Category</th>
<th>Degree of Entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Members of the uniformed services on active duty (including active duty for training and inactive duty training (drill)) and comparable personnel of the NATO nations who meet the conditions prescribed within this instruction.</td>
<td>See section B</td>
</tr>
<tr>
<td>2</td>
<td>B. Members of a Reserve Component of the Armed Forces not on active duty.</td>
<td>See section C</td>
</tr>
<tr>
<td></td>
<td>Dependents of active duty members of the uniformed services, dependents of persons who, died while in such a status, and the dependents of active duty members of NATO nations who meet the conditions prescribed in section E of this instruction.</td>
<td>See sections D &amp; E</td>
</tr>
<tr>
<td>3</td>
<td>Members of the Senior Reserve Officers' Training Corps of the Armed Forces.</td>
<td>See section C, par. 3</td>
</tr>
<tr>
<td>4</td>
<td>Retired members of the uniformed services and their dependents and the dependents of deceased retired members.</td>
<td>See section D</td>
</tr>
<tr>
<td>5</td>
<td>Civilian employees of the Federal Government under the limited circumstances covered by the Federal Employees' Health Service Program.</td>
<td>See section G, par. 11</td>
</tr>
<tr>
<td>6</td>
<td>All others, including former female members of the uniformed services and their newborn infants.</td>
<td>See sections F &amp; G</td>
</tr>
</tbody>
</table>

A-6

Appendix A
VII. REFERENCES
References


38. Simon, H. "An Index of Accessibility for Ambulatory Health Services", Medical Care, 1979, 17(9), pp 894-902.


73. American Optometric Association Task Force on Optometric Manpower (Final Report), September 11, 1981, St. Louis, MO.