

Evaluation of the Virtual Naval Hospital

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Executive Summary

Background

The Virtual Naval Hospital (VNH) is a digital medical library administered over the Internet by the Electric Differential Multimedia Laboratory, University of Iowa College of Medicine in collaboration with the U.S. Navy Bureau of Medicine and Surgery (BUMED). A CD-ROM version of the VNH is also distributed to Navy health care providers. Its purpose is to deliver authoritative medical information to point-of-care medical providers to help take better care of patients.

Evaluations of the VNH to date have focused on information needs of medical providers and readership of the World Wide Web (WWW) site. No analysis of VNH utilization patterns, derived benefits, or media preferences has been done. The goal of this evaluation is to provide an analysis of the VNH that can be used to document lessons learned, and planning for future services that might be offered.

Issues

Among the issues we considered are the following:

- What is the impact of the VNH on clinical training for primary care providers?
- What is the impact of the VNH on the medical planning process for combat operations and operations other than war?
- Does access to the VNH result in improved patient care?
- What are the alternative technologies for delivering similar kinds of medical information?
- Does the VNH lead to cost savings?
- What materials should be added to the digital library to fill gaps in medical education?
- What are users' attitudes toward using the VNH?
- What are the monetary costs and benefits associated with VNH use by the Navy medical community?
- How is the VNH used by non-medical Navy personnel?

Approach

We developed survey questionnaires administered over the Internet and by email to elicit feedback on the issues from two target populations—military health care providers and other military personnel seeking health care information. To motivate a high response rate from deployed health care military providers, they were contacted by email or Naval message and urged to view the Website and participate in the survey. Participation in the survey by other populations was urged by “attention getters” placed on the VNH. The survey was administered by CNA through a link provided directly on the VNH.

Results

There were 852 responses to the survey for health care providers, mostly to the Web-based version. About half of the surveys were authenticated as coming from military health care providers and were retained for analysis. The response rate from the non-medical population was poor—only 177 respondents.

Overall, for military medical professionals:

- The greatest general use for the VNH is for patient care information.
- Use of the VNH for *training* is mainly for Professional Military Education (PME) and teaching preventive measures to ships' crew.
- Use of the VNH resulted in improved patient care for 70 percent of respondents.
- Use of the VNH improved provider confidence in making diagnoses and formulating treatment plans for 58 and 50 percent of respondents, respectively.
- Use of the VNH resulted in avoiding SIQ days, mostly because of improved primary prevention practices (57 percent of respondents), and MEDEVACs for diagnostic purposes.
- Use of the VNH facilitated planning of Naval Operations (Operations Other Than War—85 percent; Combat Operations—58 percent of respondents).
- The VNH is cost effective, producing an estimated annual net savings of \$258K.
- Users are mostly satisfied with the VNH (94 percent). Dissatisfaction focused mainly on the CD-ROM, which is only updated semi-annually, resulting in complaints that the information was not current.

Recommendations

Although satisfaction with the VNH was high, there were some complaints about the currency and difficulty of locating information on the CD-ROM. Therefore, for ease of use, include a search engine on the CD-ROM version of the VNH.

The existence of the VNH is not as widely known among Navy health care professionals as it could be. Therefore, BUMED should develop a process for spreading the word of the existence and uses of the VNH for both Navy medical professionals and other Sailors.

Background

No set of medical providers is more isolated than the GMO and IDC at sea and in the field. They are tasked with promoting wellness in the warfighter and attending to the medical diseases and injuries of the warfighter. To deliver high-quality medical care, naval health care providers and their patients need to be armed with convenient access to current, authoritative medical information.

The Virtual Naval Hospital (VNH) is a digital medical library available to the general public over the Internet. It is administered over the Internet by the Electric Differential Multimedia Laboratory, University of Iowa College of Medicine, in collaboration with the U.S. Navy Bureau of Medicine and Surgery (BUMED).

The Navy approached digital library researchers at the University of Iowa, who had a history since 1992 of providing digital library services to isolated rural primary care providers and their patients via the Virtual Hospital digital library.¹ The Navy wished to leverage Iowa's expertise and lessons learned to deliver digital library services to isolated Navy primary care providers and patients at sea.

The Virtual Naval Hospital lowers barriers to accessing information for disease diagnosis, decision support, treatment, and follow-up as well as for patient education. By delivering medical information to the point of care, the Virtual Naval Hospital can help improve clinical outcomes. The Virtual Naval Hospital provides a platform for tele-education for the U.S. Navy that can be completely integrated with the U.S. Navy's and Department of Defense's current and future telemedicine programs. By moving expert medical information and not people, the Virtual Naval Hospital uses technology as a force multiplier to help provide care in remote and isolated areas, thus eliminating time and distance as obstacles to the delivery of care and helping to take medical care back to the deckplates. By eliminating providers' and patients' information isolation, better medical care can be delivered to Sailors and Marines, thus helping to maximize readiness, allowing the Navy to fulfill its missions (*from the VNH website*).

The purpose of the VNH is to deliver authoritative medical information to point-of-care medical providers to help take better care of patients. It is used by Navy medical personnel to provide health-related diagnostic and treatment protocol information. It is also intended as a source for both provider and patient education and health promotion, as well as a reference library of BUMED instructions. Because Internet access is sometimes problematical at sea, the VNH is also available to Navy Medical personnel on CD-ROM.

¹ M.P. D'Alessandro et al. "The Virtual Hospital: The Digital Library Moves from Dream to Reality." *Academic Radiology* 1999; 6:78-80.

Purpose

The VNH became operational in 1997 and has experienced tremendous growth since, averaging about 70,000 visitors in the first 3 months of 2000. Evaluations of the VNH to date have focused on information needs of medical providers and readership of the World Wide Web (WWW) site.² The goal of this evaluation is to provide an analysis of the VNH that can be used to document lessons learned, and planning for future services which might be offered.

Of additional concern to the Navy is the cost-effectiveness of the VNH. A goal of this study is to provide an economic analysis and develop a business model to identify costs and savings associated with development and maintenance of the VNH.

A cost-effectiveness analysis typically compares the relative costs of alternate means of providing some product. In this case, the product is knowledge. The immediate effects or benefits of gaining knowledge are not always immediately apparent. This is particularly true for knowledge acquired in the process of obtaining “professional education,” such as a health care provider keeping up with the medical literature. When a provider uses the VNH to help make a diagnosis, the independent contribution of information obtained from the VNH may be difficult to isolate. That is because a health care provider typically uses multiple resources, such as consultations with colleagues, to aid in making a diagnosis. Thus, if a correct diagnosis led to some savings, how much of that savings should be attributed to the VNH?

Another aspect of a cost-effectiveness analysis is the substitution of alternate technologies for the VNH. Keeping in mind that the VNH is a reference tool, what are the alternatives for providing the same information? We will focus on alternate *media*.

An obvious alternative is printed materials. In many cases, however, it is impractical to provide paper copies of the many books, journals, and other materials contained the Internet and CD-ROM versions of the VNH because of space limitations aboard ship. No other practical alternatives come to mind.

Issues

Among the issues considered in this report are the following:

- What is the impact of the VNH on clinical training for primary care providers?
- What is the impact of the VNH on the medical planning process for combat operations and operations other than war?
- Does access to the VNH result in improved patient care?
- What is the preferred medium for the VNH (Internet or CD-ROM)?
- What are the alternative technologies for delivering similar kinds of medical information?

² D.M. D'Alessandro et al. “Information Needs of Naval Primary Care Providers and Patients at Sea.” *Military Medicine* 1999; 164(2):127-131.

- What materials should be added to the digital library to fill gaps in medical education?
- What are users' attitudes toward using the VNH?
- How is the VNH used by non-medical Navy personnel?
- What are the monetary costs and benefits associated with VNH use by the Navy medical community?

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Methods and Data

Many users of the VNH are in isolated locations (i.e., aboard ships, in remote duty stations). These users are hard to contact by postal mail and telephone—the traditional methods for collecting survey data. The Internet was a natural vehicle for survey administration for the data collection. Most users of the VNH do so over the Internet, and could be contacted and motivated to complete a survey form integral with the VNH website. Therefore, we developed a survey questionnaire that could be administered over the Internet to elicit feedback on the issues. Two populations were targeted for the survey:

- Navy health care providers and administrators.
- Other military personnel seeking health care information.

