This dissertation has been microfilmed exactly as received

McDowell, Wanda Elizabeth, 1922-

The Ohio State University, Ph.D., 1962
Health Sciences, nursing

University Microfilms, Inc., Ann Arbor, Michigan
THE NURSE-PATIENT-PHYSICIAN TRIAD AS A SELF-REGULATING MECHANISM: A HOMEOSTATIC MODEL FOR MEASURING PATIENT CARE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Wanda Elizabeth McDowell, B. Sc., M. A.

The Ohio State University
1962

Approved by

[Signature]
Adviser
Department of Education
ACKNOWLEDGMENTS

I wish to express appreciation for the encouragement and guidance given me by my adviser, Professor Herman J. Peters. I am particularly indebted to Dr. Peters for his awareness of the multiple dimensions of education and experience, and, consequently, for his understanding and confidence in my work on the patient care problem. Other members of my committee who were helpful in many ways were Professor Mildred E. Newton, Professor Earl W. Anderson, and Professor Everett J. Kircher. I am especially grateful to Professor Daniel Howland, Director of the Systems Research Group, The Ohio State University, for the privilege of studying and working with him. This study is one of a series of studies undertaken by the Systems Research Group to investigate the health care system, and I am indebted to Dr. Howland for the opportunity to work on the problem. Dr. Howland's penetrating observations and criticisms have contributed immensely to my understanding of science.

My appreciation is offered, also, to the nurses, patients, and physicians of the real world who gave substance to the homeostatic model of triad behavior.
My doctoral program was sustained by the financial support and personal encouragement of the Division of Nursing and Division of General Medical Sciences of the Public Health Service, United States Department of Health, Education and Welfare. I am grateful for the award of a special research fellowship which I held from June, 1958, to June, 1961 (Special Research Fellowship Award Number NF-8065-C2). This study was supported in part, too, by Research Grant Number GN-W-4784 awarded by the Division of Nursing, Public Health Service, United States Department of Health, Education and Welfare to the Systems Research Group, The Ohio State University.
## CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION AND PURPOSE OF THE STUDY</td>
<td>1</td>
</tr>
<tr>
<td>The Purpose of the Study</td>
<td>3</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>4</td>
</tr>
<tr>
<td>The Basis for the Study</td>
<td>6</td>
</tr>
<tr>
<td>Organization of Remainder of Study</td>
<td>9</td>
</tr>
<tr>
<td>II. REVIEW OF THE LITERATURE</td>
<td>11</td>
</tr>
<tr>
<td>The Medical Profession and Hospital Administration</td>
<td>11</td>
</tr>
<tr>
<td>The Nursing Profession</td>
<td>15</td>
</tr>
<tr>
<td>Non-medical Research Groups</td>
<td>20</td>
</tr>
<tr>
<td>III. PROCEDURE FOR THE STUDY</td>
<td>23</td>
</tr>
<tr>
<td>The Triad as a Self-regulating Mechanism</td>
<td>23</td>
</tr>
<tr>
<td>Procedure for Conducting the Study</td>
<td>30</td>
</tr>
<tr>
<td>Source of Data</td>
<td>31</td>
</tr>
<tr>
<td>Interpretation of Data</td>
<td>33</td>
</tr>
<tr>
<td>IV. DESCRIPTIONS OF TRIAD BEHAVIOR IN TWENTY SITUATIONS</td>
<td>35</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient A</td>
<td>39</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient B</td>
<td>68</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient C</td>
<td>78</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient D</td>
<td>87</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient E</td>
<td>99</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient F</td>
<td>113</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient G</td>
<td>119</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient H</td>
<td>130</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient I</td>
<td>138</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient J</td>
<td>144</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient K</td>
<td>151</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient L</td>
<td>158</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient M</td>
<td>167</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient N</td>
<td>182</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient O</td>
<td>190</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient P</td>
<td>199</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient Q</td>
<td>208</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient R</td>
<td>220</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient S</td>
<td>228</td>
</tr>
<tr>
<td>Triad Behavior in the Care of Patient T</td>
<td>252</td>
</tr>
<tr>
<td>V. DISCUSSION OF THE STUDY RESULTS</td>
<td>263</td>
</tr>
<tr>
<td>System Input Information</td>
<td>265</td>
</tr>
<tr>
<td>System Output Information</td>
<td>267</td>
</tr>
<tr>
<td>Monitoring Activity</td>
<td>271</td>
</tr>
<tr>
<td>Control, Comparator, and Regulatory Activity</td>
<td>273</td>
</tr>
<tr>
<td>Regulatory Strategies as a Consequence of Blood Pressure Disequilibrium</td>
<td>275</td>
</tr>
<tr>
<td>Regulatory Strategies as a Consequence of Occlusion of Airway</td>
<td>276</td>
</tr>
<tr>
<td>Regulatory Strategies as a Consequence of Pain</td>
<td>277</td>
</tr>
<tr>
<td>Summary of the Study Results</td>
<td>278</td>
</tr>
<tr>
<td>Implications from the Study Results</td>
<td>281</td>
</tr>
<tr>
<td>VI. SUMMARY AND CONCLUSIONS</td>
<td>290</td>
</tr>
<tr>
<td>Summary of the Study</td>
<td>290</td>
</tr>
<tr>
<td>Conclusions</td>
<td>292</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>297</td>
</tr>
<tr>
<td>AUTOBIOGRAPHY</td>
<td>303</td>
</tr>
</tbody>
</table>
TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. University Hospital Recovery Room Record</td>
<td>32</td>
</tr>
<tr>
<td>Used by Physicians and Nurses</td>
<td></td>
</tr>
<tr>
<td>2. Personal Data of Twenty Patients</td>
<td>34</td>
</tr>
<tr>
<td>Observed in this Study</td>
<td></td>
</tr>
<tr>
<td>3. Lower and Upper Limits of Systolic Blood</td>
<td>268</td>
</tr>
<tr>
<td>Pressure Specified for Twenty Patients</td>
<td></td>
</tr>
<tr>
<td>4. Patient Vector Changing in Value</td>
<td>270</td>
</tr>
<tr>
<td>over Time</td>
<td></td>
</tr>
</tbody>
</table>
# ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Triad: Nurse-Patient-Physician</td>
<td>25</td>
</tr>
<tr>
<td>2. Relationship Between Hospital Setting, Degree of System Regulation and Variables to be Regulated</td>
<td>27</td>
</tr>
<tr>
<td>3. Ranges of Patient Behavior and Regulator Action</td>
<td>29</td>
</tr>
<tr>
<td>4. Frequency of Occurrence of Regulatory Strategies versus Patient Signals of Disequilibrium</td>
<td>279</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION AND PURPOSE OF THE STUDY

The present age is characterized by specialization, rapid advances in science and technology, changing patterns of social life, and changing patterns in education. These developments have made their impact on society's demands for health care, and, conversely, on the ability of society to meet these demands. Despite the problems which are confronted by those who design and operate health care facilities, there remains a goal of great magnitude which involves us in seeking ways of coping with the health care system as it exists today and as it may exist in the future: society's increasing regard for good health as a basic human right (Committee on Medical Care Teaching, 1958). To protect and develop the health potential of every individual has been described by Dunn (1957) as the societal goal of providing for "a general level of wellness."

