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A STUDY OF THE LINEN AND LAUNDRY CONTROL PROCEDURES
AT THE USAF MEDICAL CENTER
WRIGHT-PATTERSON AFB, OHIO

A Problem Solving Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Hospital Administration

by

Major Jerome P. Lake, USAF, MSC
August 1980

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<p>→ The study was to determine the cause or causes of deficiencies in the linen and laundry management. The study will develop alternatives where implementation would correct these deficiencies. The objectives would examine how other facilities manage linen and laundry control and develop a methodology that would be contrasted to the existing system that would identify the system weaknesses. The study sets a standard for linen and laundry management applicable to the medical center while the literature review determined that there is no clear cut method of management. The study recommended alternatives to enhance the operation of the linen and laundry service as well as provides a monitoring and security program to maximize linen control efforts. <i>Keywords: contract administration; cost analysis; thesis</i></p>			
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I. INTRODUCTION

Facility Background Information

The United States Air Force Medical Center at Wright-Patterson Air Force Base, Ohio is a composite medical facility with a 310 bed designation and has an expansion capability to 365 beds. It is managed by a staff of 276 officers, 530 enlisted personnel, and 330 civilian employees and provides services to 13,000 active duty members, 32,000 dependents of active duty members, 30,000 retired members and their dependents and 24,000 civilian employees. In addition to this primary patient care function, it also acts as a secondary and tertiary care center, providing support services for approximately 700,000 other beneficiaries within its responsible region. Its primary mission has been, and continues to be, to provide the medical support necessary to maintain the highest possible degree of combat readiness and effectiveness of the Air Force through programs concerned with aerospace medicine, dental care, environmental health, medical care, occupational medicine and veterinary services. The medical center is accredited by the Joint Commission on Accreditation of Hospitals and is a member of the American Hospital Association, the Ohio Hospital Association and the Dayton Area Hospital Council.

In addition to providing a broad range of medical services to its beneficiary population in the areas of primary care, family

practice, emergency medicine, medicine subspecialties, surgical subspecialties, mental health, flight medicine, and occupational medicine, the USAF Medical Center also operates as a military consultant center, acting as a direct referral hospital and an area medical center of Air Force Region three and DOD Region six. It provides specialized services on a referral basis to other facilities in the following disciplines:

Dermatology	Alcohol Rehabilitation
Electoencephalography	Allergy
Cardiology	Endocrinology
Gastroenterology	Cardiovascular Surgery
Gynecology	Corneal Transplant
Nephrology	Drug Rehabilitation
Neurology	General Surgery
Neurosurgery	Hand Surgery
Nuclear Medicine	Head and Neck Surgery
Obstetrics	Infectious Diseases
Internal Medicine	Ocular Prosthesis
Surgery	Oral Surgery
Orthopedic Surgery	Maxillofacial Surgery
Otorhinolaryngology	Orthopedic Internal Prosthesis
Podiatry	Peripheral Vascular Surgery
Proctology	Psychiatric General Care
Pulmonary Diseases	Psychiatric Intensive Care
Rectal Reconstruction	Radiotherapy Super Voltage
Rheumatology	Therapeutic Abortions
Thoracic Surgery	Urology
Endodontics	Orthodontics
Periodontics	Prosthodontics

Conducting the ongoing training programs at the medical center also continues to play a major role in the operation of the facility. Numerous residencies are in effect with 51 medical residents (disciplines covered include internal medicine, surgery, obstetrics/gynecology, pediatrics, and psychiatry), 4 dental residents, 19 nurse interns, 5 psychology interns, 2 administrative

residents, and 18 enlisted personnel receiving advanced training in the areas of cardiology, laboratory services and radiology.

Problem Identification

The requirements levied on ancillary and support departments to handle the workload generated by outpatient visits and inpatient services in the medical center are staggering. One such department which was studied in detail and was the basis for the Problem Solving Project is concerned with the responsibility for providing laundry and linen support services to the facility. The particular subject area was selected because of the continuous and recurring problems experienced by this department with the ultimate result being a generally unsatisfactory operation. Specifically, problems and complaints were lodged on an almost daily basis by the staff on the quality and performance of linen and laundry support. Unfortunately, a readily identifiable solution had not been apparent and the blame had been directed to a variety of individuals and reasons, depending upon who was doing the evaluation. Executive management generally voiced the opinion that improper inventory control with inadequate stock levels to meet periods of linen shortages was the primary culprit, medical materiel service felt that the failure of the plant management department to monitor stock levels and take early requisition actions to allow for sufficient pipeline time to purchase linen was the major contributing factor, the plant management department which has responsibility for the Hospital Aseptic Management Services (HAMS)

contractor felt that poor support out of the base laundry facility with repeated losses of linen and inferior service was the responsible agency, the HAMS contractor felt that the linen was being misappropriated by hospital personnel which ultimately caused the shortage, and nursing service personnel attributed the blame and problems to poor laundry support which was compounded by a "free-borrowing" attitude between sections and a lack of adequate internal guidelines. While there was universal agreement that laundry and linen was a significant and frustrating problem, there was no universal agreement on what must be implemented in order to solve the dilemma. Clearly, the entire operation was suspect from the standpoint of an ability to adequately and correctly function and was a fertile area for review and examination.

Statement of the Problem

The problem was to isolate the cause or causes of the deficiencies noted in linen and laundry management and to provide workable solutions to be implemented to resolve these same deficiencies.

Objectives

The initial objective of the study was to accomplish an intensive literature search in order to evaluate how other personnel in the health care industry were accomplishing their respective functions. This was followed by a study of the

existing system in the medical center in order to assess the current method of operation. Individuals interviewed and functions evaluated included executive management, plant management, nursing services, clinics, inpatient operations, medical materiel, the hospital aseptic management services contractor, and laundry operations. Information gleaned was used to identify internal trouble spots and make recommendations to change the existing system, or reinforce those positive aspects which should be retained as strong points, in order to improve the efficiency of medical center operations in the area of linen and laundry management.

Limitations

There were no restrictions on reviewing hospital records or interviewing of federal employees, both military and civilian members. However, it was required that care be exercised in interviewing those contractor personnel who work within the medical institution but are not government employees such as the hospital aseptic management services housekeeping members as well as civilian employees outside the facility and not under direct federal jurisdiction such as laundry contractor personnel. Prior to interviews or intervention into those individuals work environment, approval was first obtained from their immediate military contact point. Additionally, restrictions were further placed on the project officer from making any recommendations

directly to the contracting officer or his employees which in any suggested any modifications to the existing technical provisions which covered specific job responsibilities. Any noted deficiencies or inconsistencies noted which were observed to violate the specifications were reported directly to the appropriate military counterpart responsible for monitoring the work to be accomplished.

Any recommendations to change operating procedures, purchase additional equipment, revise operating hours, change the work force mix, or alter existing methods of conducting business were first to be made as a recommendation to executive management which, in-turn, was ultimately responsible for making the final decision on the proposed change. However, this should not be construed or inferred to mean that discussing current operating practices with the staff or soliciting their ideas while simultaneously obtaining their opinions on new practices currently employed by other hospitals was prohibited. It was only intended to act as a guideline to ensure that all final decisions were both agreed upon and coordinated within the medical center.