The intended sample of Navy health care providers and administrators comprised Navy physicians, dentists, Independent Duty Corpsmen, nurses, Medical Service Corps, and various medical technicians. To motivate a high response rate from deployed health care military providers, they were contacted by email, Naval message, and by notices in the Surgeon General's column in the Navy Medical Information Center (NMIMC) Newsletter. They were urged to view the VNH website and participate in the survey. Alternatively, they could request a computer readable copy of the survey that could be emailed back to CNA after completion. Participation in the survey by other military personnel was by urged by “attention getters” placed on the VNH. The Internet version of the survey was administered by CNA through a link provided directly on the VNH.

Survey Design

Two surveys were constructed. One was for Military Medical Professionals (MMP); a second for other military personnel seeking health care information (i.e., “patients”). When accessing the survey over the Internet, respondents were greeted with a screen introducing the survey, allowing respondents to select the appropriate form. Because the survey was available to the public, those choosing the MMP survey were asked to provide an identification code used to authenticate respondents as members of the Navy medical community. The codes were distributed to Naval medical commands during the announcement process. Because there are two versions of the VNH (Internet and on CD-ROM), survey questions for medical professionals elicited information on the use of *both* versions.

Medical Professionals

The MMP survey form consisted of 11 sections and an introductory portion. The sections included:

1. Personal Information (respondent's specialty, nationality, branch of service, duty station, and age).
2. Internet Access.
3. Impact on Clinical Training (hours/week VNH use for various training aspects).

4. Medical Planning Process (focused on VNH use to plan medical support for combat and operations other than war).
5. "Just in Time" medical information (mainly for health care providers).
6. Provider Confidence (evaluation of VNH role in boosting provider confidence in making diagnoses and treatment/follow-up plans).
7. Saving Patient Sick Days (degree to which VNH information allowed patients to get back to work sooner by avoiding sick-in-quarter (SIQ) days, or returning to full or limited duty status).
8. Use of Alternative Medical Information Resources (relative frequency of use of different sources of medical information to answer medical questions; preference for Internet vs. CD-ROM versions of the VNH).
9. Suggestions for improving the VNH.
10. Evaluation of the VNH (with respect to breadth of topics, level of detail, accuracy of information, and overall satisfaction).
11. Comments.

The email version of the survey questionnaire for MMP paralleled that of the Web-based survey. In response to a request for the survey by email, a floppy disk image was sent by return email. Respondents also received instructions for completing the survey and returning the resulting data electronically. In some instances where email could not be used, a floppy disk with instructions was sent via postal mail.

Response to the survey was mostly voluntary. However, an initially poor voluntary response rate prompted BUMED and the Navy Medical Information Center (NMIMC) to request that local commanders urge participation by medical professionals. There was no attempt to publicize the VNH outside the Navy medical community.

Non-Medical Personnel

The survey form for other military personnel (i.e., patients) was also accessible through a link on the VNH internet site. It consisted of 7 sections and an introductory portion. The sections included:

1. Personal Information (respondent's specialty, nationality, branch of service, duty station and age).
2. Internet Access.
3. Source of medical information.
4. Reasons for using the VNH.
5. Benefits of using the VNH.
6. Evaluation.
7. Comments.

The data collection period for both surveys was from February through August 2000.

Cost Data

Cost data were obtained from the University of Iowa College of Medicine Electric Differential Multimedia Laboratory, the VNH's administrators. The money buys the Navy access to the University of Iowa's Virtual Hospital infrastructure, by piggybacking the VNH on top of the Virtual Hospital's personnel, content creation workstations, Web servers and bandwidth. The Navy is not charged for the use of Virtual Hospital content creation workstations, Web servers, or bandwidth.

In 1997 the VNH was budgeted for \$197,000; and in 1998- September 2000 it was budgeted for \$250,000 each year. Actual expenditures were about \$182,000 / year on the VNH times 3.75 years, or \$682,000.

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Results

There were 852 responses to the survey for health care providers, mostly to the Web-based version. Respondents were authenticated on the basis of their entering the assigned “survey code,” or identification of the IP address of the host submitting the survey as a military facility. Applying this screen resulted in a sample size of 462 respondents.³ All but 69 of the survey responses were via the WWW site. About 50 percent of the emailed responses came from those deployed on ships. In addition, about 20 percent of the 462 respondents had never previously used the VNH and were excluded from those parts of the analysis requiring familiarity with the VNH.⁴

The sample was post-stratified on the basis of medical specialty. The stratification allowed us to determine how representative the sample was (in terms of the relative distribution of the specialties of the sample and population. A secondary purpose of the stratification was based of expected differences in utilization patterns of information available from the VNH.

The strata consisted of five groups, as described below:

1. Administrative (Medical Service Corps (MSC) - Administrative).
2. Clinical/technicians (nurse, laboratory technicians, Hospital Corpsmen (HM)).
3. Dental (dentists and dental-assistants (DN)).
4. Provider (physicians, physician-assistants, nurse-providers, midwives, psychologists, and Independent Duty Corpsmen (IDC)).
5. Other (respondents who did not identify their specialty).

Table 1 shows the proportions of survey respondents and the actual population sizes making up the stratification. The data suggest that the sample distribution is not representative of the Navy MMP population as a whole. This will limit our ability to project the extent of VNH benefits Navywide.

Respondents were from a wide range of duty stations. Table 2 shows the distribution of duty stations by medical specialty.

³ Eighty surveys submitted by non-USN medical personnel were excluded.

⁴ Some Navy medical personnel were directed to view the VNH website and respond to the survey. Those without Internet access or the CD-ROM did not have the opportunity to use the VNH.

Table 1. Sample Distribution of Navy Medical Specialties

Specialty	Sample	Population
Administrative	14%	62%
Tech	37%	12%
Dental	11%	11%
Provider	38%	15%
(Frequency)	(462*)	(37,280)

* The distribution of percentages of respondents by specialty who had used the VNH was similar. Excludes 24 respondents in the “Other” category.

Table 2. Respondents by Specialty and Duty Station (percentage of sample)

Table 3

Duty station	Specialty					Total
	Admin	Tech	Dental	Other	Provider	
Clinic	2.6	8.9	5.2	0.7	8.5	25.9
FMF	0.4	7.8	0.9	0.0	4.8	13.9
HQ	0.9	2.2	0.4	0.2	1.3	5
Hospital	3.1	7.6	0.7	1.7	8.3	21.4
NEPMU	1.3	0.0	0.0	0.9	2	4.1
Research	0.7	0.2	0.4	0.0	0.2	1.5
Seabees	0.0	0.7	0.2	0.0	1.3	2.2
Ship	3.3	1.7	1.3	0.2	4.1	10.7
Other ^a	1.1	6.1	1.1	1.3	5.7	15.3
Total	13.3	35.3	10.2	5	36.2	100

^a Mainly Air Squadrons and Reserve Units.

Internet Access

Bandwidth is at a premium, and often rationed, aboard ship. This could limit access to the VNH via the Internet for deployed medical professionals. The data shown in table 3 suggest that 83 percent of survey respondents have Internet access at their duty stations.⁵ This is not to say that all medical professionals enjoy that level of access. Note that most respondents (85 percent) did so via the WWW. This presents a bias toward

⁵ All military medical professionals should have access to email. While the survey did not specifically define “Internet access,” we assume this term to mean access to the WWW.

those with access to the WWW. The percentages of email and WWW respondents who reported having Internet access were 10 percent and 93 percent, respectively.⁶

Table 3. Internet Access and Duty Station

Duty station	% with access
Clinic	92
FMF	91
HQ	87
Hospital	85
NEPMU	79
Other	80
Research	71
Seabees	90
Ship	49
Total*	83

* Includes respondents who did not use the VNH.

Likewise, only half of those who are on ships reported access to the Internet at their duty stations.

For those who do have access to the Internet at their duty stations, most have high-speed access with a Local Area Network (LAN). As shown in table 4, there is some differentiation in Internet access by specialty.

Table 4. Internet Access at Duty Station by Specialty

Specialty	% with access	LAN access
Admin	74	98
Tech	85	84
Dental	68	87
Other	96	80
Provider	85	82
Total	82	85

While most respondents seem to have a high speed Internet connection at their duty stations, do they have sufficient access for job-related activities? In table 5, we show

⁶ Note that some individuals who responded to the survey by the WWW may have done so from locations other than their duty stations. This was evident by the non-military IP addresses associated with the source of the submissions.

self-reported actual and required, or “needed,” job-related Internet use by medical specialty. The column labeled “shortfall” is the difference between the requirement and actual use. On average, the shortfall is less than one hour per week. This suggests that those who do have Internet access at their duty stations have sufficient bandwidth to meet most of their requirements.