In order to achieve the goal of "a general level of wellness," society must provide facilities for the promotion of health and the prevention and treatment of disease. As a consequence of the increasing demands being made upon
existing health facilities, and rising costs thereof, the problems of health services are characterized by complexity (Committee on Medical Care Teaching, 1958). While monetary and human resources appear to be the basic ingredients needed to design and operate the health system, just what the proportions and allocations of each might be is of crucial concern in the dual context of society's demands for and provisions of health care.

A major approach in coping with the problems existing in health care has been the attempt to appraise "the quality of health services in general and of hospital care in particular" (Sheps, 1955, p. 877). While good patient care is a goal of every hospital, precise statements of the term's meaning are lacking. The problem of determining the quality of patient care exists, primarily, because of the difficulty of finding valid and reliable measures of patient care (Sheps, 1955). Consequently, the precise effect of decisions relevant to direct patient care made by hospital personnel at all levels of administration and operation are unknown. The effects of these decisions are felt, too, in the education of medical and nursing personnel. Judgments made by educators are reflected in turn, in the practice of medicine and nursing. The interaction of medical-nursing services and medical-nursing education is deeply sensed, but the actual effect of one upon the
other and their ultimate influence on direct patient care had been unexplored.

It appears necessary, therefore, that research be conducted on the problem of measurement and evaluation of patient care. Research results would (1) aid in the decision-making of those who design, manage, staff, and utilize hospital facilities, (2) improve the quality of patient care, (3) contribute to curriculum development in medical and nursing education, (4) provide a basis for patient education, and (5) contribute to health system understanding.

The Purpose of the Study

The purpose of the study was to originate and develop insight into the problem of appraising the quality of patient care by applying a conceptual model of nurse-patient-physician behavior to a specific situation. The model had been developed prior to the study by the Systems Research Group, The Ohio State University (Report 940-6, 1961).

It was believed that the investigation would (1) provide an explicit representation of real world phenomena within the framework of the triad model of nurse-patient-physician behavior, (2) suggest implications for nursing research, education, and practice, and (3) disclose
significances inherent in the design and operation of patient care facilities for the nurse-patient-physician triad.

In organizing the framework of the study, five assumptions were made regarding nurse-patient-physician behavior:

1. The basic subsystem of the total hospital system directly related to patient care is the nurse-patient-physician triad.

2. The triad's task is to re-establish and maintain the desired state of the patient within specified limits with respect to a wide range of variables.

3. Patient care is measured by the ability of the triad to regulate patient condition within specified limits.

4. Patient care, the regulation of patient condition within specified limits, is a function of the hospital setting, or locale, in which the individual is a patient.

5. Central to the concept of regulation of patient condition within specified limits is the assumption that information about the state of the patient is the salient factor which impedes or enhances triad performance in a patient setting.

**Definition of Terms**

The term *postanesthesia recovery room* is used in this study to designate the physical location in the general
hospital of an area staffed and equipped for the purpose of caring for patients in their immediate postoperative period. Following the patient's recovery from the anesthesia used during the operative procedure, he is returned to his assigned room on a particular nursing unit.

The word model refers to the pattern or schema designed as an analogy of a particular real world phenomenon to display the relationships which are believed to exist between selected components which make up the whole.

In this study, real world phenomena refers to the observed behavior of nurse, patient, and physician as contrasted with the writer's conceptualization of nurse, patient, and physician behavior. Such a conceptualization provides a framework for the design of the research project. One must then make observations and collect data in the actual world of fact and substance to support the conceptualization.

The word system refers to an organization of behaviors, man and machine, which is purposeful -- which is goal-directed. The hospital patient care system, therefore, is that aggregation of behaviors which has as its purpose -- patient care in the hospital setting.

For the remainder of the study, words will be defined as they are used to identify or describe a particular behavior or concept in the context of direct patient care.
The Basis for the Study

The conceptual basis for measuring patient care and describing triad behavior has its origin in Cannon's work on homeostasis (Cannon, 1932). Cannon developed the concept from his research on the relation of the autonomic system to the self-regulation of physiological processes. Homeostasis was the word suggested by Cannon to designate the steady states in complex living organisms which must be maintained by coordinated, cooperative, physiological processes if the organism is to realize its fundamental condition of stability.

Cannon (1932, pp. 24-25) envisioned the application of the principle of homeostasis to processes other than physiological when he wrote:

It seems not impossible that the means employed by the more highly evolved animals for preserving uniform and stable their internal economy (i.e., for preserving homeostasis) may present some general principles for the establishment, regulation and control of steady states, that would be suggestive for other kinds of organization—even social and industrial—which suffer from distressing perturbations.

Concepts of Cybernetics

Wiener's classic work (1948) unified, expanded, and developed the fundamental concepts of homeostasis with communication and information theory into cybernetics: information, communication, regulation, and control in
men and machines. Since Wiener's original work, others have continued the development and utilization of these concepts: (Tustin, 1953; Tsien, 1954; Menninger, 1957; Ashby, 1958; Beer, 1959; Cadwallader, 1959, and Bakke, 1960).

The present study represents an application of Ashby's view of cybernetics. In describing cybernetics (1958, pp. 1-2) he stated:

Cybernetics, too, is a "theory of machines," but it treats, not things but ways of behaving. It does not ask "What is this thing?" but "what does it do?". . . . It is thus essentially functional and behavioristic.

What cybernetics offers is the framework on which all individual machines may be ordered, related and understood.

The cybernetic concepts which are relevant to the present study are regulation and control as defined by Ashby (1958). The essential variables of a machine, man or metal, must be maintained within specified limits if the organism is to survive. When disturbances threaten the homeostasis of the organism, or when disturbances actually occur to disrupt the equilibrium, regulation is the process by which the essential variables are protected and survival is assured.

An example may be given by referring to a familiar essential physiological variable of the human body. If the body temperature of the human temporarily falls to 80 degrees F. or rises to 110 degrees F., the organism
cannot long survive (Carlson and Johnson, 1953). To warm or cool the body, chemical and physical changes occur which correlate heat production and heat loss via afferent and efferent nerve fibers. The autonomic nervous system is the control mechanism which sends messages to and from the temperature-regulating center in the thalamus to assure the necessary adjustment when the body's homeostatic state is disrupted or is threatened by a disturbance.