Additional manpower resources, outside of suggesting reprogramming efforts internally within the medical center, were not authorized. Additionally, any proposed changes in the linen and laundry contract had to be consistent with the existing hospital aseptic management services contract and the newly negotiated (FY 1980) civilian service contract for laundry services.

While budgetary restrictions were not arbitrarily imposed, it had to be recognized that any additional funds above those initially programmed for in the Fiscal Year 1980 budget would not be immediately available but would require budget revision actions with subsequent funding becoming available in the latter part of the impending fiscal year.

One final major consideration which had to be addressed prior to recommending any proposed change in linen and laundry service concerned the severe limitation of available working space in the facility. While the medical center was in the process of obtaining approval for a Military Construction Project (MCP) which would substantially increase the size of the facility, the expansion start-up date will not be effective prior to Fiscal Year 1982 with an occupancy date estimated in Fiscal Year 1986. Consequently, any space allocated to this service prior to the additional footage gained under the new construction program had to be at the expense of some existing department or service.

Assumptions

The basic assumption was made that the hospital would continue its present medical support mission as previously described, at least until the effective date of its major construction project. Furthermore, it was assumed that funds currently budgeted for in ¹² linen expenses and the laundry contract for the upcoming fiscal year would be spent for this purpose with some reprogramming available to give minor flexibility in the total dollar value of

monies ultimately expended. There is also every reason to believe that, organizationally, the medical center would continue to operate in its current configuration and that the existing hospital aseptic management services contractor would continue to be responsible for linen in the hospital and that, effective in October 1979, an annual contract would be negotiated with a civilian agency which would accomplish the laundering of all hospital linens.

Standards

Depending upon the literature being surveyed, various approaches could have been utilized for establishing standards and criteria against which to evaluate the soundness of any proposed solution concerning linen and laundry management. However, for the purposes of defining the most appropriate solution that best fits the particular needs of the USAF Medical Center, a combination and consolidation of some of the principles outlined in AFM 67-1, Volume V, USAF Supply Manual: Air Force Medical Materiel Management System-General¹; the American Hospital Association/National Safety Councils', Safety Guide for Health Care Institutions²; the American Hospital Associations', Infection Control in the Hospital³; and the Joint Commission on Accreditation of Hospitals', Accreditation Manual for Hospitals⁴; were used. The following specific criteria were chosen to represent those requirements which must be satisfied if the solution in the medical

center was deemed to be satisfactory: 1) Adequate procedures for the collection, transportation, processing and storage of linen shall be in effect that minimize the possibility of infection. 2) Linen shall be removed from both inpatient and outpatient areas in such a manner as to provide a minimum of agitation in order to prevent a gross airborne microbial contamination and shall be bagged at the location used. 3) Blankets shall be laundered after each patients use. 4) Mattresses will be enclosed in covers of impervious plastic in order to prevent contamination and to permit easy cleaning. 5) There shall be an adequate supply of clean linen in order to meet the needs of the hospital which may involve establishment of linen stock levels within a responsible agency in order to meet periodic shortages within using activities. 6) Separate containers will be used for transporting clean linen and soiled linen and will be laundered on a frequent basis. 7) The laundry room will be planned, equipped, and ventilated so as to prevent dissemination of contaminants. 8) Soiled linen from isolation areas will be identified and suitable precautions will be taken in subsequent processing. 9) Local guidelines will be published in the medical center to adequately cover responsibilities of all departments involved in linen and laundry activities. 10) Soiled linen shall not be sacked or pre-rinsed in patient care units. 11) Linen should be removed at least daily from patient care areas and at least twice daily from the nursery. 12) Linen known to be contaminated with infectious

microorganisms, particularly from isolation areas, should be clearly labeled and handled with special care. 13) The room for storing and sorting soiled linen shall be separate from other processing rooms and ideally be equipped with negative pressure. Additionally, this area shall be thoroughly cleaned and disinfected daily. 14) The laundry shall be designed to handle seven days linen within the work week. 15) The flow of ventilation air in the laundry should be from the cleanest to the dirtiest areas. 16) The floor and all equipment in the laundry should be cleaned at the end of each workday and a regular schedule should be established and maintained to clean overhead and hard-to-clean areas. 17) Shelves of closets where clean linen is stored must be cleaned on a regular basis. 18) There shall be documentation of participation by laundry service personnel in a relevant continuing education program. 19) Reliable measures shall be implemented, using either a weighted measure or a physical inventory to determine linen forwarded to and received from the laundry. 20) Security measures shall be adequate to properly safeguard government supplies and it will be the primary responsibility of medical materiel, plant management, and the individual user activities to ensure that this is accomplished, 21) Procedures shall be implemented for properly marking medical center linen to prevent loss at the commercial laundry facility and to discourage illegal removal by medical center or patient personnel. 22) Adequate procedures shall be implemented to correctly monitor and account for linens which are

determined to be nonserviceable. 23) Reorder points shall be established to ensure that adequate supplies of linen are on hand to meet usage requirements as they occur, without the requirement for priority requisitioning of items and inconvenience to patients and staff through nonavailability of sufficient stock. 24) Personal retention clothing items will be appropriately marked for easy identification and procedures will be established for laundering of these items. 25) The medical center shall require that the commercial laundry contract meet the standards outlined herein under the criteria listed. Furthermore, the commercial concern shall be tasked to ensure that the clean linen is completely packaged and is protected from contamination upon delivery to the medical center. 26) The linen distribution system which is ultimately adopted for use within the medical center shall be such as to effectively meet the needs of the user population.

Review of the Literature

One common thread ran throughout all the literature reviewed and this was the fact that there is no easy or clear-cut method of solution to the linen and laundry problem. Barbara Ellis in an article published in Hospitals does the most succinct job of analyzing this frustration when she states: "Linen costs presently range from 20 to 40 percent of the total cost of a hospital laundry and linen service. As estimated 80 percent of the linen replaced is attributed to linen misuse, including theft, leaving only 20 percent to actually wear out." She cites, and is further supported

by seminar speakers at an American Hospital Association seminar in New Orleans, that this is generally caused by a combination of the following factors: 1) the perpetuation of costly traditional linen use practices, 2) the lack of managerial effectiveness and authority, 3) the lack of administrative interest in and support of the linen service, and 4) the lack of adequate factual information with which to pinpoint problems and make managerial decisions.⁵ While there continues to be considerable debate, with conflicting views expressed by some linen managers, the more popular and universally accepted methods of combating some of these problems will be discussed.

1) Perpetuation of Costly Traditional Practices. Concerning the issue of the perpetuation of costly traditional practices, there is almost universal agreement. Hospitals are too frequently doing patient linen changes that are not justified, often the result of a repeated response that has become ritualized. In light of modern health practices and advances in the areas of antisepsis and asepsis, medical technology, drugs and medical practice, seven day per week bed changes for most patients is no longer justified. In spite of this, a survey conducted by the Thomas Jefferson University Hospital in Philadelphia revealed that 73 percent of the 40 hospitals surveyed are still changing beds daily.⁶ While some controversy exists on how often this bed changing should take place, making it an open area for negotiation, the evidence clearly supports something less than daily changes for other than the incontinent

patient. There is also supporting evidence to show that less than daily changes of other linen such as pajamas, bath towels, blankets, etc., may be effectively accomplished without compromising patient care.