The column labeled “supplement” shows the average number of hours/week that medical professionals supplement their job requirements while away from their duty station (i.e., at home). Note that the supplemental hours well exceeds the shortfall. This may reflect the tendency of many to spend more time than anticipated to browse the Internet, either because of the difficulty of locating information or because of one’s inquisitive nature.

Table 5. Job-related Internet Use at Duty Station (average hours/week)

Specialty	Actual	Required	Shortfall	Supplement
Admin	7.9	8.0	0.2	3.5
Tech	7.4	7.9	0.5	5.0
Dental	4.1	5.0	0.9	2.5
Other	10.1	11.2	1.1	6.6
Provider	6.9	7.8	0.9	5.3
Total	7.0	7.7	0.6	4.7

Reasons for VNH Use

In this section we focus on how Navy medical professionals use the VNH and the amount of time they use it for various activities.

The VNH is used for a variety of information-seeking activities. Those in the medical specialties represented have different information needs. This is reflected in table 6, which shows the percentage of VNH use (either Internet or CD-ROM) for the activities supported by the VNH. There was a relatively high level of use observed for each activity. The percentages suggest that information about patient care is the most sought-after—regardless of specialty.

Table 6. VNH Use for Various Activities (percentage within specialty)

Specialty	Activity					
	Patient care	Health promotion	Prof. Ed.	Train others	Admin	Other
Admin	52	52	52	51	57	30
Tech	67	54	63	57	54	15
Dental	83	77	74	72	72	36
Other	83	75	75	71	67	21
Provider	65	56	58	55	52	11
Total	67	58	61	58	56	18

How many different kinds of information do users seek from the VNH? The data in table 7 suggest that most respondents use the VNH to support multiple activities.

Table 7. Number of Activities of VNH Use (percentage of users)

Specialty	Number of Activities of Use					
	1	2	3	4	5	6
Admin	15	3	0	13	26	44
Tech	9	5	8	13	45	20
Dental	5	5	0	5	44	41
Other	5	5	5	5	55	25
Provider	10	2	10	11	54	14
Total	9	4	6	11	46	24

Table 8 shows the average weekly use (hours) of the VNH for the various activities, and media (Internet and CD-ROM) preferences for each. (A breakdown by medical specialty is shown in appendix 1.) The time spent using the VNH on the Internet was about the same for all but Health Promotion (and "Other"). The time spent using the CD-ROM version for the various activities was about half of that spent on the Internet.

Table 8. VNH Use for Various Activities (hours/week; percentage preferences by media)

<u>Activity</u>	<u>Mean hours/wk</u>		<u>Preference (% sample)</u>		
	<u>Internet</u>	<u>CD-ROM</u>	<u>Neither</u>	<u>Internet</u>	<u>CD-ROM</u>
Patient care	1.0	0.6	32	55	13
Health promotion	0.5	0.4	12	43	45
Prof education	1.2	0.8	33	50	17
Train others	1.0	0.7	38	48	14
Administration	1.1	0.7	39	47	15
Other	0.2	0.0	66	28	6
Total	5.0	3.2	N/A	N/A	N/A

Most users prefer the Internet version of the VNH for their medical information needs. An exception was for those seeking health promotion information. In this case, preferences were about the same for Internet and CD-ROM access. A relatively large percentage said they had no media preference for most activities, with the exception of health promotion. When using the VNH for health promotion, respondents had near equal preferences for the Internet and CD-ROM versions.

Training Support

The VNH was intended to be a training support tool—both for the professional education of the military medical user and for the training of others. The survey used for collecting feedback from VNH users requested vignettes on how the VNH was used for this purpose. Appendix 2 contains excerpts of their responses. The most common uses for the VNH as a training support tool⁷ are the following:

- Preparing lectures for professional education of medical staff
- Feedback on current guidelines for medical practice
- MANMED training
- Preventive medicine crew training (smoking prevention, first aid)
- Advancement training self-study guide
- Pharmacology training
- Sick call screening
- Staying current within specialty
- Training HM reservists, EMTs
- CBR training

⁷ The items listed were perceived by survey respondents as being training-related.

- Train laboratory technicians
- Patient feedback
- Pre-deployment training (port specific)
- HIV education
- Make LTGs for crew training
- Research clinical guidelines
- Source for information on administrative discharges for teaching Administrative Psychiatry course
- Source of graphics for training lectures
- Hotlinks in presentations
- Source for MEDLINE searches for use in developing training materials
- Safety lectures for flight crews.

Thus, the VNH is seen as a resource for training materials. Professional Military Education (PME), for both self-training to keep current and for advancement, was a major focus. The VNH is widely used as source materials for preventive medicine training (e.g., first aid, smoking prevention) of ship's crew.

Medical Planning Process

Unlike digital medical libraries meant to serve the general public, the VNH is a unique source of materials for planning medical aspects of military operations. As a military organization, the Navy must be prepared for combat operations. Another role that has emerged in recent years requiring the participation of Navy medical professionals is Operations Other Than War (OTW), such as disaster relief. Tables 9 and 10 show the percentage of Navy medical professional use of the VNH for both kinds of medical operations planning, and their evaluation of VNH in facilitating⁸ the planning process. The results suggest that the VNH is more widely used for planning operations OTW. When it was used for this purpose, it mostly facilitated the process. The Internet version tended to provide a greater degree of facilitation than the CD-ROM for both operational planning uses. This could be the result of the Internet version being more current and the scarcity of information on the CD-ROM.

⁸ In this context, *facilitation* refers to being able to locate information for structuring medical inputs, determining data-gathering requirements, and completing planning documents, and was generally helpful in the process.

Table 9. Use of the VNH for Medical Planning for Combat Operations (percentage of responses)

Specialty	Used			Facilitated	
	Internet	CD-ROM	Either ¹	Internet	CD-ROM
Admin	40	38	40	31	11
Tech	17	21	21	75	73
Dental	35	31	35	40	29
Other	22	12	25	75	100
Provider	20	18	23	67	50
Total	24	23	26	58	49

¹ Used either the Internet or CD-ROM versions of the VNH.

Table 10. Use of the VNH for Medical Planning for Operations Other Than War (percentage of responses)

Specialty	Used			Facilitated	
	Internet	CD-ROM	Either ¹	Internet	CD-ROM
Admin	45	32	45	54	14
Tech	44	42	47	98	96
Dental	29	25	29	56	50
Other	20	17	29	100	100
Provider	39	27	42	87	80
Total	39	32	42	85	78

¹ Used either the Internet or CD-ROM versions of the VNH.

Improved Care

A primary purpose of the VNH is to provide information to military point-of-care providers. A measure of effectiveness for this role is improved health care. Table 11 shows VNH user's evaluation of the extent to which having the VNH available improved patient care.

Table 11. Degree of improved Care from VNH Use (percentage of users)

Specialty	Internet			CD-ROM		
	Great deal	Some	None	Great deal	Some	None
Admin	10	37	53	10	19	71
Tech	31	41	28	19	36	45
Dental	17	27	57	9	14	77
Other	31	54	15	25	50	25
Provider	20	60	20	23	34	43
Total	23	47	30	18	31	50

The majority (70 percent) of those using the Internet version of the VNH to provide care felt that the available information resulted in some degree of improved care. (The modal response was "some improvement.") While those in all specialties responded to

the question of improved care, perhaps the responses of *providers* should receive the most attention. Among providers, 80 percent of those using the VNH over the Internet felt that its use resulted in improved care.

Provider Confidence

Improved care can be the result of making the correct diagnosis and prescribing proper treatment and follow-up. The audience for the VNH is often a health care provider, such as a Corpsman, with limited medical training. The VNH can provide “just in time” medical information to aid in diagnosis and treatment prescription, in the absence of other resources or colleagues with whom to consult. Table 12 shows estimates of the extent of provider confidence attributable to the VNH.

Table 12. Provider Confidence Attributed to the VNH¹ (percentage with improved confidence)

<u>Specialty</u>	<u>Diagnoses</u>		<u>Treatment</u>	
	<u>Internet</u>	<u>CD-ROM</u>	<u>Internet</u>	<u>CD-ROM</u>
Admin	13	10	15	10
Tech	65	54	60	27
Dental	29	23	27	25
Other	64	40	60	50
Provider	70	54	60	21
Total	58	44	50	24

¹ The modal response was “some confidence.”