The regulating mechanism just described is a device which operates automatically -- independently of voluntary effort. In the words of Carlson and Johnson (1953, p. 330), "The evolution of an automatic thermostat in animals has done much to diminish the dependence of the organism upon the vicissitudes of the environment." Homeostasis in the human and in the machine is dependent on information, communication, regulation, and control.

Homeostatic concepts may be applied to the behavior of both individuals and systems to learn about their responses to disturbances in various environments. The first task in investigating the behavior of a system, man or machine, is to define its survival states (Ashby, 1958). What are the essential variables? What is to be regulated? How are the control and regulatory functions performed? What are the information requirements of the system and what is the communication network?
In Chapter I the writer has introduced the importance of investigating the current health care system in order that present and future goals of society may be met. The problem of measuring and evaluating patient care in the hospital setting was designated to be of particular interest and concern. The purpose of the study was presented along with its underlying assumptions. The major concepts of cybernetics that were utilized in formulating the study were introduced.

**Organization of Remainder of Study**

Chapter II contains a selected review of the literature which pertains to the problem of appraising the quality of patient care. Chapter III fulfills a two-fold purpose: (1) to present the conceptual model of nurse-patient-physician behavior, and (2) to describe the procedure followed in carrying out the study.

Chapter IV contains descriptions of each of the twenty situations in which triad performance was observed. Following each of these, a brief summary is given of the interpretation made of triad behavior within the framework of the triad model.

Chapter V contains the writer's discussion of the results of the study under these general headings: (1) system input information, (2) system output information -- the patient vector changing in value over time,
(3) monitoring, comparator, control, and regulator activities, and (4) regulatory strategies utilized as a consequence of patient disequilibrium. In the second part of this chapter there is a discussion of the implications of the study for (1) nursing research, education, and practice, (2) the design and operation of patient care facilities, and (3) the application of homeostatic models to a specific situation to explain and structure group behavior.

The summary of the study and the conclusions are found in Chapter VI.
CHAPTER II
REVIEW OF THE LITERATURE

A search of pertinent literature to ascertain various approaches used by others in evaluating the quality of patient care did not reveal any which had utilized the concepts of cybernetics in formulating a patient care measure.

A representative selection of the literature is reviewed here, however, to clarify the problem and illustrate the approaches that have been made to deal with it. The literature is divided into categories according to the professional group making the appraisal: (1) the medical profession and hospital administration, (2) the nursing profession, and (3) non-medical research groups.

The Medical Profession and Hospital Administration

The concern of the medical profession for ascertaining the quality of patient care and the accompanying problem of measurement was expressed by Hawley (1955, p. 1533).

From the beginning man has been forced to appraise property and to assess virtues. He has been eminently successful with property. . . . He has been less successful in his assessment of the intangibles. . . . This is particularly true of
the evaluation of the quality of medical care
given to hospital patients, a field in which
a lack of logic, organization, scientific methods,
practicability, and universal reporting has
reigned supreme.

In spite of the difficulties encountered, evaluation
of the medical care given to hospital patients have been
made. Sheps (1955, pp. 877-79) identified three purposes
for evaluating the quality of care, and four methods of
evaluation. The three purposes were (1) regulation,
(2) improvement of quality of care, and (3) program
evaluation. Methods used in evaluation were (1) by set
standards of care, (2) by indexes of elements of perform­
ance, (3) by indexes of the effects of care, and (4) by
qualitative clinical evaluations.

The appraisal for the purpose of regulation is con­
cerned with matching an institution against specified
standards to assure its functioning at a minimum accept­
able level. The accrediting or regulatory services of
national professional organizations, professional
licensing boards, and health insurance groups are organi­
zations which set minimum standards of acceptance for
equipment, facilities, organization, and professional
qualifications of staff. If the hospital does not meet
these minimum levels of acceptance, it is not accredited
until the need is met. Thus patients and staff are
protected, indirectly, from inadequate resources and unsatisfactory practices (Crosby, 1952; Gunderson, 1954).

An appraisal which is conducted for the purpose of improving the quality of care usually originates from within the individual hospital. The chief method utilized for this purpose is the medical audit (Hawley, 1955, p. 1533):

The medical profession and hospitals have long been aware of the need for an effective and practicable method for evaluating the quality of patient care, and numerous attempts have been made during the past forty years to develop an acceptable medical audit.

The medical audit is based on the premise that valid hospital statistics will indicate areas of medical care which require investigation by the hospital medical staff. Hospital records are examined to gather data in such categories as diagnostic errors, pathological reports on surgical specimens, mortality rates, autopsy rates, consultations, and the frequency of diagnostic tests (Krause, 1953; LeTourneau, 1953; Mortrud, 1953; Meyers and Slee, 1959).

The Professional Activity Study (PAS) of the Commission on Professional and Hospital Activities, Inc. (Meyers and Slee, 1959), is of particular interest in the current use of medical statistics as a method of ascertaining the quality of care patients receive. The facilities of this group, located in Ann Arbor, Michigan, are used by
109 hospitals in 23 states. The PAS uses objective data, which have been obtained by the medical record librarian from the clinical records of all hospitalized patients as soon as they are discharged, organizes the data by business machine methods at its central office, and returns the information in report form to the participating hospital the following month. From the report, staff and administration can see, for example (1) the activities of the various services of the hospital, (2) the utilization of diagnostic facilities, (3) the length of stay by disease condition, and (4) the use of definitive therapy -- surgery, blood transfusions, drugs, et cetera. According to Meyers and Slees (1959, pp. 72-73), this system is of practical assistance to the record librarian, and it provides the administration with an accurate basis for evaluating and improving the quality of patient care.

The medical audit, therefore, is comprised of indexes intended to reflect elements of performance (staff) or the effects of care (patient). These indexes require careful definition in their design and use. According to Sheps (1955, p. 881):

At best, they are indirect and partial indicators of the basically intangible characteristics with which we are concerned. In a given organizational setting, with access to given standards of consultation and services, doing a certain number of laboratory examinations, one can have numerous shades in the range of quality of care, depending
on the skill, the judgment, the experience, and the character of the persons involved and on their relationships with patients.

Program evaluation constitutes another purpose for the appraisal of hospital quality. Clinical-pathological conferences and patient teaching programs, for example, may be assessed to determine what difference they make on the quality of care. Program evaluation is highly subjective in that it depends, in the final analysis, upon the clinical evaluation of judges. What the hospital needs is a basis for comparison -- either with a program of another hospital or with itself before initiating the program. The search for suitable controls is vital, and difficult, because of the many variables which characterize the hospital system.

The setting of standards by accrediting and licensing agencies, the indexes of the medical audit, and the clinical judgment of hospital programs typify the principle approaches undertaken by the medical profession and hospital administration in evaluating the quality of patient care.

