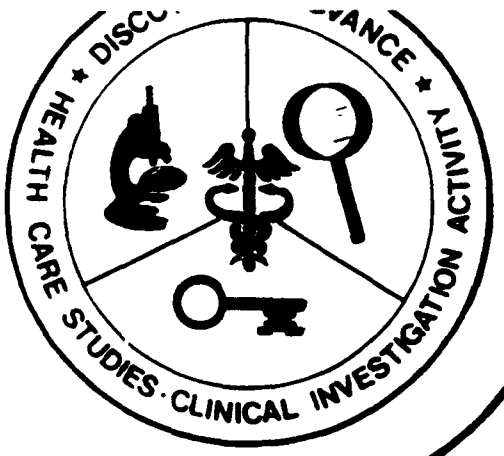

UNITED STATES ARMY

HEALTH CARE STUDIES AND

CLINICAL INVESTIGATION ACTIVITY

AN EVALUATION STUDY OF OFF-THE-SHELF PATIENT CLASSIFICATION SYSTEMS

LTC KAREN A. SEIPP, AN, USA
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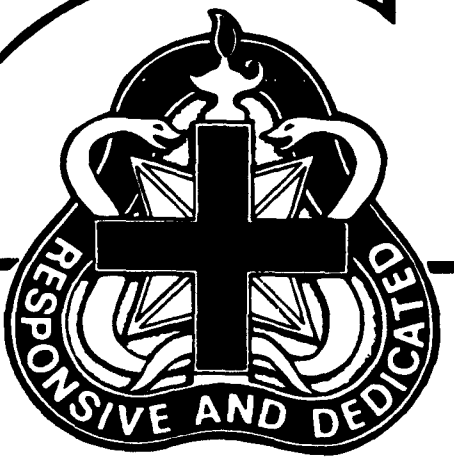
FINAL REPORT
HR 92-003
March 1992



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This study was conducted to determine if commercially available, off-the-shelf patient classification systems (PCS) would meet the functional requirements for nursing's management information needs. Information about the systems was also considered in the development of other options for revising the Workload Management System for Nursing (WMSN).

Approximately 89 potential sources were identified through lists in nursing administration and hospital automation references. The majority of these were consultant or information systems companies. Information was provided by 59 of the sources.

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A 3-phase plan was developed to expedite identification of suitable systems using readily available information. Respectively, the objectives were to 1) identify and collect information on commercially available, off-the-shelf PCS's, 2) organize pertinent information using an adapted evaluation model, and 3) identify PCS's meeting predetermined selection criteria. A data collection form was developed to guide the telephone interviews and written materials on PCS methodology were requested. Information was sorted using an adapted version of the content-input-process-product (CIPP) model.

A decision matrix incorporating predetermined selection criteria identified suitable PCS's. The two systems identified for further corporate evaluation were Van Slyck and Medicus.

The evaluation model used in this study provided a framework for information that had relevance to DoD. Very often, organizations begin testing systems without a clear understanding of their requirements. In addition, marketing information often overstate a system's capabilities and understate limitations. Conflicting definitions of common terms further complicates making comparisons. This can significantly delay putting a new system into the hands of the nursing staff. However, by clearly establishing the primary purpose of classification, selection criteria can be used to identify suitable tools for further consideration.

ACKNOWLEDGMENTS

This study's value lies in the fact that it examined the functional information necessary for corporate decisions to be made on nursing resource management systems. If the study had not been as inclusive of available commercial systems or had not been completed in such a short span of time, it would have had no value at all to those making the hard decisions. Therefore, we would like to thank Ms. Sue E. Akins, Management Analyst, for making many of the initial telephone calls and nurse researchers COL Jane L. Hudak and LTC John L. Carty, Nursing Studies Branch, for their consultation.

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INTRODUCTION

Purpose

This study was conducted to determine if any commercially available, off-the-shelf patient classification systems (PCS) would meet the functional requirements for the Department of Defense's (DOD) nursing management information needs. Additionally, information about the commercial system methodologies for patient classification and staffing were identified and considered in the development of other options for the revision of the Workload Management System for Nursing (WMSN).