When we again focus on providers, the majority said that the VNH did boost their confidence. The data suggest that the VNH plays a stronger role in boosting provider confidence in making diagnoses (70 percent), than for making treatment decisions (60 percent).

Saving Patient Sick Days

Having the correct medical information on hand can increase local capability in diagnosing and treating and can result in savings to the Navy. An alternative to a provider making a “just in time” diagnosis and prescribing the correct treatment is to seek a consult. Often, the patient must be sent away from the duty station for the consult. This results in a loss of productivity for both the patient and someone from the medical staff who may need to escort the patient. Table 13 shows responses to a series of questions seeking to measure the degree to which information provided on the VNH had resulted in getting a patient back to work sooner by avoiding sick-in-quarter days or returning the patient to full or limited duty status.

Table 13. Ways VNH Avoided Sick-In-Quarter Days (percentage reporting SIQ avoidance)

Specialty	Avoid MEDEVAC		Primary prevention		Accuracy of diagnosis		Reduce complications		Decrease need for consult	
	Internet	CD-ROM	Internet	CD-ROM	Internet	CD-ROM	Internet	CD-ROM	Internet	CD-ROM
Admin	10	16	32	21	14	11	14	11	19	16
Tech	27	31	66	59	57	56	56	44	48	38
Dental	25	32	28	29	24	24	24	29	21	24
Other	50	30	91	60	73	30	64	30	64	30
Provider	21	24	59	58	66	50	49	43	60	50
Total	24	26	57	49	53	41	46	36	48	37

Focusing on providers, the greatest savings arise from improved primary prevention practices. Note that the other areas in which medical information can get a patient back to work more quickly are related to promptness and accuracy of a diagnosis. For example, with “just in time” medical information on hand to make a rapid and correct diagnosis, time is saved by avoiding the need for a consult, and perhaps a MEDEVAC for that purpose. This chain of events should return the patient to work sooner than if a diagnosis and subsequent treatment were delayed.

Information Resources

Military medical professionals were asked to estimate the likelihood of using each of a series of information resources to answer questions arising when seeing a patient. They were asked to report their time distribution for the resources listed (i.e., percentage of an arbitrary 2-hour period spent using each information resource). As an example: “Suppose you had spent 2 hours researching a question: one hour reading journals (50% of time spent), 30 minutes on the Internet with the VNH (25%), and 30 minutes with an onboard colleague (also 25%) ...” The total should be 100 percent.

Table 14 shows the results separately for those with different medical specialties. The use of books and onboard colleagues dominate as the time spent using information resources. Providers and dental specialists tended to favor other Internet resources over the VNH. These results are somewhat ambiguous. They do not address the relative efficiency of a given resource in conveying information per unit time. For example, providers reported spending an average of 7 minutes on the Internet with the VNH and 10 minutes with some other Internet information resource. Does this speak to the relative *efficiency* of using these resources? That is, does it take 7 minutes to locate information on the VNH and 10 minutes on an alternate site to locate and read *the same* information? Or do providers fail to find what they are looking for and then use a different resource? The structure of the survey question does not allow us to answer these questions with any certainty.

Table 14. Likelihood of Using Alternate Information Resources (percentage of time/patient visit typically used¹)

Specialty	Resource								
	Books	Journals	Onboard colleagues	Onshore consults	VNH Internet	Other internet	VNH CD-ROM	Other computer	Other
Tech	35	7	20	4	15	7	6	5	3
Dental Provider	25	10	42	12	1	6	0	1	3
	41	11	15	11	7	10	2	2	1

¹ Based on 109 respondents completing the question.

Alternate Internet Sites

The VNH is one of many Internet-based information sites used by Navy medical professionals. When asked to list alternate sites, respondents identified hundreds of Internet-based resources. Table 15 lists the most frequently identified sites.

Table 15. Frequently Mentioned Alternate Internet-based Medical Information Resources

Internet Resource
AAFP
AMA
American Dental Assn (ADA.ORG)
BUMED homepage
BUPERS
Centers for Disease Control (www.cdc.gov)
Grateful Med
MDCONSULT
MEDLINE
MEDSCAPE
National Library of Medicine (www.nlm.nih.gov)
Naval Operations Medical Institute (NOMI)
Navy Environmental Health center (www-nehc.med.navy.mil)
OVID
Pub Med Med Online NEHC web site
Virtual Hospital Iowa (VH.ORG)
WEBMD
WHO.ORG

Preferred Modality

Access to the Internet for medical personnel at sea is often limited. However, if Internet access were not a problem, more than half (52 percent) of respondents would prefer to access the VNH over the Internet rather than from the CD-ROM.⁹

Reasons for an Internet preference were mostly related to currency and breadth of information. Reasons for an CD-ROM preference, were mainly related to an unreliable, slow, or non-existent Internet connection, and ease of use and portability the CD-ROM.

Suggested Enhancements to the VNH

Managers of the VNH are constantly striving to improve their product(s). In an effort to get feedback on how this should be done, users were surveyed on ways to improve and enhance the VNH. Respondents were asked to provide comments for both the Internet and CD-ROM versions. Four areas of VNH functionality were scrutinized:

Most helpful VNH resource. The MANMED (NAVMED P-117) along with its administrative instructions, was often cited as the most helpful resource for each of the specialty groups. Providers used reference materials associated with their medical specialty (e.g., orthopedics, GMO Manual). No explicit suggestions for enhancements of the “most helpful resource” were mentioned.

Problems with use. Most problems cited with using the VNH were related to Internet access. Otherwise, currency of information on the CD-ROM, lack of detail, and need for an improved search engine were often mentioned as problems.

Information for providers that should be added. Links to other Websites, more dental information, and HM-level information were cited as useful additions.

Information for patients that should be added. Links to other Websites, patient handouts, and self-care “algorithms” were indicated as areas that would enhance VNH use by patients.

Appendix 3 shows respondents’ comments.

User Evaluation

Respondents were asked to evaluate the VNH along four dimensions:

- Breadth of topics.
- Level of detail.
- Accuracy of information.
- Overall satisfaction.

Tables 16 and 17 summarize their ratings for the Internet and CD-ROM versions, respectively. Overall, the VNH gets high marks. The Internet version had a higher overall satisfaction rating (94 percent) than the CD-ROM version (90 percent). The

⁹ The Internet was the most frequently cited media preference for each specialty.

area receiving the lowest rating is “Level of Detail,” particularly among providers (82 percent satisfactory).

Table 16. Ratings of Internet Version of VNH (percentage satisfactory)

<u>Specialty</u>	<u>Dimension</u>			<u>Overall satisfaction</u>
	<u>Breadth</u>	<u>Detail</u>	<u>Accuracy</u>	
Admin	100	95	100	100
Tech	96	96	100	99
Dental	100	90	100	95
Other	92	92	92	86
Provider	92	82	95	89
Total	95	90	98	94

Table 17. Ratings of CD-ROM Version of VNH (percentage satisfactory)

<u>Specialty</u>	<u>Dimension</u>			<u>Overall satisfaction</u>
	<u>Breadth</u>	<u>Detail</u>	<u>Accuracy</u>	
Admin	100	100	100	100
Tech	97	97	100	97
Dental	86	83	100	86
Other	88	75	88	88
Provider	83	76	85	85
Total	89	85	92	90

Use of the VNH by Non-Medical Navy Personnel

The VNH provides information for both the medical professional and patients on health promotion/disease prevention and first aid, consumer health information textbooks, consumer health organizations, and aids to searching the Internet. There were 177 responses to the Web-based survey for non-medical professionals by those identifying themselves as military personnel. Sixty-one percent identified themselves as USN personnel. Three percent of respondents were deployed on ships.

Given the poor response rate, it will not be possible to generalize the results. The data shown in table 18 are merely suggestive of the impressions of a self-selected sample of non-medical military users of the Internet version of the VNH.

Table 18. Reasons for VNH Use by Military Patients (percentage of respondents using for stated reason)

Reason	Percentage use
Self-diagnosis	21
Clarify diagnosis	22
Research medical problems of others	32
Research use of medications	33
Healthy living advice	31
Just curious	37
Other	36

Military “patients” use the VNH for multiple reasons. Curiosity and “other” were the most frequently cited reasons. (See appendix 4 for a listing of the “Other” reasons.)

The VNH is only one source of medical information for respondents. Table 19 shows the percentage of respondents who use a variety of other sources.

Surprisingly, the most frequently cited source of medical information was printed material, such as books. Medical providers, either at the duty station or elsewhere, were indicated as a source of medical information by 81 percent of respondents.