The Nursing Profession

The nursing profession has also attempted to assess the quality of care which patients receive. The problem of
measurement is found to be the obstacle in focusing directly on patient care. Finer (1954, p. 121) stated:

The nursing profession (like most branches of public administration) must face the fact that, except for a few basic and material techniques, the quality of its service, its performance, its productivity, and its efficiency (and the words can be used indifferently) are not susceptible of precise or statistical measurement and statement. That is possible only over a small range of its activities, which are not the most important.

The nursing profession has been undaunted, however, by the difficulties inherent in the problem of measurement. Abdellah (1961, p. 22) discussed a major reason why criterion measures have not been identified:

Nurses themselves cannot agree upon measurable criteria of effective nursing care. . . . Since there are so many variables in the situation both physical and psychological, it becomes increasingly difficult to isolate specific variables.

Because criterion measures in nursing have yet to be identified and developed, nursing research has been directed into areas which are researchable: studies of nurses and studies of what nurses do, for example.

The following discussion of selected references is representative of areas of nursing research which focused on what nurses do. In 1950, the American Nurses' Association instigated a long-term investigation of nursing functions. Hughes, Hughes, and Deutscher (1958) compiled the findings of these studies and reported them in book
form. Other investigations which focused on nursing functions and activities with the ultimate aim of improving patient care were (Wright, 1954; George and Kuehn, 1955; Abdellah and Levine, 1958; New, Nite and Callahan, 1959; Safford and Schlotfeldt, 1960). The study by Wright (1954) conducted at Harper Hospital, Detroit, was unique in that it was the first to enlist the collaboration and cooperation of personnel from various hospital services with representatives from business and industry who were concerned with hospital problems in relation to patient care. The primary result of the study was a rewriting of job descriptions for the various levels of hospital nursing, with the subsequent reallocation of task assignments, and a change in staffing patterns. Accompanying these changes was the belief, based on a patient opinion poll, that patient care had indeed been improved. Two other studies which represent the use of patient opinion of his hospital stay as an index of his care were (Wilder, 1952; Abdellah and Levine, 1958).

In a study reported by Safford and Schlotfeldt (1960, p. 149), a questionnaire was developed, since no existing measure of quality of patient care could be found, to test the hypothesis that "... quality of nursing care provided selected groups of patients decreases when numbers of patients assigned to nurses increases."
The authors defined quality nursing care as "... the performance of nursing action identified as components of good nursing care -- identified as such by nursing personnel, physicians, hospital administrators, and patients in the hospital in which the inquiry was conducted."

The questionnaire, therefore, was designed to measure quality of nursing care in five major categories: (1) physical care, (2) emotional care, (3) nurse-physician relationship, (4) teaching and preparation for home care, and (5) administration. Patients, physicians, and nursing personnel on selected units were asked to complete the questionnaire. Family members were allowed to complete questionnaires for patients who were too ill. Safford and Schlotfeldt (1960, p. 154) reported these findings as a result of the study: "Findings from the investigation demonstrated the high quality of nursing care provided in the institution under study and also demonstrated that work load of nursing personnel was definitely related to the quality of nursing care provided patients."

While the research which has been referred to has been valuable in helping to define and develop the practice of nursing, it is limited in its application to the still-existing problem of a direct assessment of the quality of patient care. Abdellah (1961, p. 23) stated this succinctly, by saying: "... we may surmise falsely that we
have improved nursing care but without knowing what effect this care has upon the patient. We may be meeting the hospital's, the physician's, and the nurse's needs but not the patient's!"

Currently, attempts are being made to focus directly on patient needs and patient care in order to design, staff, equip, and program an environment which will assure "good patient care." Studies on progressive patient care (Abdellah and Strachan, 1959; Haldeman, 1959; Lockward, Giddings, and Thoms, 1960) are still in progress to determine the effectiveness of the program in quantitative and qualitative terms.

The Nurse Utilization Project Staff of the State University of Iowa (1960) recently completed a study investigating the relation between nursing activity and patient welfare. Patient welfare measures used were these:

A. Clinical measures
   1. Days in the hospital
   2. Days of fever
   3. Number of post-operative days
   4. Narcotics, analgesics, and sedatives

B. Scaled measures
   1. Mobility
   2. Mental attitude
   3. Physical independence
   4. Skin condition
   5. Patient opinion

C. Physician's evaluation

D. Patient activity sampling measures
The major result of the investigation was summarized as follows (Nurse Utilization Project Staff, 1960, p. 4):

"No improvement in patient welfare was produced by substantially increasing the size of the ward staff, by conducting inservice education programs, or by combining staff increases and inservice education."

Non-medical Research Groups

In recent years, researchers in disciplines other than the health fields have combined skills and efforts to attack health system problems -- hospital system problems, in particular. The first groups to engage in the multidisciplinary approach to health system understanding were the Operations Research Groups at Johns Hopkins University and The Ohio State University.

A progress report of the work being done at Johns Hopkins University (Flagle, Huggins, and Roy, 1960; Connor, and others, 1961) reveals the use of a Direct Care Index which is a measure of the number of daily nurse hours of direct patient care required to provide the current standards of care. The Direct Care Index groups patients according to their level of need: (1) mobility, (2) state of consciousness, (3) emotional state, (4) adequacy of vision, and (5) need for isolation. These levels of patient needs are categorized further into three predominant levels of patient condition: (1) self-care,
(2) partial care, and (3) total care. In the words of the authors (Connor, and others, 1961, p. 38): "A major problem to be approached is the establishment of standards of care. . . . we have for the time being accepted the level of performance as it exists as a standard -- a measure of patient need." They feel that the direction suggested by their research is toward a flexible organization in which resources and supplies are allocated according to continuous measures of patient needs.

Summaries of the multidisciplinary studies focusing on the development of a methodology for the evaluation of patient care conducted by the Systems Research Group (formerly the Operations Research Group), The Ohio State University, may be found in the 1961 annual report (Report 940-6, 1961). A number of component studies were conducted which included, for example (1) the work of the sociologists on the effect of social stratification on the performance of selected medical tasks, (2) the work of the psychologists on hospital communication and the patient's need for information, (3) the work of the industrial engineers on the performance of the hospital supply task (blood supply system) in relation to various aspects of patient care, and (4) the economists' analysis of hospital labor shortages during the period 1940-1960.
In summary, approaches to the problem of measuring and evaluating the quality of patient care primarily have been restricted to hospital care of the patient as it has been viewed by hospital administration and the medical and nursing professions. In conclusion, a brief reference was made to two major non-medical research groups which have been concerned with hospital system problems as they relate to patient care.