2) Lack of Managerial Effectiveness. It is felt that most of the administrative efforts to effectively control linen have failed because of managements failure to determine exactly how many items are used in which particular area and the further failure to involve nursing service personnel in the establishment of linen policies and to assign at least some of the resonsibility to the using unit where it belongs. Donald Risso, vice president of marketing for Linen Systems for Hospitals Inc., feels that this failure has resulted in the nursing staff rarely being attuned to the magnitude of the costs being incurred. This lack of understanding is not a conscious effort on the part of nursing to be spendthrifts, but rather a lack of communication of specifically defined policies and objectives. Consequently, since they aren't aware of costs or how much management has budgeted to spend, they can not be expected to be sensitive to the excesses or abuse of materials.⁷ McCartney, et. al., takes this concept one step further and demonstrates the resultant negative spin-off as a result of this practice such as open linen rooms that encourage linen loss, portions of clean linen being discarded with soiled linen, unnecessary use of linens, and inefficient adoption of administrative procedures and systems. He maintains that one of

the foremost tasks of any linen and laundry control system is to instill in all nursing and ancillary service personnel a concern for the problem of linen control.⁸

3) Lack of Administrative Interest. The most frequently cited method of positively increasing administrative interest in the system is through establishment of a linen utilization committee which has the power to make policy. While membership on the committee varies depending on the author cited, it was generally felt that it should be broad based with sufficient authority and direct interest in implementing the suggestions. As such, it should be composed of the associate administrator, nursing administrator, housekeeping, linen services, operating room personnel, and key nursing ward personnel. Duties generally felt to be within the purview of this committee included analysis of financial data, linen usage rates throughout the facility, discussion of fluxuations in consumption within the facility, evaluation and recommendations for savings in use of linens, recommending standardization and classification of linens, reviewing and assisting in periodic inventories, review of high volume items, recommending measures for improved security, solving of linen related problems and conducting an in-service training program. Documented feedback where this approach has been implemented has included linen needs more satisfactorily met through better planning, comparison of linen usage between units to more effectively change procedures, and improved cost saving advantages while maintaining high quality patient care.⁹

4) Lack of Factual Information. There is little to dispute the fact that coherent, factual linen use information is required if management is to have a system that is responsive to decision making. Clearly, appropriate information which can measure performance is needed for a progressive system. Unfortunately, while this is certainly one of the more important areas, it is also the one which no author was able to satisfactorily address. This was a direct result of the fact that in order to have an effective linen service management information system, the manager needs to have identified both consumption and replacement problems in order to pinpoint the use areas where the problems are occurring. The authors acknowledge that this data is not available unless the facility is aware of the amount of soiled linen returned from each use area. Other than suggesting the use of computer assistance in tabulation of manual data counts, no innovative new approaches were introduced. What they suggest, under the proposed system of counting dirty linen, is a giant step backward in technology. Further negating those publications was the failure of the authors to adequately justify the increased risk of potential cross-infection within the facility, increased risk to personnel handling the linen, or provide any cost benefit analysis studies to demonstrate that any real savings could result.^{10,11} It would initially appear that additional research with documented results is required before any health care facility should seriously entertain this potentially risky and labor intensive work method in the hopes of

ultimately improving their feedback of information. However, while it is not advocated that a counting system be initiated, this is not to be construed as a wholesale condemnation of establishing effective factual information systems to analyze linen usage through the monitoring of linen inventories and their respective costs.

Problem Solving Methodology

A general systems approach using the holistic viewpoint where it is recognized that the linen and laundry management system is a unique entity, composed of interrelated components, and interacting in some way with its environment, was used in addressing this study. While this approach gives considerable latitude in the methodology, the decision was made, early on, that based on the limitations imposed, the authority did not exist to change the basic system which was established. Consequently, the heuristic (or alternative) approach was selected which involves looking at the current operating practices of linen and laundry control with recommendations made to ways of improving the existing system used.¹² It requires the pinpointing and rectifying of weaknesses of the present system and then offering appropriate solutions for strengthening the system rather than the development of an entirely new system.¹³

In order to accomplish this, an evaluation was conducted of the existing system to measure just how efficiently and effectively

it was operating while pinpointing weaknesses that needed to be addressed. Inquiry techniques, consisting of interviews with hospital staff members, hospital aseptic management services contractor personnel, base agencies, and laundry contracting personnel were the most common form of non-quantitative feedback. These interviews were supplemented by direct site analysis to personally observe system interactions, flow chart analysis to assist in identifying systems deficiencies, direct and indirect research (an evaluation of the existing system and secondary research for recommending a prospective system), and cause and effect relationship evaluations employed in order to ensure the implementation of an optimal feasible solution.

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II. DISCUSSION

Revised Procedures

A major change occurred between the time that the Proposed Problem Solving Research Proposal was submitted (19 September 1979) and the time when the current system was extensively evaluated. Specifically, the medical center no longer uses the services of an industrial funded base laundry which was organized under the provisions of AFR 148-4, Laundry and Dry Cleaning services and Operations. Effective soon after the start of the new fiscal year (20 October 1979), this service was accomplished by a commercial laundry service. The main driving force behind this decision was a result of incomplete and unsatisfactory service, requirements for sorting of dirty laundry by the medical center which resulted in the unnecessary utilization of critical space, pick-up and delivery from the laundry required to be accomplished by a medical center vehicle and driver, Joint Commission on Accreditation of Hospitals (JCAH) requirements that weren't being fulfilled, poor quality control practices, and the resultant exorbitant costs.¹ While the other findings were documented during the study, the referenced exorbitant costs of an inhouse laundry versus a commercial contract were never borne out in actual practice due to the fact that the original estimate of \$104,000 for commercial laundry services was substantially underestimated seeing as the actual bid price was \$201,796. The other points referenced were

well substantiated in the literature as evidenced by two documents: a letter written on 11 April 1979 to the base services officer, with photographs attached, showing dead vermin discovered in the clean linen²; and a 30 April - 11 May 1979, field memorandum report, citing excessive inhouse laundry support times, return of linen for rewashing, and noncompliance with JCAH standards.³

While the experience at Wright-Patterson was not favorable with shared base use laundry services, it should not be considered as a vote of "no-confidence" for its use industry wide. A review of the current medical literature reveals countless instances where inhouse services have been demonstrated to be superior to contractual commercial services.^{4,5,6} Its potential was also very favorably demonstrated by an on-site visitation to a small short term hospital (Dettmer Hospital in Troy, Ohio) and a very large combination acute and long term care, nursing home and domiciliary care Veterans Administration Medical Center (Dayton, Ohio). Both used medical inhouse laundry services that were also shared with other hospitals and both were extremely pleased with the services received and the financial aspects of operating their own service. While they suffered the same in-house distribution problems, lost linen, JCAH shortcomings, etc., as the medical center at Wright-Patterson, the problem was not at the laundry support level. The biggest difference which must be pointed out is that both Dettmer and the Veterans Administration have direct

control over their laundry while the medical center was dependent upon the air base correctly managing the base laundry, of which the medical center had little control. Clearly the evidence supports the requirement for the individual facility to select that method of service that best fits their particular needs.