Background

The Army, Navy, and Air Force Nurse Corps currently utilize WMSN for nursing resource management. The basic research for WMSN was conducted from 1977 to 1985 (Sherrod, Rauch, & Twist, 1981; Misener, Frelin, & Twist, 1983; Vail, 1986). In August 1991, in the interest of maintaining the clinical and methodological currency of WMSN, Nursing Studies Branch, the U.S. Army Health Care Studies and Clinical Investigation Activity was directed by the Office of the Assistant Secretary of Defense, Health Affairs (OASD[HA]) to consider all reasonable alternatives in revising WMSN.

The process of developing research study concepts and evaluating the functionality of commercial PCS systems had to be accomplished in a relatively short time. Members of the Nursing Studies Branch (NSB) identified four options: two approaches using the current system's basis of acuity and previous research, a multidimensional approach to acuity more consistent with professional practice, and the purchase of an off-the-shelf system.

Although an evaluation of commercial systems can examine many characteristics, functionality is usually given the highest priority. Functionality encompasses not only the range of functions performed, but the specific way the system accomplishes those functions (Pivnicny & Carmody, 1989). Before committing to expensive, time-consuming testing, it is essential to identify the systems that will produce the desired outcomes in a satisfactory manner. The evaluation model used in this study provided a framework for functional information that had relevance to DOD medical treatment facilities.

Very often, organizations begin testing systems without a

clear understanding of their requirements. In addition, marketing information often overstates a system's capabilities and understates its limitations. Conflicting definitions of what should be common terms further complicates making comparisons. All these factors can significantly delay putting a new system into the hands of the nursing staff. However, by clearly establishing the primary purpose of classification, selection criteria can be used to identify suitable tools for further consideration.

OBJECTIVES

A 3-phase plan was developed to expedite identification of suitable systems using readily available information. Respectively, the objectives were to: (a) identify and collect information on commercially available, off-the-shelf PCS's, (b) organize pertinent information using an adapted evaluation model, and (c) identify the PCS's meeting predetermined selection criteria.

METHODOLOGY

Overview

Eighty-nine potential PCS sources were identified from lists in nursing administration and hospital automation references ("Directory of Consultants," 1990; Roland & Roland, 1989; "Software Guide," 1991). A data collection form was developed to guide the telephone interviews. Written materials on PCS methodology were also requested. Information was sorted using an adapted model which organized data according to system content, input, process and product. A matrix of the selection criteria identified suitable PCS's.

Procedures

Phase I

PCS sources from three lists were compiled from the literature. The majority of the PCS sources were consultant or information systems companies. All were contacted using the telephone numbers provided in the listings. A data collection form guided the telephone interviews conducted by three NSB staff and assured consistency in the interview process (see Appendix A). Written information on the PCS methodology was requested and follow-up calls were made as needed.

The main objective of the initial telephone call was to identify a point of contact (POC) with knowledge of the PCS methodology. Most firms referred the inquiries to registered nurses on their staff who functioned as members of the design, research and/or implementation teams. When this was not possible, questions were answered by others, usually marketing

personnel. Although the information received from marketing personnel may not be totally accurate or complete, it was not unreasonable to expect a company's representative to provide accurate product information to potential clients. This was considered an acceptable limitation, as the purpose of the study was to identify functionally suitable systems for further review, not to make a final selection. In some instances, requests for return telephone calls and/or written materials were ignored. After a reasonable number of attempts had been made, fourteen sources were dropped from the study due to lack of response from the companies.

Fifty-seven sources were eliminated during the course of the study using other rejection criteria. Some sources did not have a PCS methodology. These included nursing information systems without PCS modules, software programs that automate a hospital's existing PCS, management applications of acuity data, and firms that only provided consultative services. Eight of the eliminated sources had PCS's used exclusively in limited specialty areas, such as Emergency Departments or long-term care facilities. Other sources had PCS's that were one module of an extensive automated system that could not function as a stand-alone system.

Product information was provided by fifty-nine of the sources. Packets were made combining the completed telephone data collection forms and the mailed information. Code numbers were assigned to each packet and used for the remainder of the study. This was done to reduce selection bias by the NSB researchers in the event several potentially suitable systems were identified.