As epilogue to this chapter, and as prologue to the next, the following excerpt is quoted from an editorial entitled, "Mechanism and Purpose," found in *Lancet* (Volume 258, p. 27):

The other day an experienced physician was asked what criteria he would apply in judging the efficiency of a hospital: what relative importance would he attach to the qualifications of the staff, the ratio of beds to nurses, the adequacy of special departments, the catering, the facilities for reablement, and the various other items on which inspecting authorities commonly make notes? He replied: "I should not inquire into any of these things. I should simply go into the wards, select six patients, and find out precisely what had been done for them, and the care they had received, since the day of their admission."
CHAPTER III
PROCEDURE FOR THE STUDY

The content of this chapter has been organized to (1) describe the model of the nurse-patient-physician triad as a self-regulating mechanism, and (2) present the procedure used in applying the triad model to a specific situation.

The Triad as a Self-Regulating Mechanism

Utilizing the concepts of cybernetics, the nurse-patient-physician triad was viewed as a self-regulating mechanism which constantly compares actual and desired patient condition and takes action to minimize the difference between the two. This action is the utilization of regulatory strategies to re-establish and maintain the state of the patient within specified limits, or error bandwidth.

The word bandwidth refers to the specified upper and lower limits within which essential variables are maintained. When the limits of the bandwidth are exceeded, there is a difference -- or error -- between desired behavior and actual behavior. Thus, in the patient care system, the term error bandwidth is used to denote the
difference between actual and desired patient behavior with respect to specified upper and lower limits of essential variables. It is this difference, called difference information or error information, which initiates physician and nurse action.

The component parts of the triad model in relation to its information, regulation, and control characteristics are these: process; comparator; regulator; monitor; controller. Figure 1 is an illustration of the triad model as a system for the regulation of patient condition.

As a process, the patient generates signals which, if detected, reveal his state or condition at any given moment in time. These signals, or patient state information, are physiological, psychological, social, and economic variables which change in value over time. Physiological variables, for example, which reveal patient condition include blood pressure, temperature, pulse, and respiration. Psychological variables of the patient to be considered are anxiety, fear, and hostility. Social variables of concern include those aspects of the patient's rehabilitation period, when, for example, following loss of vision the patient is confronted with problems of occupation and recreation. Economic variables to be taken into account are those which have to do with the patient's economic status -- as, for example, his ability
COMPARATOR
Compares input with output information. Sends difference (θb - θi) to regulator.

INPUT
Information about what is wanted—directions.

REGULATOR
Makes adjustments as required to maintain patient states.

PATIENT
Generates state signals.

OUTPUT
Information about what is actually happening.

MONITOR
LEVEL 1: Feeds output information to the comparator.
LEVEL 2: Performs comparator function, and feeds difference information to regulator.
LEVEL 3: Performs comparator and regulator functions.

THE TRIAD
NURSE-PATIENT-PHYSICIAN
Figure 1
to pay for hospital care, and his ability to maintain himself and his family following illness.

Essential, or critical variables are those which, if disturbed result in the loss of homeostasis. A combination of these essential variables is known as a multidimensional vector which describes patient states or patient condition. Patient vectors, or essential variables, depend on the hospital setting, as illustrated in Figure 2. In the operating room, for example, essential variables to be considered are primarily physiological. In the nursing unit, essential physiological, psychological, economic, and social variables must all be taken into account in ascertaining and regulating patient condition.

The function of the comparator is to measure the difference between actual and desired patient condition. This information is then transmitted to the regulator for action. The function of the regulator, therefore, is to receive difference information and make an adjustment to the system by initiating regulatory strategies in order to minimize the difference between actual and desired patient condition. It is the controller who specifies system input -- that is, specifies desired patient condition -- and controls the behavior of all system components relevant to the regulation of patient condition.
### Essential Variables

- Error Bandwidth

### Hospital Settings

<table>
<thead>
<tr>
<th></th>
<th>Nursing Unit</th>
<th>Operating Room</th>
<th>Recovery Room</th>
<th>Nursing Unit</th>
<th>Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sociological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TIME — RELATIONSHIP BETWEEN HOSPITAL SETTING, DEGREE OF SYSTEM REGULATION AND VARIABLES TO BE REGULATED:**

*Figure 2*
The function of the monitor, characterized by three levels of monitoring, is to respond to signals which reveal system output (Howland, 1958). In the triad model, the monitor responds to signals generated by the patient in one of three ways. At the first level, information about patient condition, the output of the system, is recorded by the monitor or passed directly to the comparator. At the second level, the difference between actual and desired patient condition is determined by the monitor and difference information is given to the regulator. At the third level, the monitor performs the functions of the first two levels, and in addition, performs the function of the regulator: instigates regulatory strategies in order to return the patient to a desired state. Figure 3 is an illustration of nurse-patient-physician action in the regulation of an essential variable, blood pressure.

Questions which were asked in order to apply the triad model to a specific situation were:

1. What characterizes system input information in the recovery room setting?

2. What characterizes system output information in the recovery room setting?

3. Are the three levels of monitoring discernible in observations of triad behavior? Who performs the monitoring activity? What are the consequences of this activity?
Patient Homeostasis - Patient Regulates Own States

Area of Nurse Action

Area of Physician Action

RANGES OF PATIENT BEHAVIOR AND REGULATOR ACTION

Figure 3
4. Are the controller-comparator-regulator activities distinguishable in the recovery room? Who performs these activities? What are the consequences of these activities?

5. What are the essential patient variables which elicit nurse-physician response? How is information about them acquired and displayed?

6. What regulatory strategies are used when patient disequilibrium occurs?

Procedure for Conducting the Study

The descriptive study is oriented toward finding out what is occurring (Jahoda, Deutsch, and Cook, 1951, p. 54). Before hypotheses can be formulated and tested, knowledge of a specific situation is required. A principal method of acquiring this knowledge is by utilizing the technique of direct systematic observation (Heyns and Lippit in the Handbook of Social Psychology, 1954, and Jahoda, Deutsch, and Cook, 1951). A descriptive study, therefore, based on the technique of direct systematic observation was designed to record triad behavior as it occurred.

The procedure for collecting the data was formulated according to the method suggested by Ashby. Data were collected by recording a time-varying sequence of behaviors which described system performance (Ashby, 1958, p. 88). Such a recording is called a protocol. The protocol shows, therefore, the sequence of patient input and output states and subsequent physician-nurse action in the regulation of patient condition.
Source of Data

The patient setting for the study was the recovery room of University Hospital, The Ohio State University, Columbus, Ohio. Continuous observations were made of triad behavior in twenty situations. The length of the observations varied from one hour and forty minutes to four hours. In the four situations in which the patient had not been returned to his room at the end of four hours, the continuous observation was terminated.

The unit of observation was the nurse-patient-physician triad. Data were collected by (1) observing the interaction of the triad and categorizing the behavior into monitoring, regulatory, and control activities, (2) recording the measurements of patient condition made by the nurse on the recovery room record, and (3) recording the regulatory strategies utilized by nurse and physician. To make the protocol complete, the latter were supplemented by the observer in that the nurse did not record each occurrence of nurse-physician action. Instead, she summarized her activities over a period of time. An example of the nurse’s use of the recovery room record to record patient behavior and nurse-physician action is given in Table 1.