Commercial Contractor

On 3 October 1979, Purchase Order F3360179 DC 140, was formalized with Economy Linen and Towel Service in Dayton, Ohio at a price not to exceed \$201,796 for them to provide services during the period 20 October 1979 through 30 September 1980.⁷ This price was based on an estimate of approximately 900,000 pounds of laundry at \$.23 per pound with the contractor to perform services in accordance with all applicable Air Force directives and the standards published by the American Hospital Association and the Joint Commission on Accreditation of Hospitals. While the majority of the language in the laundry service specifications was consistent with that generally published for any health care institution, two items were noted that specifically apply to the medical center and could have been subject to some additional consideration and negotiation. These included a two day turn around time for laundry with deliveries Monday through Friday (with the exception of holidays) and a shrinkage factor of eight percent allowed for clean laundry over dirty laundry which is processed. On the initial item, frequency of delivery, the medical center is placed in the obvious disadvantage of carrying additional

inventory two to three extra days based on the provisions of the contract. While it is realized that some additional cost may have been incurred as a result of more frequent deliveries, it must be offset by a much higher cost in inventory levels, increased workload during periodic inventories, increased potential for loss with more supplies, and the possibility of more frequent outages during weekends and holidays. Larry York, in an article published in Hospital Forum, cites evidence that hospitals may then be over-reacting to these potential shortages by tying up excessive working capital (cash flow) in inventories. What results is that in addition to large amounts of capital tied up in inventories, hospitals incur ongoing carrying or holding costs to maintain these inventories that are approximately 30 percent of the average inventory value.⁸ Further testimony is provided by Charles Housley in a materiel management article when he states: "Lean and Hungry" inventories are easier to control than overstocked stores.⁹

Clearly there are some adverse tradeoffs to be considered in the five day delivery service to the medical center. On the second issue of shrinkage which the medical center currently allows the commercial laundry, there is currently evidence available in the literature which suggests that a more realistic rate to shoot for is in the five to seven percent range to ensure that the hospital has returned to it all the laundry which is sent out using a weighted measure.¹⁰ This represents another fertile area for investigation that could result in overall decreases of laundry expenses to the medical center.

A tour of the Economy Linen and Towel Service was conducted on 6 November 1979 with the hospital plant manager, the hospital contractual officer, the hospital aseptic management services executive housekeeper and the administrative resident receiving a briefing from the primary contractor to ensure that all technical provisions of the contract were being fulfilled. The one questionable practice of the contractor which was observed involved a potential threat of airborne contaminants from a dirty sorting area into the clean wrapping area which could result from an override to the established air flow system. Basically, what was involved was a sliding door left open between the clean linen wrapping (positive airflow) and the dirty receiving (negative airflow) that could easily be offset by a wind flowing in from the outside dock area at dirty linen receiving that has the potential of offsetting the entire system. Keeping the interconnecting door closed during processing operations was discussed with the primary contractor and should alleviate this deficiency.

Hospital Aseptic Management Services

The USAF Medical Center has in effect a Hospital Aseptic Management Services (HAMS) contract with the firm of Harry A. Stroh, which is located out a regional office at Princeton, New Jersey. Provisions have been included to extend this contract, which currently runs from 1 January 1979 - 31 December 1979, for either one or two additional years at the option of the government. While the technical provisions reflect the HAMS contract to be dual

purpose, accomplishing all housekeeping functions as well as linen and laundry responsibilities, only that portion specifically addressing the latter will be examined in accordance with the subject of interest.

A great deal of the terminology and general provisions of the hospital aseptic management services contract are applied universally to technical provisions Air Force wide. They generally spell out those techniques and practices that have been found to be ideal in any health care setting which work to the benefit of the respective facilities. They delineate standards for such items as employee conduct, personal hygiene and appearance, required health examinations, required orientation and continuing education which includes information on infection control, appropriate safety measure information, and information concerning proper handling and care of all linen. Quite possibly the strongest point, to the advantage of the medical center, is the requirement that a trained and qualified executive housekeeper be on board on a full time basis to ensure compliance with all technical aspects of the written contract. This has worked extremely well by providing a focal contact point while simultaneously providing the expertise required in modern day linen and laundry control management.

In addition to the specifics detailed in the technical provisions, the contractor is tasked with all supplemental instructions provided in information provided in the following publications: Infection Control in the Hospital, Accreditation Manual for

Hospitals, Isolation Techniques for Use in Hospitals, Air Force Manual 160-34, Air Force Manual 127-101, and the OSHA Act of 1970, P.L. 91-596. While examining each of these specific catch-all guidelines may seem appropriate in ensuring that all ideal standards are maintained, they are quite possibly more idealistic than realistic. Just citing one reference to demonstrate the point, the Joint Commission on Accreditation of Hospitals (JCAH) in their accreditation manual fully acknowledge that their standards are designed to reflect optimal goals and they recognize that complete compliance with every standard is rarely possible.¹⁰ Compounding this problem is the ongoing difficulty of often interpreting what the intent of the JCAH was when they developed the standards. Never-the-less, it is acknowledged that these references do at least offer a good departure point and an excellent library to HAMS contractor personnel.

Support Requirement Responsibilities

Linen and laundry management responsibilities for the medical center include responsibilities for support to both inpatient and outpatient activities, within the facility as well as to outlying activities, that are organizationally a part of the medical center. While all of these activities and functions are supported by the commercial laundry services with a pick-up and delivery point at the linen service area located in the main medical facility, the hospital aseptic management services contractor responsibilities for delivery, stocking of carts, and pick-up of dirty linen is

limited to direct support within the main facility. The outlying areas, physically separated from the main facility, are tasked with a pick-up and delivery to a single point in the main facility. The following break-out represents those activities having direct linen use requirements.