There was an additional benefit of the study. Methodologies and presentation formats of interest to the other WMSN revision options were also identified and shared with the appropriate nurse researchers. These included non-time based acuity methodologies, customized PCS and staffing systems, specialty nursing task lists, report formats, and marketing layouts.

Phase II

The context-input-process-product (CIPP) model is an evaluation tool proposed by Stufflebeam (1987) for use with educational programs. Context, input, process and product are the four parameters evaluated in the model (Stufflebeam et al, 1971). Information about objectives, needs and expectations is obtained through context evaluation. Input evaluation yields information regarding procedural designs as well as strengths and limitations. Process evaluation provides information regarding implementation and monitoring. Product evaluation allows decision makers to assess information about results, reactions, and deficiencies.

After synthesizing information from the literature regarding patient classification systems, the investigators constructed a framework comprised of four parameters: operating context, system capabilities, implementation design and outcomes. Specific data requirements within each parameter are presented in Appendix B.

The final draft of the CIPP evaluation matrix was reviewed and approved by NSB. The matrix was entered into the word processor to speed up the evaluation process and improve legibility. Although the matrix proved somewhat awkward and redundant, redesign would have delayed rather than improved data entry.

In Phase II, one nurse researcher started a CIPP evaluation matrix for each PCS source using the information from the telephone data collection form and the mailed information. Sources were eliminated from the study as soon as they were identified as meeting one of the rejection criteria discussed previously. This occurred at various stages of the study. Some sources remained in the study through Phase III, while others were eliminated after the first telephone call.

Phase III

Selection criteria for a major system requires clarity about the strategic goals of the organization as well as the needs of customers at all levels. Therefore, once information about the systems had been sorted, criteria were developed to identify systems meeting functional requirements. In November and December, the selection criteria were reviewed by the Nursing Consultant, Office of the Surgeon General and the Assistant Chief, Army Nurse Corps. The criteria were approved in mid-December and required: (a) reliable & valid tool(s) for the seven clinical areas currently using WMSN, (b) completed tool(s), or minimal adaptation required, (c) standardized categories used across clinical specialties, (d) information for rating patient accessible in patient record, (e) in use in multiple sizes and types of hospitals, (f) an audit, or interrater reliability system, and (g) a predictive daily staffing system.

FINDINGS

Eighteen sources were identified as having commercially available PCS's and were evaluated using the CIPP matrix. (See Appendix C for an alphabetical listing.) Four sources were subsequently deleted when they were found to provide duplicate tools. Table 1 displays the application of the selection criteria to the 14 final PCS tools.

Table 1

Patient Classification Tools Sorted Against Selection Criteria

PCS Code No.	Used in 7 clinical areas	Same categories all areas	Needs minimal or no modification	All info in chart for audit	Multiple MTF sites and types	Audit System	Staff System
01	x	x	x	x	x	x	x
04	x	N	N	x	x	x	x
09	x	N	x	N	x	x	x
15	N	N	x	x	x	x	x
18	x	N	N	x	x	x	x
20	x	x	x	N	N	x	x
21	x	x	N	x	x	x	x
23	x	x	x	x	x	x	x
24	N	x	x	x	x	x	x
34	x	N	N	x	x	x	x
35	x	N	N	N	x	x	x
40	N	x	N	x	x	x	x
43	x	N	x	x	N	x	x
53	x	x	N	x	x	x	x

Note. x = meets criteria; N = does not meet criteria.

Two of the 14 systems met all selection criteria: Van Slyck (01) and Medicus (23). The two systems have many common characteristics. Both are reported by their companies as well-researched, valid and reliable PCS tools reflecting current nursing practice. Developed in the 1970's, both tools are used nationwide in many teaching and nonteaching acute care facilities of various sizes. Factor evaluative, or checklist-type tools, they use standard categories across all units. The acuity values are weights, not time. Interrater reliability is determined from information in the medical record.

The number of patients per acuity category is reported and therefore available for development of acuity-based manpower standards. Translating acuity weights to full-time equivalents by the staffing systems requires some customization by the companies to identify the needs and philosophy of the facility or

hospital system. The staffing systems project staffing requirements as numbers of each skill mix per shift.