The observations were made over a six-week period. The criteria for selecting the twenty patients for the
TABLE 1
UNIVERSITY HOSPITAL RECOVERY ROOM RECORD
USED BY PHYSICIANS AND NURSES

Form 6611
THE OHIO STATE UNIVERSITY
UNIVERSITY HOSPITAL
RECOVERY ROOM RECORD

Notify Dr.
Operation

<table>
<thead>
<tr>
<th>Date</th>
<th>Room No.</th>
<th>Patient's No.</th>
<th>Name</th>
<th>Address</th>
<th>City</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Condition on Arrival in R.R.</th>
<th>Circulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Oral" alt="Airway" /></td>
<td><img src="Oral" alt="Endotracheal Tube" /></td>
</tr>
<tr>
<td>Oral</td>
<td>Oral</td>
</tr>
<tr>
<td>Nasal</td>
<td>Nasal</td>
</tr>
</tbody>
</table>

Special Care Needed
None of above
Within normal limits for this patient

<table>
<thead>
<tr>
<th>Fluid Therapy</th>
<th>Output and Drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>![5% DW x 0.2 NaCl](5% DW x 0.2 NaCl)</td>
<td>![5% DW](5% DW)</td>
</tr>
<tr>
<td><img src="Blood" alt="Blood" /></td>
<td><img src="Others" alt="Others" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>B.P.</th>
<th>Pulse</th>
<th>Resp.</th>
<th>Temp.</th>
<th>Treatments - Medications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Admitted to R.R. —
study were that each had had a major surgical procedure performed, and that the anesthesia used during the procedure had been a general anesthesia. Table 2 contains these data for each of the twenty patients: sex, age, and operative procedure.

**Interpretation of Data**

Following the collection of the data, they were examined for regularities and repetitiveness (Ashby, 1958, p. 40) in order to describe the triad model in terms of (1) system input information, (2) system output information — patient condition as a multidimensional vector made up of selected variables which changed in value over time, (3) the occurrence and consequence of monitor, control, comparator, and regulatory activities, and (4) the utilization of regulatory strategies to regulate patient condition.

According to Jahoda, Deutsch, and Cook (1951, p. 296):

Raw data can be used in analysis and interpretation independently of whether or not they have been quantified in all aspects. . . . raw data in the course of analysis fulfills two distinct functions: to illustrate the range of meaning attached to any one category, and to stimulate the discovery of new insights.

The descriptions of triad behavior in each of the twenty situations and interpretations of triad behavior based on the triad model are given in Chapter IV.
TABLE 2
PERSONAL DATA OF TWENTY PATIENTS
OBSERVED IN THIS STUDY

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Operative Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18</td>
<td>Male</td>
<td>Open Heart</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>Female</td>
<td>Splenectomy</td>
</tr>
<tr>
<td>C</td>
<td>21</td>
<td>Female</td>
<td>Thyroidectomy</td>
</tr>
<tr>
<td>D</td>
<td>25</td>
<td>Male</td>
<td>Mitral Commissurotomy</td>
</tr>
<tr>
<td>E</td>
<td>33</td>
<td>Female</td>
<td>Abdominal Hysterectomy</td>
</tr>
<tr>
<td>F</td>
<td>34</td>
<td>Male</td>
<td>Appendectomy</td>
</tr>
<tr>
<td>G</td>
<td>39</td>
<td>Male</td>
<td>Bilateral Caldwell-Luc</td>
</tr>
<tr>
<td>H</td>
<td>39</td>
<td>Female</td>
<td>Wertheim Hysterectomy</td>
</tr>
<tr>
<td>I</td>
<td>46</td>
<td>Female</td>
<td>Abdominal Hysterectomy</td>
</tr>
<tr>
<td>J</td>
<td>47</td>
<td>Female</td>
<td>Cholecystectomy, Appendectomy</td>
</tr>
<tr>
<td>K</td>
<td>52</td>
<td>Male</td>
<td>Gastrostomy, Transverse Colectomy</td>
</tr>
<tr>
<td>L</td>
<td>54</td>
<td>Male</td>
<td>Left Thoracotomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Esophagogastronomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Splenectomy</td>
</tr>
<tr>
<td>M</td>
<td>55</td>
<td>Female</td>
<td>Right Thyroid Lobectomy</td>
</tr>
<tr>
<td>N</td>
<td>56</td>
<td>Male</td>
<td>Total Laryngectomy</td>
</tr>
<tr>
<td>O</td>
<td>57</td>
<td>Female</td>
<td>Cholecystectomy</td>
</tr>
<tr>
<td>P</td>
<td>58</td>
<td>Female</td>
<td>Cholelithotomy</td>
</tr>
<tr>
<td>Q</td>
<td>58</td>
<td>Male</td>
<td>Left Hemipelvectomy</td>
</tr>
<tr>
<td>R</td>
<td>60</td>
<td>Male</td>
<td>Right Radical Neck Dissection</td>
</tr>
<tr>
<td>S</td>
<td>62</td>
<td>Male</td>
<td>Excision Abdominal Aneurysm and Insertion of Graft</td>
</tr>
<tr>
<td>T</td>
<td>70</td>
<td>Male</td>
<td>Right Nephrectomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cholecystectomy</td>
</tr>
</tbody>
</table>
In order to avoid redundancy, and thus to enhance the readability of the material, the following remarks have been made to preface the descriptions of triad behavior.

The recovery room is under the supervision of the Department of Anesthesiology. Until the patient leaves this area, therefore, the physician-controller is usually an anesthesiologist. It was not in the purpose of the study to observe a particular nurse, physician, or a patient with a specific disease entity. The descriptions of triad behavior, therefore, do not reveal the identity of the individuals who were involved.

No nurse aides were employed in the recovery room. Orderlies were assigned to the area primarily to provide assistance in (1) turning, lifting, and transporting patients, and (2) procuring, using, and caring for equipment. The nursing staff was composed of graduate professional nurses and junior nursing students. A ward secretary provided clerical assistance to the recovery room personnel.
The investigator observed that frequently, as the reader may note, the nurse and physician attempted to arouse the patient by calling his name repeatedly. This was accompanied by gently shaking him -- by grasping his shoulder or hand, for example. Such activity was considered to be both a monitoring activity and a regulatory activity. As a monitoring activity, the nurse and physician attempted to elicit the patient's response and thus determine the patient's level of consciousness. As a regulatory activity, the nurse and physician used these auditory and sensory stimuli to hasten the patient's arousal from the anesthesia and return to consciousness.

The remaining remarks are presented in summary form to assist the reader in following the descriptions of triad behavior.