Main Facility (Bldg 830)

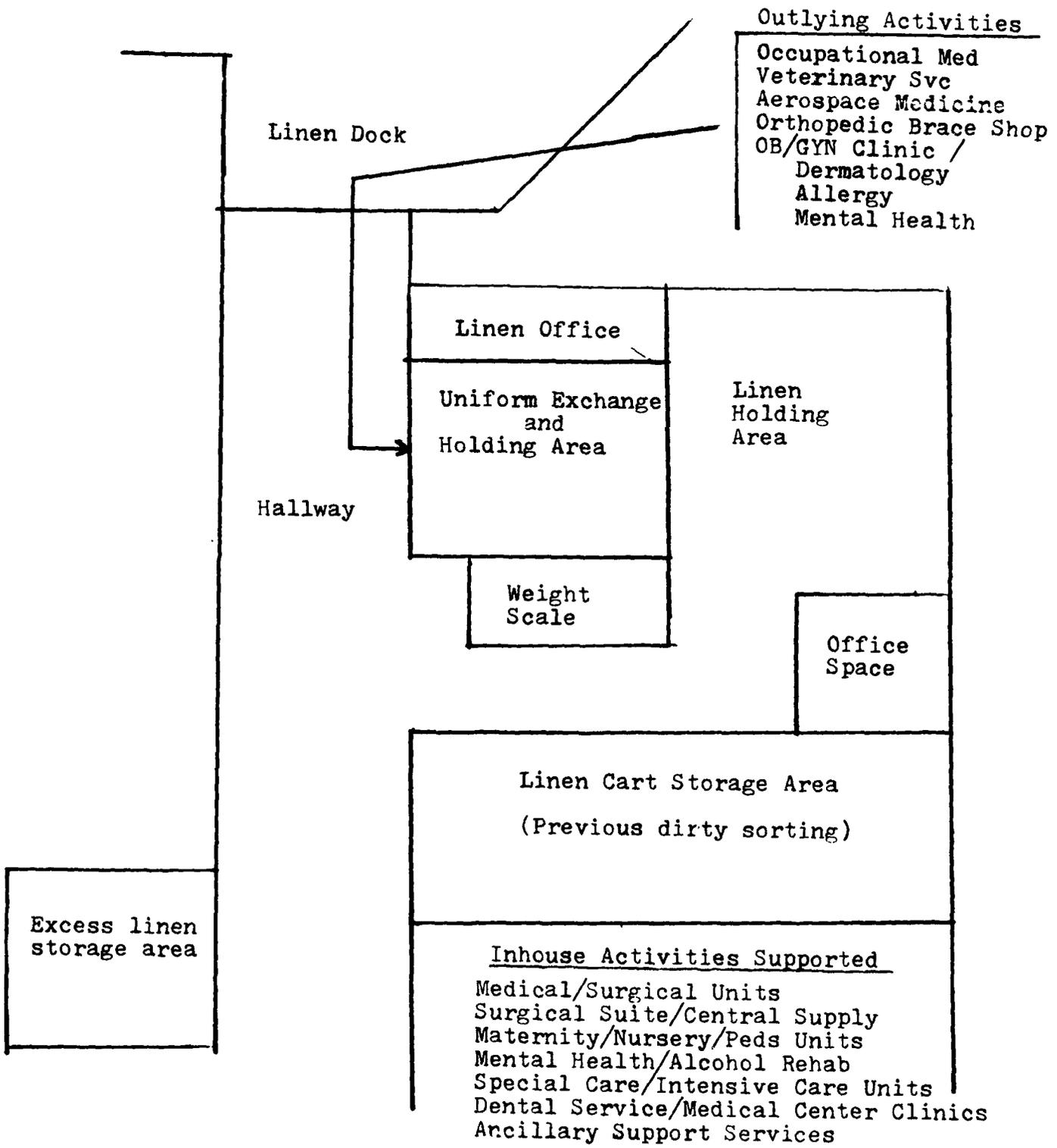
Medical Unit (1-North)
 Orthopedic Unit (2-South)
 Minor Surgical Unit (2-West)
 Major Surgical Unit (2-North)
 Surgical Suite/Central Supply
 Maternity/GYN Unit (3-West)
 Newborn Nursery (3-North)
 Peds/Adolescents (3-South)
 Mental Health (4-North)
 Alcohol Rehab Unit (4-West)
 Oncology/TDRL Unit (5-South)
 Medical Unit (5-West)
 Special Care/Intensive Care
 Dental Clinic
 Emergency Services
 Other Medical Center Clinics
 Ancillary Support Services

Outside Support Activities

Occupational Medicine
 Service (Bldg #40)
 Veterinary Service (Bldg #1435)
 Aerospace Medicine (Bldg #205)
 OB/GYN - Dermatology/Allergy -
 Mental Health (Bldg #219)
 Orthopedic Brace Shop
 (Bldg #174)

Figure #1, Laundry/Linen Flow Diagram, reflects the physical layout of the linen and laundry service areas. It is operated by HAMS contractor personnel who are under the supervision of an executive housekeeper who, in-turn, is responsible to the plant manager. They provide twice daily service for an hour each morning and afternoon to support linen exchanges, both organizational linen and personal whites, from outlying support buildings as well as organizational whites for inhouse personnel, on a one-for-one exchange system. Organizational linen support for the clinics and inpatient services within the facility are

Figure #1 Laundry/Linen Flow Diagram



handled by two distinct methods. For all activities, other than inpatient services, the activities do a call-in service in the afternoon before the next duty day and inform linen personnel of their requirements. These items are then delivered to the respective areas prior to 0900 the next duty day. This action is followed by HAMS personnel visiting each of the areas in the late afternoon to collect all the dirty linen which has accumulated during the day. For inpatient service areas, linen personnel conduct a personal survey each morning to count linen requirements for those areas that use linen cabinets. For other inpatient areas that use the linen exchange cart system, they bring these carts directly to the linen exchange area. By 0830 each day the clean linen is transported to the wards by the filled linen exchange carts or by linen hampers for stocking of the linen cabinets. In the late afternoon they then collect the dirty linen which has accumulated on the wards so that it is ready for return to the commercial laundry the next morning after the clean linen is delivered to the facility. This action allows the commercial laundry services to use the same linen hampers, which they provide, to deliver the clean linen and pick-up the dirty linen with the hampers and transport truck cleaned at the plant between deliveries. This established procedure allows linen support Monday-Friday for all activities with the exception that on weekends and holidays, shelf stock must be used to support inpatient activities and operational clinics as commercial laundry services do not provide support.

User Satisfaction

One message comes through very clearly after extensive interviews which included select individuals from each of the outlying areas, all inpatient service areas, and a random sampling of both in house clinics and ancillary support services; the linen and laundry services has taken a dramatic change for the better since a change was made from base to commercial laundry services. Personnel were unanimous in their support of the commercial contractor, the hospital aseptic management services contractor, and the plant management service personnel. As opposed to trying to lump all the various categories of individual activities together for the purpose of discussion, they are individually categorized to permit analysis based on their voiced uses and needs.

Outlying Buildings - While each of these activities voiced general satisfaction with current services, they were nonsupportive, as might be expected, with the requirement that they personally be tasked with delivering dirty laundry and receiving clean laundry from the main facility. However, a review of the volume of their workload gave little justification to a revision of current operating procedures which would entail additional expense for door-to-door commercial laundry contract services. This was primarily a result of the fact that the large users, the occupational medicine service, the orthopedic brace shop, and the obstetrics/gynecology service, were heavily into the use of disposable linen items which consisted primarily of patient gowns and sheets. The most prevalent

reasons cited for the extensive use of disposable items was that it was a continuation of past practices, that there was inadequate space available which prohibited adequate storage of either clean or dirty cotton linens, or that it had been dictated to them by someone in management in the past. It appeared that there had been a lack of intensive analysis as to whether these activities should use rewashable linen or paper disposable items and it was evident that there was some adverse backlash as a result of disposable linen use which would justify further examination. Specifically, in the occupational medicine service, disposable sheets were being used on both sides in order to conserve supply monies which had a potential for harm to a patient from being placed on a contaminated surface during emergency treatment. In the orthopedic brace shop, disposable sheets were being used against the wishes of the assigned staff. It was their contention, which was verified upon examination, that paper sheets simply did not have the necessary strength and consistency to withstand examination and fitting of braces to the patient on the examination table. Wasted, torn, sheets were the ultimate result of this ongoing practice.