Additionally, both companies have other management applications that use the acuity and staffing data. The cost of the two systems is flexible and dependent on the amount and type of support requested from the companies. Implementation time appears about the same for both systems.

Despite the similiarities between the two systems and the fact that they both meet the preestablished selection criteria, significant differences exist between the Medicus and Van Slyck systems. Table 2 details the differences.

Table 2

Differences Between the Medicus PCS and the Van Slyck PCS

Criteria	Medicus	Van Slyck
Basis of acuity	Amount & complexity of care	Risk, complexity, skill level & time
Number of indicators	36	70
Time/frequency of acuity rating	Daily	Every shift
Tool modification	None required	Minimal
Face validity for nursing staff	Total nursing domain not shown	Total nursing domain is shown
Number of categories	6	7
Staffing system	Projects staffing 3 shifts based on planned care	Projects staffing 1 to 3 shifts based on actual care
Input used to determine staffing	Lirect and indirect time, operating constraints	Direct and indirect time, short length of stay patients, outpatients, operating constraints
Number of hospitals using the tool	300	70
Automation	Multiple options available	Manual only
Access to civilian data base	Yes, annual reports	No
Maintenance of system	Comprehensive support & maintenance	Annual updates

The major underlying difference between the two systems, the use of actual versus prospective workload, is the most critical one. This and the other differences between the two PCS's provide a mechanism for selecting a system to replace the current WMSN, if an off-the-shelf option is deemed acceptable to DOD.

DISCUSSION

The sense of urgency felt by users and top management to replace an obsolete system is understandable. "If problems with an existing system are serious enough to justify spending tens of thousands of dollars to find a new system . . . how can a hospital spend years waiting for a new system to be in place?" (Doyle, 1990). The process of identifying a system that meets organizational needs is necessarily time consuming.

However, there are strategies for meeting the goals of the search for a system and reducing time delays. First, senior management must define their expectations. The requirements of the system should be derived from the organization's strategic plans (Doyle, 1990). Selection criteria can then be developed that identify the purpose of the system and set priorities on customers' needs in accomplishing that purpose. The next major step is to identify systems for thorough review and pilot testing. Missteps can result in expensive delays by implementing and testing systems that do not meet functional requirements.

CONCLUSIONS

Adapting the Stufflebeam CIPP model resulted in identification of relevant data in a systematic manner, facilitating the judgement process. Clearly identifying systems that meet functionality requirements from readily available information reduced both the time and cost of the selection process.

RECOMMENDATIONS

Although the model clarified the selection process, more information was obtained and organized initially than was required. As the philosophy and needs relative to patient classification were clarified, some information was no longer required to evaluate the systems.

Examining system functionality does not eliminate the need for further evaluation. Other aspects of purchasing a system must be explored to insure valid performance in military practice settings. The findings of this study were briefed to the Chief, Army Nurse Corps, OASD(HA), and the Tri-service WMSN Working Group for further consideration at the corporate level.

If purchasing a system is deemed by nursing leadership as the most cost effective solution to revising WMSN, the differences between the two systems provide a mechanism for final selection. If provided strategic planning information, a multidisciplinary task force could weight the desirable characteristics to identify a system for pilot testing.

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Appendix A

Patient Classification System Survey Worksheet

Date/Initials_____

PCS Name_____

Organization_____

Address_____

_____

POC & Phone No._____

_____

A. General Description of PCS:

1. Type of PCS? _____factor evaluative _____prototype

2. Patient acuity categories? _____yes _____no
_____no. of categories

3. Same categories used in all clinical areas? ____yes ____no

4. Clinical areas? (Mark which have separate tool)

_____crit care	_____ED	_____L&D
_____medsurg	_____NBN	_____NICU
_____outpt	_____PACU	_____Peds
_____OB/GYN	_____psych	_____sameday surg

5. Is the tool used to collect data ____retrospectively
____concurrently
____prospectively

6. How often is the tool completed? ____once/shift ____once/day

7. How is IRR done?

8. All IRR-required info in patient record?

9. Tool's uses? _____pt acuity
_____daily staffing _____staffing standard
_____productivity monitoring _____QA
_____costing nursing services _____billing