1. The underlined number which follows the word nurse or physician was used to illustrate (1) the number of these individuals who cared for the patient, and (2) the shifting staffing pattern of care which could be observed in this patient setting.

2. Intravenous fluids, including blood, were accounted for in centimeters -- therefore, the abbreviation cc was used.

3. Medications usually were measured in milligrams -- thus, the abbreviation mgm appeared in the data.
Medications were administered intravenously most of the time. This route was preferable because (1) the drug was absorbed more rapidly and (2) an intravenous infusion was flowing. Drugs were given intramuscularly or by some other means if the intravenous route was contraindicated.

4. Blood pressure was measured according to the height, in millimeters, of a column of mercury -- consequently, the abbreviation mm was used following the specification of limits for this variable. It was omitted, however, in the data which gave a sequence of blood pressure readings. The top number denotes systolic blood pressure, and the lower number, diastolic blood pressure (for example, 130/70). An asterisk was placed at the right of a blood pressure reading when the specified limits for the systolic blood pressure had been exceeded.

5. Pulse and respiratory rates were measured according to the frequency of occurrence per minute.

6. Temperature was measured via the telethermometer on the Fahrenheit scale.

7. Rather than writing out the words blood pressure, pulse, respiration, and temperature each time, the abbreviations BP, P, R, and T were used respectively.

8. Oxygen therapy was sometimes initiated not in response to a patient signal of disequilibrium, but as a preventive measure to enhance the patient's respiratory
function and, thus, to hasten the patient's return to consciousness. Reference to the use of this regulatory strategy in the interpretation of the data, therefore, was only with respect to the state of patient disequilibrium.

9. The physicians' order sheet contained directives for the patient's care extending beyond the recovery room period. Only that information which was relevant to the patient's care during his stay in the recovery room was included, therefore, in the description of triad behavior.

10. According to the recovery room staff, the decision to return a patient to his room was based on the latter's (1) orientation, (2) stability of "vital signs," and (3) ability to maintain an open airway.

11. In order to describe triad behavior, the study data and interpretations utilizing the triad model were organized into two columns. In the first column, the protocol obtained by observing triad behavior and by recording the measurements of patient states and the regulatory action taken by nurse and physician is given in detail. In the second column, the components of the triad model are utilized to interpret representative selections of the protocol -- thus illustrating the application of the model to a specific situation.

12. Detailed summaries were written following the first five descriptions of triad behavior to illustrate the
application of the triad model to triad behavior. Because of the regularity and repetitiveness of triad performance, the remaining fifteen summaries contain only the data unique to the situation.

**Triad Behavior in the Care of Patient A**

**Triad Behavior**

2:20 p.m.

Patient A was admitted to the recovery room accompanied by five physicians and a nurse-anesthetist. The latter, under the supervision of a staff anesthesiologist, gave the following information to nurse who received the patient:

1. Open heart surgery had been performed under general anesthesia.

2. An oral airway was in place.

3. The estimated blood loss was 1500 cc.

**Interpretation of Behavior**

The nurse-anesthetist, under the immediate supervision of a staff anesthesiologist, performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.
4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-160 mm.

5. The patient was to receive, in addition to the fluids started in the operating room, 500 cc of whole blood and 400 cc of 5 per cent dextrose in water.

2:22 p.m.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 138/68
P 100
R 16

Nurse 2 assisted physician 1 with the intravenous infusions. Orderly 1 put the oxygen tent in place. Physicians 3, 4, and 5 checked venous pressure readings and

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information which reveals the actual state of the patient.

The nurse's behavior is categorized as Level I monitoring activity.
recorded them on the doctors' notes.

Nurse 1 checked the physicians' order sheet for additional information regarding the care of the patient in the recovery room:

1. Venous pressures every one hour by the interne.
2. Urinary output and specific gravity every hour.
3. Chest tubes to 20 cm underwater suction.
4. The blood is to run at 20 drops per minute.
5. Each intravenous portal is to have a total of 400 cc over the next 16 hours of 5 per cent glucose in water at 5 drops per minute for each intravenous infusion.

These directives illustrate (1) the physician-controller's need for patient information in order to ascertain patient condition, and (2) the instigation of regulatory strategies to maintain the patient in a desired state.
2:25 p.m.

Nurse 1 made this measurement and recorded it:

BP  142/72

Nurse 2 checked the chest suction which had been started in the operating room. She also checked the urinary catheter which had been inserted in the operating room. She attached it to an open drain.

2:28 p.m.

Nurse 1 made these measurements and recorded the data:

BP  148/70
P    100
R    24

2:30 p.m.

Nurse 1 was concerned about the chest suction. "It doesn't sound right."

The behavior of nurse 2 characterizes Level III monitoring activity. Though the physician did not specify the attachment of the urinary catheter to an open drain, the nurse used her judgment in doing so. As a consequence, this activity helped to maintain the patient in a desired state.

Orderly 2 assembled equipment
to attach the rectal telethermometer to the dial. The telethermometer had been inserted in the operating room.

2:31 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 150/70
- P 80
- R 28

Physician 4 started an intravenous infusion of whole blood assisted by nurse 1.

2:32 p.m.

Nurse 2 checked the oxygen tent, chest suction, and intravenous infusion. She stated that the oxygen tent did not sound "right" to her. She turned the oxygen tent off and started nasal oxygen. Nurses 2 and 3

Level I monitoring activity describes the behavior of nurse 1.

Nurse 2 is engaged in Level III monitoring activity.
worked with the chest suction apparatus and an orderly from oxygen therapy repaired the oxygen tent.

2:33 p.m.

Physician 3 took the venous pressure and reported it to nurse 1 who recorded it on the recovery room record.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>144/78</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>

2:35 p.m.

Physician 1 visited the patient, observed him, called him by name, and checked the recovery room record.

2:37 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>152/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>104</td>
</tr>
</tbody>
</table>
Nurse 2 checked the nasal oxygen, chest suction, intravenous infusion, and emptied the catheter drainage: 180 cc of clear amber urine. Nurse 4 observed the patient and read his chart.

2:39 p.m.

Nurse 1 made these measurements and recorded the data:

\[
\begin{align*}
\text{BP} & \quad 146/76 \\
\text{P} & \quad 96 \\
\text{R} & \quad 28
\end{align*}
\]

2:40 p.m.

Orderly 1 completed the attachment of the rectal telethermometer to the dial. He had been interrupted to hold fluid bottles and obtain other equipment.

Nurse 1 is engaged in Level I monitoring activity.
2:44 p.m.

Nurse 1 made these measurements and recorded the data:

BP  146/72
P   96
R   28
T   92

Nurse 1 removed the oral airway. She discontinued the nasal oxygen. She placed the oxygen tent in position. She repeatedly called the patient by name. Nurse 3 checked the chest suction, fluid therapy, and placed the patient in low semi-Fowler's position.

2:45 p.m.

