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REPORT NO. 87-31

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Shipboard Medical Information Systems: Familiarity and Receptivity

Christopher G. Blood and Dawn M.P. Brand

Analyses were performed on the perceived automation needs and current medical department computerization status aboard ships of the U.S. Pacific Fleet to determine if present automation status had a bearing on receptivity to further automation. Current medical department automation status consisted of microcomputers and/or the Shipboard Nontactical ADP Program (SNAP). Measures of receptivity to department automation included perceived need for automation of reports and composite scores of perceived need for 12 automated medical capabilities. Those ships with the highest present levels of automation were the most receptive to medical department computerization. Lack of familiarity with benefits to be attained through automation was proposed as responsible for observed decrements in receptivity among medical departments.

Keywords: attitudes; office automation; medical computer applications; beginning; (CT)

INTRODUCTION

The responsibilities of Navy shipboard medical department representatives are many and varied. In addition to direct patient care, medical department personnel perform tasks such as preventive medicine training for the crew, medical supply inventory, monitoring of sanitation, and the writing of numerous reports. The average workweek of independent duty corpsmen is 59 hr in port and 85 hr at sea.¹ Administrative duties were found to take up the largest percentage of the working day of medical department personnel.

In view of the administrative burden placed upon corpsmen aboard U.S. Navy ships, it would seem logical that automating administrative functions would be readily perceived as a work-saving measure. Indeed, the need for a shipboard information system has been documented² and general requirements for such a system have been outlined.³ However, in a survey to assess medical information needs, the data obtained showed that some respondents did not feel the medical department should be computerized.⁴ This lack of receptiveness may bear on the postimplementation utilization of any such system. Previous investigations have shown that attitudes toward computers prior to implementation affect both short- and long-term adaptation to computerization⁵ and reactions to

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training.⁶ Research has also shown that as people are exposed to computers and their associated benefits, anxiety decreases and a positive attitude toward computers develops.^{7,8}

The purpose of this study, then, was to examine perceived need as a possible function of a departmental condition that varied among ships. It was hypothesized that medical personnel aboard ships with some current automation capability would exhibit greater receptivity toward computerization of medical department functions than those aboard ships that presently have no departmental automation. This hypothesis is based on the expectation that medical department representatives with some current automation on board will be more familiar with the benefits attained through automation than personnel aboard vessels with no computerization.

MATERIALS AND METHODS

The shipboard medical information system needs survey was mailed to 173 ships of the Surface Pacific (SURFPAC) and Air Pacific (AIRPAC) Fleets. Responses were received from 106 ships, representing 14 types of surface vessels: ammunition, amphibious, battleship, carrier, cruiser, destroyer, frigate, landing, minesweeper, oiler, repair, salvage, store, and support. Table 1 indicates the information surveyed concerning automation status and need.

Measures of current automation were the presence or absence of computers. A number of Navy ships have implemented an automated system called the Shipboard Non-tactical ADP Program (SNAP) for generating reports, tracking medical tickler file infor-

Table 1. Queries from Automation Status and Perceived Need Survey

Is the SNAP (Shipboard Non-tactical ADP Program) computer system aboard this ship?

Are there presently any microcomputers used by members of the medical department?

Which reports would you most like to see automated?

Using this scale (G = great need for automation, S = some need for automation, N = no need for automation, D = doesn't apply to this ship), check the following areas for need of being automated.

G	S	N	D	
				PATIENT RECORDS
				MEDICAL SUPPLY INVENTORY
				GENERATING REPORTS/LOGS
				COMPILING FORM LETTERS/MESSAGES
				MEDICAL DECISION MAKING
				PERIODIC TRAINING FOR MEDICAL DEPARTMENT STAFF
				GENERAL MEDICAL TRAINING FOR CREW
				PREVENTIVE MEDICAL TRAINING FOR CREW
				MEDICAL REFERENCE LIBRARY
				DAILY TASK INVENTORY
				PHARMACY SUPPORT
				QUALITY ASSURANCE FUNCTIONS

List the rank of each medical department member

What is the average weekly patient load?

mation, and maintaining supply inventories. In addition, some medical departments have acquired microcomputers to perform a similar variety of medical functions as well as tasks such as word processing. Accordingly, information on the presence of the SNAP system or other microprocessors aboard ship yields four levels of current automation status: (1) no micros or SNAP, (2) SNAP only, (3) micros only, and (4) micros and SNAP. The presence of microcomputers alone was considered a higher level of automation than SNAP alone because of accessibility and flexibility. Microcomputers, when present, were always located in the medical department (not always true with SNAP) and the programs run on the micros were limited only by the skills of the user; whereas SNAP has preset formats.