Linen items, both cotton and disposable, used in other outlying support activities were minimal in nature and represented no problems of any magnitude in acquisition, use, or shelf stock.

Medical Center Clinics/Ancillary Support Areas - The revised procedures which the HAMS contractor installed whereby

each section calls in its order on a daily basis has generally worked very well in the hospital. One section interviewed which still was not satisfied with current operations was the emergency room which stated that there had been some instances of outages and improper levels delivered. However, a physical review of their area revealed a stockroom with no security and linen supply levels requisitioned against stock levels established in April 1975. It was acknowledged by assigned personnel that some of the confusion experienced may indeed be due to section procedures and policies that require updating or change. The only other complaint voiced with some regularity was that, periodically, the linen cart used for stocking the shelves or examination tables was left in the hallway or in some place other than its designated location. While some of this can be attributed to heavy patient workload and emergencies that has precluded the HAMS technician from having immediate access to the designated area, it can easily be rectified by simply informing an individual at the information desk of any deviation from its standard location.

Linen for air evacuation patients is the only readily identifiable area where linen, at hospital expense, is authorized to be given outside the facility without reimbursement. Each inpatient, scheduled for aeromedical evacuation, is clothed in hospital pajamas and placed on a canvass litter with property accompanying him consisting of two sheets, one pillow, one pillowcase, two blankets, one litter mattress, a pair of slippers, and a robe.¹¹ Normal

accountability for these items is not required and it was determined that incoming patients, with their accompanying linen, was sufficient to offset any linen departing the facility as a result of this medical mission requirement.

Inpatient Service Areas

Two distinct and different systems exist within the main medical center for handling linen. Inpatient units 3 South, 4 North, 3 North, 4 West, 3 West, 2 East, 1 North, 2 West, and the surgical suite/central supply all use the linen exchange cart system while 2 South, 2 North, 5 South, and 5 West all use cabinets for their linen storage. The choice of preference, for both those using the linen exchange cart system and the linen cabinets, is the cart exchange system. Plant management personnel have already recognized this requirement and are aggressively pursuing procurement of 22 new linen exchange carts for the purpose of replacing both the existing outdated carts as well as the linen cabinets. The biggest obvious advantage to this revised system will be to those wards currently using linen cabinets as they will no longer be placed in the disadvantage of having to manually transport by hand, guernsey, or medicine table, linen to each of the patient rooms on the ward. The most serious obstacle which will have to be overcome will be the disapproval of the Joint Commission on Accreditation of Hospitals, which has already cited the medical center in their 1978 accreditation survey, for having items of equipment and supplies in the hallway, thus blocking patient egress during periods of emergencies involving fire.12

Regardless of the method employed by the respective wards for storage of linens, they were all unanimous in their support of the service which they currently receive. Linen services were timely with the quantities desired received and in good condition. Again, it appears that many of the primary irritants that have plagued medical service personnel and patients alike have been resolved with a new linen service contract, revised procedures by HAMS personnel and more timely response to their desires by plant management personnel.

Cost Analysis

While the initial and primary goal of correcting the inadequate supply of linens to the using activities has been resolved, it has not been accomplished without considerable expense to the facility. Appendix A represents an analysis of inventory and cost during the period 21 June 1979 through 8 November 1979 when inventories of linen were accomplished. At face value, the document looks very impressive with inventory losses in excess of just over three percent for the five month period. Unfortunately, the amount of linen reflected as salvage with a write-off of all assets is unacceptably large. A review of the Activity Issue/Turn-In Summaries for this same period also reveals issues of \$87,407 for medical items and \$13,578 for nonmedical items, used at least partially to offset losses for salvaged items.¹³ It is acknowledged that a portion of this represents nurses dresses, male uniforms, and other items not reflected on the inventory

document in Appendix A; some issues during these months such as early June and late November that were outside the inventory cycle; and those items reflected as issues by medical materiel records but currently not reflected as linen inventory and used as back-up stock in the linen room and the medical materiel warehouse. Furthermore, the large distortions with overages and shortages from one inventory cycle to the next makes current methodology of inventory taking very suspect. Clearly what an analysis of the current system does reveal most dramatically is that a simplified system has not been established to allow pinpointing of deficiency areas such as theft, inaccurate or incorrect inventories, unacceptably large or inappropriate stock in non-working inventory, or poor contractor accountability. (The most significant question it raises may very well be not where the facility has been concerning linen practices as that is now historical and the data could not easily be reconciled but, more importantly, where the future is taking the institution if the current unfavorable trend continues.) Clearly a more effective accounting system for "tracking" of inventory and its costs is a very real requirement.

Security

A matter of considerable concern should be that of security of linen throughout all activities both within and outside the facility. Universally, security has been very lax with no viable attempt to adequately control these linen resources. A large part

of this may be attributed to the general feeling of assigned user personnel that they are not specifically responsible for the resources. All storerooms examined were unlocked, linen cabinets and carts were open with excess linen often piled on top of them, and linen exchange carts were often unzipped with the flap open. It was a generally accepted policy, and often even encouraged, that patients and all staff have free access to the linen in order to expediate services and improve user satisfaction. These practices had the obvious disadvantages of encouraging misappropriation and overutilization of linen while also having the potential of inadvertently cross-contaminating clean linen.

FOOTNOTES

¹USAF Medical Center letter to Headquarter USAF/AFSO, Changes in the Source of Laundry Service, Undated.

²USAF Medical Center letter to 2750th ABW/SV letter, Clean Linen, 11 April 1979.

³Air Force Inspector General, Norton AFB, California; Field Memorandum Report, 30 April - 11 May 1979, USAF Medical Center, Wright-Patterson AFB, Ohio

⁴Editorial, "Decentralized Laundry Service: An Often Overlooked Alternative." Hospitals, J.A.H.A., May 1, 1977.

⁵John H. Holmgren, "Automated Laundry Increases Productivity." Modern Healthcare, June 1976.

⁶Fritz Field, "Number of Linen Sets." Institutional Laundry, August 1972.

⁷AF Form 1155, 27 May 1966, Order for Supplies or Services, Purchase Order F33601-79-D0140, 3 October 1979.

⁸Larry York, "A Revolutionary Plan For Inventory Control." Hospital Forum, January/February 1978.

⁹Charles Housley, "Simplicity in Material Management." Hospital Topics, May-June 1978.

¹⁰Joint Commission on Accreditation of Hospitals, Accreditation Manual for Hospitals, 1980 Edition. Chicago, Illinois: Joint Commission on Accreditation of Hospitals; August 1979.

¹¹AFR 164-5, Worldwide Aeromedical Evacuation, Department of the Air Force, Headquarters U.S. Air Force, Washington, D.C. 1 December 1979.