Table 19. Sources of Medical Information for Military Patients (percentage using source)

Source	Percentage using source
Duty station medical provider	53
Other medical provider	51
TV programs	27
Computer software	32
Printed material, e.g., books	62
Other Web sites	23
Family and friends	29
Radio	12
Newspapers	25

“Patients” were asked to indicate the benefits they felt they derived from using the VNH. Most people reported multiple benefits (table 20). Forty-three percent of Navy personnel reported one or more benefits. The VNH was cited as having solved some sort

of medical problem using information found there. In some instances (12 percent), the VNH was perceived as being responsible for being able to “get back to work sooner.”

Table 20. Benefits of VNH Use by Military Patients (percentage reporting benefit)

Benefit	Percentage reporting
Solved a problem	30
Relieved anxiety	13
Able to get back to work quicker	12
Any	43

The level of satisfaction with the VNH was high for the military patients responding to the survey (table 21). All respondents reported satisfaction with the accuracy of information. It is unclear how these non-medical personnel evaluated “accuracy.”

Table 21. Evaluation of VNH by Military Patients (percentage satisfactory)

Criterion	Percentage satisfactory
Breadth of topics	95
Level of detail	93
Accuracy of information	100
Overall satisfaction	97

Again, there is no evidence of how well these data represent military patients in-general.

Business Case Analysis

The Navy has made a financial investment in developing and supporting the VNH. As such, it expects a return on its investment. It is necessary to quantify the costs and benefits to demonstrate a return on investment. The return on investment can be calculated as either:

1. The cost of the VNH relative to an alternative information resource producing the same benefit, or
2. The difference in the cost of the VNH and its resulting monetary benefit or savings.

There are two reasonable alternatives for a library of medical reference materials comparable to that provided by the Internet version of VNH. One is the CD-ROM version of the VNH; the other is paper copies of these same materials.

Using the first calculation method, we would compare the cost of the Internet-based VNH against the alternative of providing the Navy medical community with just the CD-ROM, and with providing paper copies of all the materials on the VNH.

Costs

The determination of costs is straight-forward. The Navy spends \$182,000 per year for both versions of the VNH.¹⁰ This buys the Navy access to the University of Iowa's Virtual Hospital infrastructure, by piggybacking the VNH on top of the Virtual Hospital's personnel, content creation workstations, Web servers, and bandwidth.

All costs are common to the WWW and CD-ROM versions of the VNH, with the exception of the \$10,000 for CD-ROM production and distribution, which is CD-ROM specific. Therefore, considering a CD-ROM-only version of the VNH as an alternative to the Internet version would produce little savings.¹¹

Providing paper copies of all of the materials on the VNH is impractical for the following reasons:

- Space limitations aboard many Navy vessels.
- Excessive distribution costs.
- Difficulty of maintaining currency of information.

For these reasons, we do not view a paper-copy version of the VNH a viable alternative.

Benefits

Attributing *monetary* benefits to the VNH is a difficult matter. The results of a CNA study¹² of the costs and benefits of shipboard telemedicine was used to set the bounds for our estimates.

The results of the survey suggest that the VNH can directly save money by:

- Reducing lost productivity of Sailors by returning them to limited or full duty status sooner through more accurate diagnoses and treatment plans.
- Avoiding the need for MEDEVACs and on-shore consults by providing information to point-of-care doctors and Corpsmen, facilitating onboard diagnosis and formulation of treatment plans.

¹⁰ The Navy has spent \$682K, from March 1997, through September 2000, on the VNH, for an average of \$182K per year.

¹¹ The marginal cost of providing a CD-ROM copy of the VNH is about \$2 per unit.

¹² F. E. Garcia et al. *A Cost-Benefit Analysis of Shipboard Telemedicine*, Center for Naval Analyses Research Memorandum, Sept 1997.

- Avoiding SIQ days through health prevention measures motivated by information obtained from the VNH.

It is necessary to make some assumptions to determine the *actual* benefit arising from the above. The assumptions fall into three categories:

1. Apportioning benefit between VNH and other contributors.
2. Estimating a multiplier, or number of cases per respondent.
3. Estimating the extent of benefit per incident (i.e., number of sick days).

Apportioning. One assumption involves the relative contribution of information gathered from the VNH. It is likely that other information contributes to these benefits. The analysis showed that medical providers use various information sources, such as consultation with onboard colleagues, other medical Websites, and journals, to make medical decisions. Respondents (providers) indicated that about 7 percent of the time researching a “typical” medical problem was associated with the VNH. This does not necessarily mean that 7 percent of the benefit should be attributed to the VNH. Suppose that the VNH provided the only information responsible for the decision leading to the benefit. Under these circumstances, all of the benefit should be attributed to the VNH. Alternately, if an onboard colleague initially provided the critical information, and the VNH was used to confirm the diagnosis, it is not clear how the benefit should be distributed. For purposes of our analysis, we will assume that 100 percent of the benefit can be attributed to the VNH.

Incidents multiplier. Respondents were only required to report, in general, if use of the VNH resulted in avoiding MEDEVACs and/or reducing SIQ days. The number of MEDEVACs avoided and the number of patients having reduced SIQ days was not elicited by the survey.¹³ Because we have no basis for determining the number of medical personnel represented by each respondent, we assume that the respondent only represents him/herself, resulting in an “incidents multiplier” of one. This will tend to produce a conservative estimate of savings. (There are likely to be other users of the VNH whose savings are the not captured with this approach.)

Extent. The data collected in the survey identified that use of the VNH resulted in reduced SIQ days. However, the data did not identify the number of incidents, or the actual number of SIQ days saved. The situation was similar for avoidance of MEDEVACs.

MEDEVACs. If the respondent reported “a great deal,” this equated to one MEDEVAC avoided. If the respondent reported “somewhat,” this equated to one-half MEDEVAC avoided.

SIQ days. We assume that each report that use of the VNH resulted in the patient being returned to duty saved 2 SIQ days. This value incorporates time saved by avoiding consultations, communication delays in contacting consultants not at the duty station, and the like.

¹³ It was felt that respondents might not be able to accurately recall that level of detail and might not take the time to gather the data.

Savings per incident. Costs avoided per MEDEVAC are estimated to be \$4,400. This estimate is based on the CNA study cited earlier. The cost avoided by returning a Sailor to duty more quickly is a measure of recaptured productivity. At a minimum, this can be represented by his/her pay and benefits. The average Sailor is paid \$17/hour, based on an E-5 with 8 to 10 years of service (the median of the paygrade distribution.) The resulting savings is \$136/day.¹⁴

The net savings for avoided MEDEVACs is calculated as:

1. Number of incidents x cost avoided per incident, where
2. Number of incidents = (number of reports) x (report weight).

The net savings for avoided SIQ days is calculated as:

1. Number of incidents x number of days x cost avoided per day, where
2. Number of incidents = (Number of reports) x (report weight)

Based on these calculations, VNH use would result an annual estimated savings of \$211,200 + \$229,296 = \$440,496. The results are summarized in table 22.

Table 22. Estimated Savings from VNH Use

	VNH contribution to savings		
	Great deal	Somewhat	Combined
<u>MEDVACs</u>			
Number reports	15	66	
Weight	1	0.5	
Number incidents	15	33	48
Cost/incident ¹			\$ 4,400
Savings			\$ 211,200
<u>SIQ</u>			
Number reports	175	493	
Weight	1	0.5	
Number incidents			421.5
Cost/incident ²			\$ 136
Days/incident	2	2	
Net savings			\$ 229,296
Total saved			\$ 440,496

¹ \$4,400/MEDEVAC

² \$17/hour, times 8 hours, or \$136/day

¹⁴ This estimate of the monetary value of a Sailor's work does not include other benefits, such as the value of medical care after retirement. Including such additional benefits would raise the hourly estimate to \$30, or \$240/day.

Subtracting the cost of \$182,000 from the estimated savings shown in Table 22, results in a annual net positive saving of \$258,000. This estimate is based on the assumption that all of the benefit is attributable to the use of the VNH.

From these data it is also possible to calculate the percentage of the benefit that must be attributed to the use of the VNH for net positive savings. That is, for savings to be at least equal to the \$182,000 annual cost. This is simply equal to the ratio of costs to benefits, or about 41 percent.¹⁵

Conclusions

A sample of convenience responded to a survey questionnaire aimed at eliciting feedback on their use of the VNH. The survey was administered over the Internet and by email. The majority of responses were to the Internet version, and may therefore reflect the biases of those with an Internet connection at their duty stations.