10. Easy for staff to use?

How long does it take to fill out? _____

Manual____ Automated_____

Acceptance by staff? (explain)

11. Strengths of the PCS?

12. Weaknesses of the PCS?

B. Methodology

1. Who developed the tool? _____corporate _____homegrown

2. When was it developed/implemented/updated?

3. Sample size?

4. How were tasks or categories defined?

5. How were times determined? (task and/or category)

____time studies ____experts ____self-report ____industry standards

6. Is complexity of tasks addressed? (must be done by RN, initiated by RN rather then Dr's order, etc)

7. Does the tool give credit for staff time spent assessing, evaluating, and integrating patient care? (cognitive component)

8. Are staffing requirements based on

____direct hours ____indirect hours ____unit mgmt hours?

9. Reliability and validity studies?

C. Information available? (and costs)

____copy tool	____user instructions	____study data
____task list	____definitions	____times
____category descriptions		____times
____manuals	____reports	____software
____articles, publications		

D. Show and Tell

1. What type of hospitals use the tool? ____no.beds
____public ____private

2. Hospitals in this area using the tool? (and POC/phone no.)

3. Do you perform demos?

Appendix B

CIPP Evaluation Matrix

I. PCS Tool Code Number:

II. Operating Context: Objectives associated with system, intended uses (needs), opportunities

a. Purpose

b. Setting

1. acute care hospitals

2. small, medium and large

3. type of clinical units

a) current 7 areas: med-surg, OBGYN, peds, NICU, crit care, psych, NBN
b) others (L&D, PACU, OR, SDS, ED, AMB, etc)
c) combined units, inpatient units seeing outpatients, etc

c. Historical information

1. year developed

2. length of time in use

3. scope (number and type of MTFs)

d. Intended and realized information needs generated

1. patient acuity

2. scheduling by day, shift

3. productivity monitoring

4. audit procedure

5. quality assurance

6. costing

7. facility staffing requirements

8. national data base

9. other

III. Input or System Capabilities: strategies and actions for accomplishing objectives

a. Design of instrument

1. theoretical framework or rationale

   a) factor evaluative or prototype
   b) basis for acuity (pt need, nsg task, time, etc)

2. content (behavioral tasks; cognitive tasks)

3. format

b. Research

1. methodology

   a) actual or estimated times

2. sample

3. data analysis

4. reliability and validity

c. Procedures for use

1. frequency of data collection, classifications

2. workload measured: actual or projected

3. additional forms, documentation required

4. unit personnel involvement

5. time to complete instrument

6. source of patient information

d. Resource requirements

1. personnel

2. automation or other equipment

3. training

4. finances

5. other

IV. Process or Implementation Design: procedures or strategies for achievement of objectives, as well as design defects

a. Implementation method

1. Customized items

   a) indicators
   b) times or weights
   c) category number or range
   d) other

2. Standard items

3. Data collection or studies required

a. Monitoring System

1. interrater reliability

2. testing of system in organization

b. Program/System Redesign

1. training

2. research

3. continued development

4. revision

5. maintenance

6. customizing staffing

c. Defects

d. Cost

V. Evaluation or Outcomes: extent to which objectives are met

a. Customer satisfaction

1. CNE/CEO

2. supervisory nursing staff

3. clinical nursing staff

4. other

b. Changes in pt assignment, staffing, productivity etc

c. Problems

1. lost workload (short LOS, outpatients, etc)
2. requires additional documentation, forms
3. other

d. Benefits

1. time savings in data entry
2. types of reports
3. generation of reports
4. timely access to information
5. easy to use
6. other

f. Additional studies on tool

Appendix C

Commercially Available Patient Classification System Sources Sorted Against Selection Criteria

Atwork Corporation (EXCELCARE)
Chi Systems, Inc.
Ernst & Young
First Consulting Group (GRASP)
Gamma Systems Services, Inc.
James Bahr Associates (ARIC)
McGladrey & Pullen (UNIQUE)
McLaren General Hospital
Medical Management Planning, Inc.
Medicus Systems Corporation
MESH University Hospital
SASHA, Inc.
Schick & Affiliates, Inc. (PACS)
Van Slyck & Associates, Inc.

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