¹²Joint Commission on Accreditation of Hospitals, Interim Self-Survey, Chicago, Illinois; Joint Commission on Accreditation of Hospitals, 24 September 1979.

¹³PCN 24011, Activity Issue/Turn-In Summary, June 1979- November 1979, USAF Medical Center, Wright-Patterson AFB, Ohio.

CONCLUSIONS AND RECOMMENDATIONS

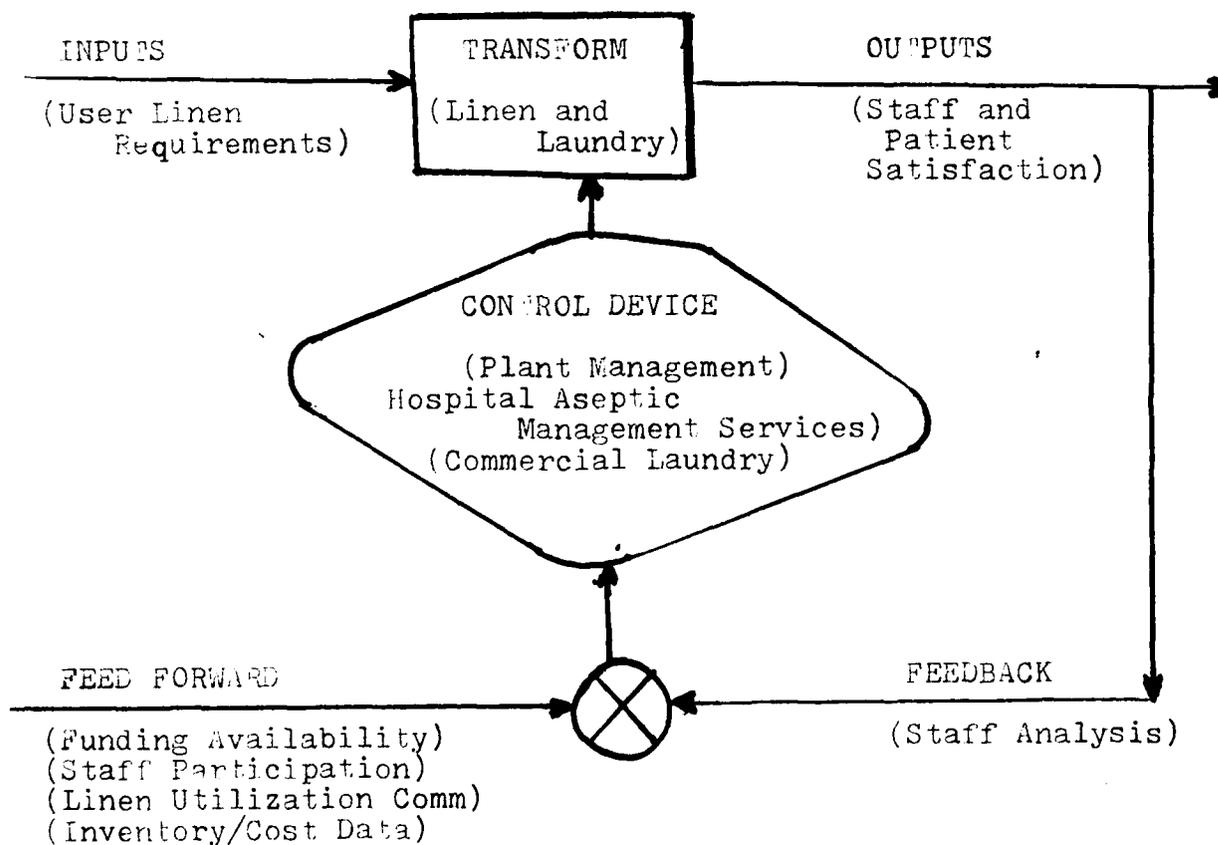
Conclusions

Clearly great strides have been made in the linen and laundry system in the USAF Medical Center as evidenced by the strong supportive testimony made by the users of the service. Furthermore, it is evident that considerable effort has been expended in the last two months to rectify a less than satisfactory service. However, it is important at this time to look even further into the future and examine those points that Barbara Ellis and other progressive managers made when they said that in order to have a totally functioning and responsive system, it is necessary that the facility eliminate the perpetuation of costly traditional linen use practices, improve managerial effectiveness and authority, increase administrative interest and support of the linen service, and increase factual information in order to pinpoint problems and make managerial decisions.

If the medical center is to satisfy and fulfill these progressive goals, considerable effort is still required. Strides have been made in the right direction with the basics accomplished, now only the sophistication is necessary to enhance it from the point where it is a reactionary system to one that is holistic, considering and addressing all the tangible and intangible variables. By using the general systems approach and

management cybernetics, which is the information processing and control decisions which operates before, during, and after implementation to maximize system performance and reduce unwanted disturbances, this homeostasis can be achieved.¹ It is graphically depicted here to reflect the processes involved:

Figure #2 Cybernetics Model



When discussing management cybernetics using the model, inputs are those requirements generated by the individual user activities. Once these requirements are received, they are processed through the transformation stage with the linen and laundry provided,

hopefully with the outputs being improved staff and patient satisfaction. Most noteworthy when viewing the process of adequately providing the required services from a systems standpoint has been the lack of an established feed forward or feedback mechanism which would allow the medical center to have a central control mechanism, which at the focal point is plant management, to make changes and enhance the system as required. The system currently in existence does not provide for closing the loop through the use of user participation; budgetary input; adequate workload, inventory, and cost data; establishment of a linen utilization committee; or appropriate analysis of overall performance, in order to provide improved delivery of services. Management cybernetics, through the establishment of a fully functioning control device would allow for utilization of the best available information to make the best control decisions. Clearly the existing system could be improved through adoption of these techniques which are available to personnel in control of the existing system.

Recommendations

A combination of recommendations have been proposed which are provided to both enhance the operation of the existing linen and laundry service while also allowing for improved information systems to improve decision making capabilities.

Linen Utilization Committee - This is currently being touted as one of the more innovative methods of managing linen services.

With a suggested composition of the associate administrator, nursing department representative, plant manager, housekeeping personnel, surgery representative, an individual from the *environmental* clinics, and ward personnel, it provides both the expertise and the management support necessary to effect optimum services. The subject material for the meeting should include reviews of financial data, linen usage rates, discussion on fluxuations, improving security, savings methodologies, and user training programs. It would have the positive affect of emphasizing, facility wide, the significance of the ongoing linen and laundry program.

Security - Problems with linen security are widespread and are very likely resulting in the unnecessary loss of high cost linen supplies. While procurement of locking linen exchange carts should have the positive effect of improving security on inpatient areas, considerable education is required in all medical center activities to more closely monitor and secure linen in use. Emphasis on the security of dirty linen should also be stressed as being as important as monitoring the security of clean linen. It has been demonstrated through the literature that often when a facility has problems with theft of linen, it is the dirty linen which is being stolen and relaundered as there is often less security with this aspect of the operation.² This temptation to misappropriate linen must be relieved by removing access by unauthorized personnel.