Overall, for military medical professionals, the results suggest:

- The greatest use for the VNH is for patient care information.
- Use of the VNH (Internet) resulted in improved patient care for 70 percent of respondents.
- Use of the VNH improved provider confidence in making diagnoses and formulating treatment plans for 58 and 50 percent of respondents, respectively.
- Use of the VNH resulted in avoiding SIQ days, mostly due to improved primary prevention practices (57 percent of respondents).
- Use of the VNH facilitated planning of Naval Operations (Operations Other Than War—85 percent; Combat Operations—58 percent of respondents).
- Use of the VNH for training is mainly for Professional Military Education (PME) and teaching preventive measures to ships' crew.
- The VNH is cost effective, producing an estimated annual net savings of \$258,000.
- Users are mostly satisfied with the VNH (94 percent). Dissatisfaction was mainly focused on the CD-ROM, which is only updated annually, resulting in complaints that the information was not current.
- The mostly widely used sources of medical information are books and periodicals.

The general impression obtained from VNH user comments was that Internet connectivity afloat was poor (i.e., slow due to restricted bandwidth). However, as the content of the VNH is mainly text (HTML), even low bandwidth connections should be adequate.

The majority of health care professionals reporting data by email were selected to participate by higher authority. About half of those submitting comments said they never

¹⁵ $182,000 / 440,496 = 0.413$

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heard of the VNH. This suggests that the CD-ROM is not widely available to some medical personnel, despite the fact that over 5,000 are distributed annually.

Recommendations

Based on the data elicited from survey respondents, we recommend the following:

- Include a search engine on the CD-ROM version of the VNH.
- Develop a process for spreading the word of the existence and uses of the VNH for both Navy medical professionals and other Sailors (patients).
- Update the CD-ROM more frequently; perhaps annually.
- Improve site navigation.
- Add more content on dental information and human anatomy.

Appendix 1. Hours and Reasons for VNH Use

The tables below show the average hours of VNH use and media preference (Internet or CD-ROM), for the different uses of information offered on VNH.

Table 1-1. VNH Use for Patient Care (hours/week)

Specialty	Mean hours/week		Preference (% sample)		
	Internet	CD-ROM	Neither	Internet	CD-ROM
Admin	0.7	0.0	72	28	0
Tech	1.1	1.1	25	59	16
Dental	0.4	0.1	54	38	8
Other	1.7	0.6	40	50	10
Provider	1.2	0.5	19	66	15
Total	1.0	0.6	32	55	13

Table 1-2. VNH Use for Health Care Promotion (hours/week)

Specialty	Mean hours/week		Preference (% sample)		
	Internet	CD-ROM	Neither	Internet	CD-ROM
Admin	0.7	0.1	0	81	19
Tech	0.5	0.6	18	33	49
Dental	0.1	0.4	11	61	28
Other	2.2	0.2	11	39	50
Provider	0.5	0.2	11	34	55
Total	0.5	0.4	12	43	45

Table 1-3. VNH Use for Own Prof Education (hours/week)

Specialty	Mean hours/week		Preference (% sample)		
	Internet	CD-ROM	Neither	Internet	CD-ROM
Admin	0.5	0.1	78	19	3
Tech	1.6	1.4	19	54	26
Dental	0.2	0.6	51	34	14
Other	3.3	2.0	44	39	17
Provider	1.0	0.5	23	64	14
Total	1.2	0.8	33	50	17

Table 1-4. VNH Use for Clinical Training of Others (hours/week)

Specialty	Mean hours/week		Preference (% sample)		
	Internet	CD-ROM	Neither	Internet	CD-ROM
Admin	0.3	0.2	74	26	0
Tech	1.5	1.4	25	52	24
Dental	0.2	0.4	56	32	12
Other	2.8	0.6	53	35	12
Provider	0.7	0.3	29	60	11
Total	1.0	0.7	38	48	14

Table 1-5. VNH Use for Administration (hours/week)

Specialty	Mean hours/week		Preference (% sample)		
	Internet	CD-ROM	Neither	Internet	CD-ROM
Admin	2.6	0.2	63	34	3
Tech	1.0	1.3	26	50	24
Dental	0.5	0.0	53	35	12
Other	1.0	2.2	56	38	6
Provider	0.7	0.3	33	55	13
Total	1.1	0.7	39	47	15

Appendix 2. Training Support

The descriptions of how military medical professionals reported using the VNH as a training support tool are tabulated below. The responses are broken down by medical specialty.

Table 2-1. Training Support

Specialty	Use
<i>Admin</i>	<ul style="list-style-type: none"> Reference Build training curriculum Train ship's crew Guidelines for PE Train HMs to treat combat casualties Patient feedback on Occupational Medicine Research readiness standards Advancement training MANMED training of students Inservice staff training Reserve unit training Develop sick-call screening course CBR casualty training
<i>Dental</i>	<ul style="list-style-type: none"> Personal advancement Inservice training
<i>Other</i>	<ul style="list-style-type: none"> Train AD laboratory technicians Deployment training
<i>Provider</i>	<ul style="list-style-type: none"> Use as NAVMED P-117 Make LTGs for crew training

Specialty	Use
	Reference to supplement materials on-hand
	Use manuals and interactive areas including x-ray and trauma pages
	Research clinical guidelines for training
	Point out VNH as source of information for operational medical officers
	Chemical weapons defense treatment training material source
	Reference materials for medical staff
	Patient education at reserve center
	BUMED articles to teach Admin discharges in Admin Psychiatry
	GMO training
	Use VNH graphics for training presentations
	Hotlinks in presentations
	Health promotion; first aid training
	Answer Corpsmen questions
	Teach CE classes for EMTs and IDCs
	Sick call screen
	Source for handouts
	Professional development of junior HM staff
	MEDLINE searches
	Medical surveillance information for port visits
	Safety lecture material source
	Seabee Operational Medical Guide training material source

Duty station	Specialty	Comments
Ship	IDC	This is a great tool for a IDC at sea. Also great source for training.
Ship	HM	thanks
Ship	Other	Please make these and any updates available to MSC Commands.
Ship	Physician_RT	I would like to have as much of the website info placed on CD-ROM. I m not aware of how much data the CD has but if the website has more than 650MB; I m sure there are providers out there like me who wouldn't mind copying the site onto a hard drive from m
Ship	Nurse	I really appreciate this useful reference source being available to me at no cost.

Appendix 3. Suggested Improvements and Enhancements

Improvements and enhancements for the VNH suggested by military medical survey respondents are tabulated here. The tables describe:

1. Most helpful information resource.
2. Greatest problem using the VNH.
3. Information for health care providers that should be added.
4. Information for patients that should be added.

(Note that the suggestions were extracted from respondents' comments and are unedited.)

Table 3-1. Most Helpful VNH Resource

Specialty	Resource
Admin	MANMED P117 is available.
Tech	access to training manuals and publications
Tech	BUMED administration
Tech	CORRESPONDENCE COURSES
Tech	Diagnostic training
Tech	HM 3&2; 1&C; Merck Manual
Tech	Immunizations information; current medical directives not found on Navy web sites; and
Tech	MANMED
Tech	Manuals and Instructions
Tech	Operational Ob/Gyn
Tech	pictures
Tech	Reference Material
Tech	SURFLANT 6000
Tech	The use of NAVMED P-117
Tech	Used to find updates and up to date findings.
Dental	Diagnosis
Dental	policy references and manuals
Other	Flight surgeon manual
Other	Manual of Naval Preventive Medicine: NAVMED P-5010; U.S. Navy
Provider	admin on pregnant women
Provider	Administrative info
Provider	Administrative references; health promotion
Provider	Clinical info
Provider	Diagnosis and treatment
Provider	GMO manual; women's health 98
Provider	I am fairly new to the site; so hard to comment at present
Provider	Instructions
Provider	Library
Provider	no comment

Specialty	Resource
Provider	not used much
Provider	Orthopedics
Provider	pharm data
Provider	pharmacy
Provider	The breakdown of topics
Provider	The Links Page