The measures of automation receptivity were the number of reports perceived as needing computerization and the extent to which the 12 proposed medical functions were perceived as being needed. Receptiveness to automation of the 12 medical functions was computed as follows: a composite perceived need score summed over the 12 capabilities with two points assigned for great need, one point for some need, and zero points for no need/doesn't apply. Additionally, a percentage need score was calculated without considering the degree of need (the sum of one point for each needed function divided by twelve). Number of medical personnel and weekly patient load were also looked at in reference to perceived need.

RESULTS

The internal consistency of the perceived need measures was assessed by correlating the number of reports needing automation with the composite medical functions need score. This analysis indicated that these measures were significantly correlated ($r = 0.254$, $p < 0.05$). Another analysis was conducted to evaluate the interdependence of the categories of current automation status. The result of a chi square analysis was not statistically significant indicating that the presence of microcomputers aboard ship was not related to the presence of SNAP.

Examining the mean number of reports perceived as needing automation by the four levels of automation status, it was found that means ranged from 3.63 to 6.08. Figure 1 shows that at each higher automation level there was a greater receptiveness to automating reports. Further, this trend was found to be significant when a correlation was computed between number of automated reports requested and automation status ($r = 0.206$, $p < 0.05$).

Responses to the perceived need for the twelve automated functions are shown in Table 2. Among all survey respondents, the composite medical functions need score ranged from 0.00 to 24.00 with a mean of 16.72. This index of automation receptivity increased with present level of automation as shown in Fig. 2. Though the difference did not reach statistical significance, the mean percent need score of ships without automation was 87%, as compared with 94% for those ships with both SNAP and microcomputers.

The relationship between measures of medical department size and perceived automation need was also investigated. Number of medical personnel aboard ships ranged