Technical Provision Revisions - Prior to negotiation for the next fiscal year commercial linen contract, base purchasing and contracting personnel should be contacted with a view toward more frequent (7 day) delivery of linen by the contractor and a reduction of the shrinkage rate from eight to six percent in weights between dirty and clean linen. If the decision is made to have the commercial vendors bid the contract with these options available, a decision could then be made as to whether the savings in inventory storage and contractor lost linen would offset the additional contract expense.

Workload/Cost Accounting - A uniform and consistent method should be devised for inventorying the linen and monitoring the value of these supplies. When the inventory is conducted, it should include a physical count of all the laundry in use within the facility plus that which is held in back-up stock. While the technique of maintaining back-up stock on hand to meet contingencies is supported, the consolidation of this stock in one area, as opposed to supplies in both medical materiel and plant management, would expedite inventory assessment. A viable quantitative technique which could be employed once the inventory has been stabilized would be to use a forecasting technique, which would hopefully move the system from judgemental forecasts to extensions of past history using exponential smoothing.³ Another simple technique often advocated involves either costing out linen per patient day or computing the total amount that is used by individual areas or total patients. A combination of these

practices should have the positive affect of assisting in budgetary operations and minimize the peaks and valleys of linen ordering and outages.

User Education - It is vitally important that the direct user population become more aware of their responsibilities in linen and laundry control and management. While some of this could be attained as a direct result of programs initiated by the linen utilization committee, failure of that committee to organize or initiate information doesn't negate this requirement. In addition to periodic visits, information letters, daily bulletin items, etc., a quarterly meeting should be conducted with key individuals from all using activities. This meeting would provide a fertile area for discussion on HAMS personnel responsibilities, infection control procedures, security, linen use policies, and financial information. These individuals must be incorporated into the system and made to feel a part of the operation along with its inherent "watch dog" responsibilities.

JCAH Responsibilities - Some recurring problems can be expected with the joint commission based on the proposal to go to an all inclusive linen exchange cart system on the wards. While the physical construction of the physical plant precludes total elimination of keeping all hallways clear of carts, it is felt that acceptable means can be employed to satisfy JCAH requirements. During periods when carts are not used, they may be temporarily stored in available alcoves, hallway use should ensure that sufficient space is left available for litter patient egress, and

use of the carts should be acknowledged during quarterly fire drills and inspections.

Disposable Linen - There is some question as to the methods used in determining which activities are going to use disposable linen and to what extent it should be used. In one particular instance, use of disposable sheets in the orthopedic brace shop, the disposable linen is not working well and the using activity is resistant to its continued use. Another area of considerable dissatisfaction is in the use of disposable wash cloths. Many patients and ward personnel claimed them to be less than satisfactory. On the other hand, occupational medicine and the OB/GYN clinic, where larger quantities are used, are very happy with the disposable linen products. This is a subject area that clearly bears additional review to see if first, the product is capable of satisfactory performance and second, whether it is cost effective as opposed to the alternative cotton linen which may be laundered. Using activities should provide written input to plant management who, in turn, should make the final recommendation with the concurrence of executive management.

Policy Guidance - Both the hospital regulation⁴ and the nursing service operating instruction⁵ are out-of-date with regard to the new commercial laundry contract, HAMS personnel responsibilities, and the method in which personnel are actually performing their respective functions. For example, some ward personnel are placing isolation linens in water soluble bags inside red plastic

bags and then labeling them with a biohazard tag which is contrary to published guidance; sorting of dirty linen procedures in the main hospital are discussed although no longer practiced; HAMS contractor personnel are designated to clean and disinfect carts when it is actually accomplished by the commercial laundry contractor; ward personnel are not bagging dirty linen using the pillow case method but rather are placing it directly in the dirty linen hamper; and ward personnel are no longer responsible for pick-up and delivery of linen as this is handled by HAMS contractor personnel. Updating the local instructional guidelines is required to ensure that user personnel are aware of their specific responsibilities. It also serves as an excellent avenue for imparting general information on a topic of interest, linen and laundry services.

FOOTNOTES

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²Thomas Mara, How to Cope with the Linen Crises, Hospitals J.A.H.A., February 16, 1974.

³Richard A. Levin and Charles A. Kilpatrick, Quantitative Approaches to Management. New York: McGraw-Hill Book Company, 1978.

⁴USAF MC Regulation 148-1, Linen Distribution Procedures, USAF Medical Center, Wright-Patterson AFB, Ohio 19 April 1978.

⁵Department of Nursing Operating Instruction Number 10, Linen Exchange, USAF Medical Center, Wright-Patterson AFB, Ohio 1 July 1976.

APPENDIX A

INVENTORY/COST ANALYSIS

INVENTORY/COST ANALYSIS

Description	21 June 79	8 Nov 79			Unit Cost	Total Cost	Adj \$ Value June Inventory	Inventory \$ - Nov 79
	Inventory	Issues	Salvage Balance	Inventory				
Bag Soiled	456	0	14	442	437	(57.55)	5087.42	5029.87
Spread	568	0	14	554	542	(176.28)	8138.26	7961.98
Blanket Inf	568	0	8	560	384	(422.40)	1344.00	921.60
Blanket	837	34	26	845	707	(941.16)	5762.90	4821.74
Coat PJ Adoles	310	0	4	306	245	(183.00)	918.00	735.00
Coat PJ Adult	1099	221	99	1221	1087	(527.96)	4810.74	4282.78
Coat PJ Inf	184	0	0	184	255	142.00	368.00	510.00
Gown Patient	337	0	34	301	246	(290.95)	1592.29	1301.34
Gown Oper White	924	0	40	884	765	(606.90)	4508.40	3901.50
Gown Tunnel	173	0	0	173	258	680.00	1384.00	2064.00
Jacket Convul	131	244	8	367	229	(1040.52)	2767.18	1726.66
Pillowcase	2238	2820	130	4928	4572	(477.04)	6603.52	6126.48
Robe	257	320	24	553	496	(644.67)	6254.43	5609.76
Sheet Crib	341	0	17	324	525	582.90	939.60	1522.50
Sheet Contour	2312	802	449	2665	2603	(254.82)	10953.15	10698.33
Sheet Flat	2928	683	318	3293	3972	2675.26	12974.42	15649.68
Towel Bath	3364	2651	752	5263	3510	(2349.02)	7052.42	4703.40
Towel Hand	1449	0	402	1047	2323	957.00	785.25	1742.25
Trs Convales	232	222	33	421	502	299.70	1557.70	1857.40
Trousers Ortho	74	0	2	72	55	(130.90)	554.40	423.50
Trs PJ Adoles	114	0	2	112	80	(124.16)	434.56	310.40
Trs PJ Infant	161	0	2	159	277	236.00	318.00	554.00
Trs PJ Adult	1400	621	76	1945	1827	(297.36)	4901.40	4604.04
Washcloths	774	600	74	1300	427	(209.52)	312.00	102.40
Undershirts	259	576	1	834	1175	409.20	1008.80	1410.00
Total							\$91,322.84	\$88,570.69

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