Table 3-2. Greatest Problem Using the VNH

Specialty	Internet	CD-ROM
Admin	slow downloads	broken links
Clinical	Navigation	Navigation
Clinical	trying to locate information quickly	same
Clinical	SPEED TO SLOW	MANMED needs to be updated; also you need a better way to view and print articles on it.
Clinical	Unable to access	CDROM Damage
Clinical	getting used to find things quicker	getting used to find things quicker
Clinical	Can t use at work	Wish more of the website update made to the CD
Clinical	Downloading files while underway.	Files being current.
Dental	I HAD NEVER HEARD OF THE VNH THE DENTAL DEPT WAS NEVER SENT UNTIL TODAY.	A COPY OF THE CD-ROM.
Dental	Lack of detail	Did not use
Dental	no dental information	no dental information
Other	Access time via internet.	- Everybody wanting to borrow it. - Navigation through all of information is best accomplished through Outline mode in my opinion.
Provider	Good info for MO s and IDC s but you leave the basic Corpsmen without info at that level.	Same
Provider	Server down; Slow links; disconnects.	Out of date; Limited selection
Provider	access to internet	updating have old version
Provider	same as above	search engine was very limited
Provider	Finding Something specific quickly	same
Provider	loss of internet access	not having most recent CD
Provider	search is difficult to to get phrasing to match engine s	same as internet problem

Specialty	Internet	CD-ROM
Provider	Too difficult to search and the material is often not up to date	Too troublesome
Provider	Ship does not support internet access. Have to utilize VNH at home.	Out of date material; old references
Provider	Couldn't get on the web	no comment
Provider	unfamiliarity with the site.	Need to use it more to be able to access things on it faster.
Provider	INCORRECT SPELLING!	To slow to load up
Provider	Did not know it existed	Same
Provider	Out of date	Out of date
Provider	Getting access via antiquated phone lines	No problems

Table 3-3. Information for Health Care Providers to Add

Specialty	Topic
Admin	links to other sites for each category of information
Tech	Anything that relates to Preventive Medicine; Environmental
Tech	I honestly don't know. I really don't use it for patient care
Tech	instructions
Tech	Send out messages with new information that has been added
Dental	develop the dental information for dental providers; IDCs and
Dental	More involved treatment processes
Other	Egans Fundamentals of Respiratory Care Seventh Edition -
Other	I think it's about right. You don't want it to be too inclusive.
Provider	A resource to easily download current publications; directives
Provider	Basic HM level info; field medicine
Provider	How about photos of real cases! An interactive site for dx &
Provider	Links between medical and administrative disposition of
Provider	more text book access and links
Provider	NAVMED P-5066 Nursing procedures manual; CNSL/CNSP
Provider	Orthopaedic Examination illustrations
Provider	surgical emergencies

Table 3-4. Information for Patients to Add

Specialty	Topic
Admin	links to other sites for each category of information
Tech	I honestly don't know. I really don't use it for patient care
Tech	More PT handouts for simple injuries and immunizations.

Specialty	Topic
Tech	Self Care
Tech	stretching exercises
Dental	Links to more information
Dental	oral health maintenance and prevention info
Other	about right as well. continued improvement is always welcome.
Provider	100% compliance on all treatments given! Do your part & we'll do ours
Provider	Format like Griffith's explaining medical and administrative disposition
Provider	More low impact physical therapy type topics; medication information sheets
Provider	more patient handouts in printable format would be nice.
Provider	Take care of your self algorithms

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Appendix 4. Other Reasons for VNH Use by Patients

Reasons non-medical survey responses gave for using the VNH Website are listed.

Table 4-1. Other Reasons for VNH Use by Military Patients

Reason
Access to administrative manuals
Admin
Because no military facility available in jrb forth worth texas area for retirees; and dependents.
Belong to the VVA
Cme/ceu
Combat stress
Combat stress/psychological issues-research
Command forced me to
Editor for base newspaper
Environmental health & safety
Find requirements for commissioning physicals on nrotc students. Surface warfare. Aviation; nuclear; etc.
For my job
Help with establishing programs in our facility
I am a civilian working for the air force rotc. My husband is a marine with the navy ROTC. I put together power point slides for cadet instruction; CPR and 1st aid being 2!
I am a safety & occ hlth specialist and am constantly researching items; trying to keep up to date on information that is job related.
I'm the MID officer here
Info on bone marrow donor procedures
Instructions
Instructorship in various physical activities
Job related; OSH professional
Keep updated
Look at safety related items
Looking for instructions
Looking for NAVMED instruction
Manual of medical department
Medications availability
My grandfather
Occupational safety
Over-seas program development
Overall medical information
P-117; other manuals not available at command
Personnel administration
Prep. For visits to the doctor
Prk eye surgery
Provide reference information
Recruit / applicant screening

Reason

Referred by other user
Reporting instructor for FS and AMSO at school of aviation safety
Research
Research
Research for PA program
Research other items
Research pub for reservists
Research pubs for civilian job
Research separation physicals
Researching biological warfare
Researching BUMED/Navy policy
Reviewing solicitation
Searching for pharmacies available to retirees
Searching for training courses that can be done at home; on-line.
Shipboard training aids
Standards for restricted and unrestricted line officers
Support Brazilian navy aviation squadrons which don't have a flight surgeon
Teaching and research
To develop course material
Training
Tricare prime remote (active duty)
Trying to figure out how to complete the overseas screening process from a remote duty station. Is 5 hours from an MTF. I have a civilian provider; but how do we complete the forms?
Underground
Want to be a doctor
War college research
XO major shore site and saw the info in the CO call kit

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Appendix 5. Comments

Comments volunteered by military medical respondents are tabulated below.

Table 5-1. Comments

Duty station	Specialty	Comments
Clinic	Physician_RT	Do not consider information posted there as reputable and trustworthy.
Clinic	HM	We need more sites like this for the navy
Clinic	MSC_clinical	I use it as a resource for P117. I do not like all the spelling errors or typing errors that I find. That really puts me off; for both the CD-ROM and Internet versions.
Clinic	Other	How do I get the CD-ROM version?
Clinic	IDC	I liked using the CD-ROM on my ship. I only hope some day my clinic gets a system where we can easily access VNH.
Clinic	Dentist	I noticed a great lack of detail. The VNH idea is wonderful - especially for IDC s and other GMO s on their first operational tour. My concerns for them include the lack of treatment and diagnosis detail and the possibility of having no internet connect.
Clinic	IDC	EXCELLENT PRODUCT. PLEASE KEEP IT UP...
Clinic	Physician_RT	Please forward a copy of the VNH-CD.
Clinic	IDC	Although no one reference can be the only reference; VNH comes close.
Clinic	IDC	I rarely use the VNH resources. When I have used the CD-ROM it was very informative because it had everything I was looking for at the time. I found it lacking in researching the full breadth of my position as an IDC.
Clinic	Nurse	I think it's great and I wish I knew about it sooner.
Clinic	Physician_other	I think this is a good resource that should continue and expand.
Clinic	HM	Presently; I am very pleased with the information you provide and will continue to use it.
Clinic	HM	The VNH website is a great resource and training tool. The CD-ROM is a great help also when the internet happens to be down in my area. I thoroughly enjoy using the website and CD-ROM for my needs.
Clinic	Dentist	The oral cavity and related structures are part of the human systems. If nothing more than to support the IDC and the independent dental officer afloat; the VNH is an outstanding format for this.
Clinic	HM	VNH has always been an outstanding consolidated source of information.

Duty station	Specialty	Comments
Clinic	HM	I would like to see something related to Navy instructions. A ROM with such info would be the greatest thing for staff training purposes since Pickeled Herring.
Clinic	Nurse	As noted advertise more.
Clinic	Physician_other	VNH is very good. Hope it gets better. Why not have access to telelibrary through VNH?
FMF	HM	The Iowa Family Practice information was the key thing that attracted me to the VNH originally; I was disappointed that it was not on the CD. It is a very useful guide for sick call reference.
FMF	HM	Outstanding resource for all to use.
FMF	Physician_other	I would prefer a link to the Navy Library with Stat Ref access and perhaps some full text journal capability
FMF	HM	Phenominal product. I have actually given copies to other Corpsmen for use in their units. I am a Reservist and I find the VNH to be the perfect starting point in solving many of the question that arise on a day to day basis. Bravo Zulu; Semper Fidelas
FMF	Physician_RT	The CD room without internet is not useful for professional medical officers.
FMF	HM	Navigation can be improved quite a bit
FMF	HM	I think it s a great tool; but by providing the required medical pubs and BUMED Instructions; would make it indispensable.
FMF	HM	You guys and gals did a great job on the development of this web site and CD. Bravo Zulu.
FMF	HM	The door has finally opened up for my fellow Corpsman to access valuable medical information to support the Marine Corps in remote places on I-I duty. Bravo - Zulu
FMF	Physician_other	It is a great resource; which I have used many times. Unfortunately I have a 1998 CD-ROM which doesn't have nearly the information that the web site does. Both are necessary though as often Internet access is not available
FMF	HM	Think it s a great program. If you could put the BUMED Pubs in PDF. That would be great. Also a few of the other BUMED instructions would be nice to.. The NATO BIO/CHEM for reference would be good.. Great program. Great overall paper saver.. Keep
FMF	IDC	This is a great tool for operational medicine and I often use it for research and recommend this site to other providers and even patients. Thank you; this site can only get better.