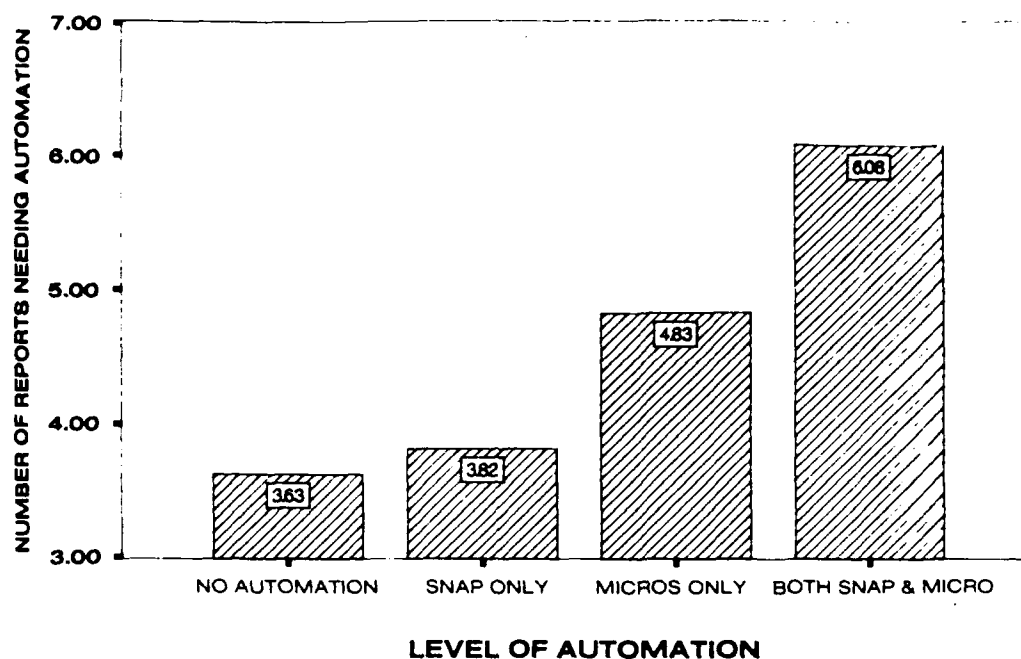


Figure 1. Mean number of reports indicated as needing automation by current medical department computerization status.

from 1 to 40, while weekly patient load varied from 10 to 500. The correlation coefficients for number of medical personnel and weekly patient load with number of automated reports requested were 0.088 and -0.094 , respectively. When the two indicators of medical department size were correlated with the composite medical need score, coefficients of 0.053 and 0.042 were obtained. The lack of significance of these four correlations suggests that the size of the medical department was unrelated to perceived automation need.

Table 2. Perceived Need for Medical Department Automation among Shipboard Survey Respondents

	Doesn't Apply		No Need		Some Need		Great Need	
	N	%	N	%	N	%	N	%
Patient records	5	4.8	17	16.3	27	26.0	55	52.9
Medical supply inventory	2	1.9	1	0.9	7	6.6	96	90.6
Generating reports/logs	1	1.0	4	3.9	29	28.2	69	67.0
Compiling form letters/messages	3	2.9	6	5.7	45	42.9	51	48.6
Medical decision making	13	12.3	24	22.6	50	47.2	19	17.9
Periodic training for med. dept. staff	3	2.8	14	13.2	53	50.0	36	34.0
General medical training for crew	3	2.9	12	11.4	59	56.2	31	29.5
Preventive medical training for crew	3	2.9	12	11.8	55	53.9	32	31.4
Medical reference library	4	3.8	10	9.4	33	31.1	59	55.7
Daily task inventory	2	1.9	7	6.7	18	17.3	77	74.0
Pharmacy support	5	4.8	7	6.7	33	31.4	60	57.1
Quality assurance function	4	3.8	7	6.7	40	38.5	53	51.0

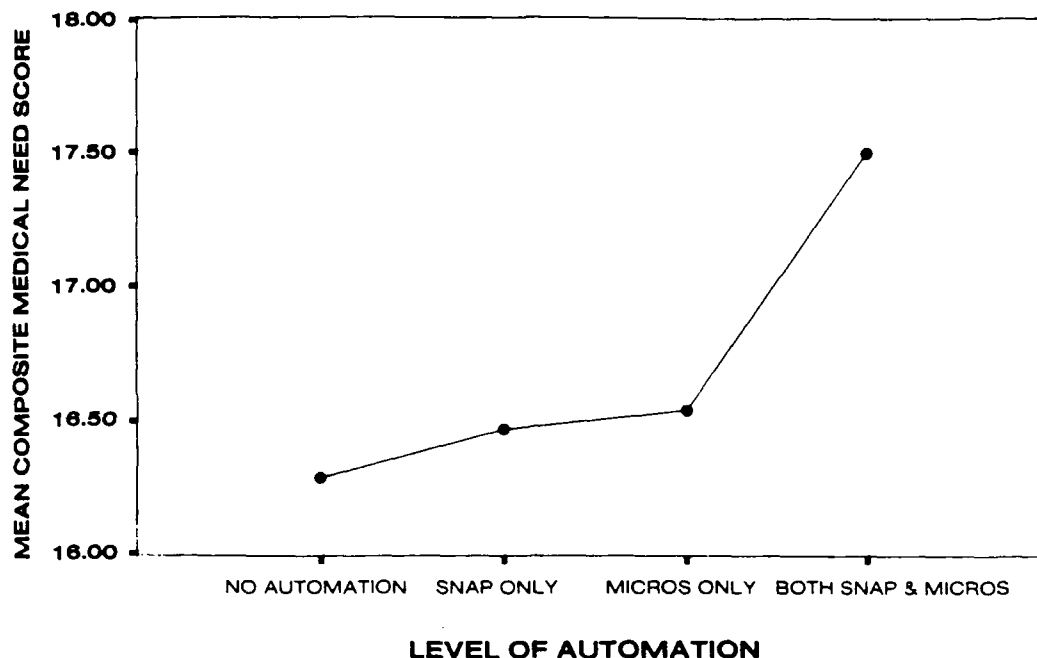


Figure 2. Mean composite medical function need score by level of current medical department automation.