Duty station	Specialty	Comments
FMF	HM	I was a little disappointed when I received the CD Rom and discovered it was not as complete as the web site. BUT; after thinking about it; it would be impossible to include all the information on the web site on a single CD Rom. Also; multiple CD ROMs
FMF	Physician_other	Out of date too quickly.
FMF	HM	It would be nice to see an interactive program for Corpsmen to increase their knowledge of basic and advanced Medical procedures. Junior Corpsmen could have a program for the basics and Senior Corpsmen could have programs on various specialty topics.
Hospital	HM	I have been using your site and CD ROM a lot lately and have referred numerous of my co-workers to it who are looking for info dealing with navy medicine
Hospital	Other	This is a wonderful way to disseminate a huge quantity of information in one area. Medical personnel are now able to quickly gather info without having to peruse through piles of reference books.
Hospital	MSC_Scientist	The evaluation section of this survey should have at least a third option. The VNH is not well organized for my specialty and I require a very broad range of information; much of which is not available on the VNH.
Hospital	MSC_clinical	this is a good site. Keep up the good work!
Hospital	Nurse	This resource was not known to me until this month. Perhaps more publicity.
Hospital	Physician_RT	I have used the VNH very little. At its inception and with slow connections it was not useful during clinic times; easier resources were available after hours. I have now been re-introduced to the site and it appears it will be much more helpful in now
Hospital	MSC_clinical	VNH has been an excellent source of information for me personally. It would have been very helpful if this was available at the beginning of my career 26 years ago.
Hospital	HM	love to see some biomedical related topics
Hospital	Physician_RT	Internet medical access is critical. Military should provide links into on-line library such as MD Consult Pub-Med texts etc.
Hospital	Physician_RT	Haven't used the CD ROM version
Hospital	Physician_RT	By your questions; you appear to be targeting operational medical officers. I am a sub-specialist at a major teaching hospital; which you may want to take into consideration when reviewing my responses.

Duty station	Specialty	Comments
Hospital	DT	I don't have a current VNH CDROM and as I have access to the net do not need one. Making one available to all operational and overseas providers was helpful to me in the past. I think many providers are not familiar with all the VNH has to offer.
Hospital	Nurse	You are on the right track. Please continue to look ahead and integrate the new resources that come available. Making it as efficient as possible will ultimately save money by saving on the long manhours wasted searching for the info needed.
Hospital	Nurse	I have been very satisfied with both the internet and CD versions of VNH. I have been extremely satisfied with the technical support and assistance received when needed. Both resources are outstanding and needed. Thanks for the effort.
Hospital	Nurse	Overall and excellent job. I only wish that the Canadian Forces Medical Service would be able to provide such an excellent service to us; up here in Canada. Cheers.
Hospital	Physician_other	Make the service faster
Hospital	Physician_RT	Visited VNH on several occasions over several years. concept is a good one and should be developed further. However; if I had a choice I would elect sites such as MDConsult over NVH due to the wide variety of resources available on the site.
Hospital	Physician_RT	A Great resource! Keep improving it.
Hospital	MSC_Admin.	A great tool for healthcare professionals!
Hospital	Nurse	This method of healthcare is future focused and would like to see it continued to meet the needs of healthcare providers.
Hospital	Nurse	This resource was not know to me until this month. Perhaps more publicity.
HQ	Physician_other	It is a great help to have access to information that is not easily available in my own (small)navy. This goes especially for all kind of hand-books (FS; GP; Corpsmen etc.)
HQ	MSC_Admin.	Please keep it up! We need these resources in the field and without the VNH we are back where we were 5 years ago!
HQ	Dentist	Quite extensive looks good
HQ	IDC	The internet is so readily available, so I do not go the VNH often. However it is nice having specific Navy medical info available.
HQ	HM	Thank goodness for this website. It has been a source of great help since I found it last year. Thank you and update; update; update.
NEPMU	MSC_Scientist	Just before taking this survey I took another look at the site and because I was looking everywhere; not just for something specific; I found all kinds of useful stuff for preventive medicine. But the site markets itself.

Duty station	Specialty	Comments
Other	Physician_RT	This is a valuable resource and should be continued.
Other	Physician_RT	Potentially very useful -if current and easy to use.
Other	DT	The survey was too strongly oriented to provision of health care for my answers to be of great value.
Other	Other	It has become a very useful tool. I applaud whoever had the vision as well as time and money to put it all together. I hope it will continue to develop into an increasingly useful tool for the physicians out in the field/off-shore.
Other	Other	I work in a Marine Corps Safety and Environmental shop. I mainly use the program to ensure that we are following proper procedure for our safety and env programs. It makes it easier to find most of the information I need in one place.
Other	Physician_other	I think VNH CD would be good but I must have missed where to pick it up.- I was aware of its existence but no one on our carrier used it for our six month deployment. A distribution plan to major commands with a small presentation might be helpful
Other	IDC	I am very satisfied with VNH. I primarily use it presently as a reference tool more than patient diagnosis and treatment protocols. Great Source.
Other	IDC	I believe it is a great tool that can help out quite a bit in bolstering the quality of care and training that we can provide to our patients and crewmembers.
Other	HM	I appreciate all your hard work!!!
Other	MSC_clinical	I would like to test the CDROM version when I get the chance; finding the site was a stoke of luck; before that I didn't have knowledge of it. It is very useful and a constant learning facility
Other	Other	Thank you for opening this site to us. You have made a significant contribution to the standardization of patient care. This is an amazing accomplishment. Thank you.
Other	HM	This is the best resource that the Navy has created so far.
Other	HM	Thanks for the modality! Please keep improving. An icon to get directly to instructions (BUMED/NAVMEDCOM) would be nice.
Other	HM	Very nice tool. It adds greatly to the overall effectiveness of active duty and retired Medical Department Personnel.
Other	DT	There should be inservice training at command levels for all levels of professionals and ranks from E-1 and up. The more people know about this and how to use it the better we will be to provide for our patients and customers.
Other	MSC_Scientist	Thank You for the VNH website! I have found it a useful tool and have used it on numerous occasions.

Duty station	Specialty	Comments
Other	HM	If you want corpsmen who are not IDC trained to make better use of VNH; then start by training them in its uses in corps school and outfit us with laptops and your CD-ROM
Other	IDC	This is an outstanding program. I recommend it to everyone I know.
Other	HM	I don t know how I worked without it. I depend on VNH now.
Other	MSC_Admin.	Thanks for having it!
Other	HM	Provide information in PDF format as well.
Research_Facility	HM	Although I am not performing in the capacity of a clinical corpsman. Having the CD-ROM for VNH will help me continue with brushing up on the essential items required of my rate. I am looking forward to any new information that will be available on the site.
Seabees	Physician_other	When I initially started using the web site it was fairly informative; especially when looking up instructions and regs. However; it lacked significant detail and often did not provide any new information. Once I found some key civilian sites (Fpnotebook)
Seabees	Physician_RT	Valuable tool in conjunction with more operationally oriented sources; and good for field troop training in medical topics...
Seabees	HM	How do I get VNH on CD-ROM? What is the possibility on having this link up to related research papers and Medical Journals?
Ship	HM	As stated earlier; all Naval Ships Medical Departments should be placed on the automatic mailing list to receive the CD-ROM and any up-dates. Thank you very much for providing me with a copy of the CD-ROM and use of your information provided on both the CD and Internet.
Ship	IDC	I'm very grateful for having the CD-ROM.
Ship	Physician_other	like the CD; would like to receive an updated version
Ship	Physician_RT	The Internet gives us relatively current info while the CD supplies us with information if the Internet is not accessible especially smaller ships.(Is the response address really VNHsurvey@cna.org or
Ship	IDC	I would like a new version of the CD. I would like all references required by the BUMED 6280.1 series to be added. These instructions/pubs are required to be on all ships.
Ship	Physician_RT	VNH - It s a good idea
Ship	IDC	I would like to see an easier way to find current instructions etc. for those of us that are not really a computer guru.
Ship	Physician_other	Great tool; would like the updated CD-Rom