DISCUSSION

The present study sought to determine if those shipboard medical department representatives using computers and, therefore, familiar with the potential benefits to be achieved through automation, would be more receptive to further automation than would medical personnel aboard ships lacking automation. Receptivity to medical department computerization was indeed highest among representatives of ships that currently had the highest levels of automation.

There was a progressive increase in the ratings of perceived automation need through the four levels of current department computerization: no current automation, presently have access to SNAP system, presently use microcomputer for medical department functions, and presently have SNAP and microcomputer. This was true for the two most discriminating measures of receptivity—number of reports perceived as needing automation and the composite score indicating degree of need for 12 different medical department functions. Additionally, when the 12 capabilities were looked at in terms of overall percentage need, those representatives aboard ships with microcomputers and SNAP clearly perceived their need to be greater than those on ships with no automation. These significant results and observed trends cannot be attributed to larger departments needing more automation because both patient load and number of medical personnel yielded nonsignificant correlations with the measures of perceived automation need.

Ships without automation and, therefore, less familiar with the benefits attainable through automation (that is, savings in time and greater record accuracy), were the least receptive to computerization of medical functions. Previous investigations support the notion of an inverse relationship between computer familiarity and automation resistance⁸ and also document the potential costs in terms of manhours, dollar amounts, and quality

of care to which resistance to medical unit computerization can lead.⁹ The observed relationship between automation familiarity and receptivity further underscores the need for a thorough orientation and training program prior to medical information system implementation.

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Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	20



REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS None	
2a. SECURITY CLASSIFICATION AUTHORITY N/A			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A				
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NHRC Report No. 87-31			5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Naval Health Research Center		6b. OFFICE SYMBOL (If applicable) Code 20		7a. NAME OF MONITORING ORGANIZATION Commander, Naval Medical Command
6c. ADDRESS (City, State, and ZIP Code) P. O. Box 85122 San Diego, CA 92138-9174			7b. ADDRESS (City, State, and ZIP Code) Department of the Navy Washington, DC 20372	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Naval Medical Research & Development Command		8b. OFFICE SYMBOL (If applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code) Naval Medical Command National Capitol Region Bethesda, MD 20814-5044			10. SOURCE OF FUNDING NUMBERS	
			PROGRAM ELEMENT NO. 63706N	PROJECT NO. M0095
			TASK NO. .05	WORK UNIT ACCESSION NO. 1053
11. TITLE (Include Security Classification) MEDICAL INFORMATION SYSTEMS: FAMILIARITY AND RECEPTIVITY				
12. PERSONAL AUTHOR(S) Christopher G. Blood, Dawn M. P. Brand				
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 87 DEC 02
15. PAGE COUNT				
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Medical department computerization, automation receptivity perceived automation need, automation familiarity, medical information systems	
FIELD	GROUP	SUB-GROUP		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) Analyses were performed on the perceived automation needs and current medical department computerization status aboard ships of the U.S. Pacific Fleet to determine if present automation status had a bearing on receptivity to further automation. Current medical department automation status consisted of microcomputers and/or the Shipboard Non-tactical ADP Program (SNAP). Measures of receptivity to department automation included perceived need for automation of reports and composite scores of perceived need for twelve automated medical capabilities. Those ships with the highest present levels of automation were the most receptive to medical department computerization. Lack of familiarity with benefits to be attained through automation was proposed as responsible for observed decrements in receptivity among medical departments.				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Christopher G. Blood			22b. TELEPHONE (Include Area Code) 619/553-8404	22c. OFFICE SYMBOL Code 20