A private duty nurse reported on duty. She received a report on the patient from nurse 1.

Nurse 1 is engaged in Level III monitoring activity.

Nurse 3 is also engaged in Level III monitoring activity.
2:47 p.m.

Physician 6 visited the patient. He checked the recovery room record. Nurse 3 checked the intravenous infusion, chest suction, and the oxygen tent with the private duty nurse. One intravenous infusion was found to be infiltrating.

2:50 p.m.

Nurse 2 checked the intravenous infusion and attempted to restart the infiltrating infusion. The patient was restless, coughing, crying out repeatedly, and trying to turn. The private duty nurse made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>154/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
<tr>
<td>T</td>
<td>92</td>
</tr>
</tbody>
</table>

This behavior is an example of Level II monitoring activity in that the nurse attempts to maintain the regulatory strategy by restarting the infiltrating infusion.

The nurse's behavior is categorized as Level I monitoring activity.
2:55 p.m.

Physician 4 visited the patient, checked the infiltrating infusion, and restarted it. He also read the venous pressure and asked the private duty nurse to record it on the recovery room record.

3:00 p.m.

The private duty nurse made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>150/72</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>98</td>
</tr>
<tr>
<td>R</td>
<td>26</td>
</tr>
<tr>
<td>T</td>
<td>88</td>
</tr>
</tbody>
</table>

She reported the rectal temperature as 88 to physicians 3 and 4. They questioned the reading, and upon checking, found that the telethermometer was out of the rectum. It was replaced by the private duty nurse and the reading was found to be 92.

Nurse 1 obtained extra blankets for the patient. Nurse 5
observed the patient and read his chart.

3:03 p.m.

The nurse anesthetist, who had accompanied the patient to the recovery room, visited the patient. She read the recovery room record, and observed the patient.

3:05 p.m.

The private duty nurse made these measurements and recorded the data:

BP 154/78
P 102
R 28
T 92.4

She attempted to arouse the patient by repeatedly calling his name.

3:15 p.m.

The private duty nurse made these measurements and recorded
She noted that he was shivering and restless, and she reported this to nurse 2.

3:25 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 156/80
- P 104
- R 28
- T 93.2

The patient continued to groan and cry out. The private duty nurse checked the intravenous infusion, chest suction, telethermometer, and oxygen tent. Nurse 1 obtained a verbal order for a medication from physician 1. Nurse 1 intervened, and as a Level II monitor, reported difference information to another nurse -- who was not functioning as a regulator.
Nurse 1, in turn, gave the verbal order to nurse 2 who prepared the medication, demerol 5 mgm and phenergan 5 mgm, and administered it intravenously.

3:30 p.m.

Nurse 5 observed the patient, the equipment, and read the patient's chart. The private duty nurse made these measurements and recorded the data:

BP 156/84
P 102
R 26
T 93.4

She emptied the catheter drainage, 75 cc of urine, and recorded the specific gravity and the amount on the recovery room record.

Upon receiving an order for a regulatory strategy (medication), she gave the order to nurse 2 who carried out the request.

The nurse's behavior is categorized as Level I monitoring activity.
3:33 p.m.

Physician Z visited the patient. He observed him, palpated his chest, called him by name repeatedly, and reassured him that he was doing all right. The patient stated that he still had pain. The surgeon also checked the chest suction equipment and drainage. He conferred with the private duty nurse and nurse 5 about the patient's progress.

3:43 p.m.

Physicians 1 and 8 visited the patient and checked the intravenous infusions, oxygen equipment, chest suction, and the position of the patient. The patient stated he had pain. No one responded to this signal which revealed actual patient condition.

3:45 p.m.

Physician 2 visited the patient, observed him, and
checked the recovery room record.

The private duty nurse made these measurements and recorded the data:

- **BP**: 160/88
- **P**: 100
- **R**: 28
- **T**: 94

She discussed these data with nurse 3. She stated: "His blood pressure is going up, but I'll wait and check it several more times."

3:50 p.m.

The private duty nurse makes these measurements and recorded the data:

- **BP**: 154/84
- **P**: 100
- **R**: 28

4:00 p.m.

The private duty nurse detects the signal that the patient's systolic blood pressure is at the specified upper limit. She makes the decision, however, to wait for additional information. Since she does not transmit this information to the comparator, her behavior is categorized as Level I monitoring activity.
recorded the data:

BP 150/88
P 100
R 28
T 94.2

Physician 5 visited the patient. He checked the chest suction, fluid therapy, and the venous pressure. He recorded the latter measurement on the doctors' notes.

4:15 p.m.

The private duty nurse made these measurements and recorded the data:

BP 154/84
P 100
R 26
T 94.5

4:30 p.m.

The private duty nurse made these measurements and recorded the data:

BP 154/88

The physician's activity is categorized as Level I monitoring activity.
She emptied the catheter drainage, 65 cc of urine, and recorded the amount and the specific gravity. She discontinued the whole blood transfusion, which had been absorbed, and started 400 cc of 5 per cent dextrose in water. She checked the oxygen tent and chest suction.

4:45 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 158/84
- P 100
- R 24

4:50 p.m.

Physicians 3, 4, and 5 visited the patient. The venous pressure was checked
by physician 5 and recorded on the doctors' notes. The three observed the chest suction equipment and drainage. Physician 3, assisted by the others, moved the patient up in bed.

The private duty nurse asked if the patient could be turned -- the patient had been asking to be turned, and had been trying to turn. No one answered her.

4:55 p.m.

The private duty nurse asked physician 3 about the blood pressure readings: "Isn't it too high?" His answer was, "It's OK." The three physicians asked the nurse to figure the fluid input and output on the hour instead of the half-hour because the latter was "too hard."

The private duty nurse, as a Level I monitor, asked the physician for a directive in positioning the patient.

As a Level II monitor, the nurse reports the patient's "high" systolic blood pressure to the physician. As controller, he does not specify a change in system input information (i.e., he does not change the upper limits of the systolic blood pressure). As regulator, he does not specify
She made new adhesive tape strips to mark the intravenous bottles and chest drainage bottles to correspond with the requested time schedule.

5:00 p.m.

The private duty nurse made these measurements and recorded the data:

BP  158/80
P   98
R   26

She measured the catheter drainage, 30 cc of urine, and recorded the amount and the specific gravity. Physician 1 visited the patient and observed him.

5:12 p.m.

The private duty nurse asked nurse 5 to "find someone and get an order for pain." Nurse 5 asked the any regulatory strategy to reduce the systolic blood pressure.

The nurse's behavior is categorized as Level I monitoring activity.

As a Level II monitor, the private duty nurse reported patient state information (difference information).
ward secretary to call the office of the department of anesthesia. Physician 9 answered and gave nurse 5 a verbal order.

5:15 p.m.

The private duty nurse asked orderly 2 to help move the patient up in bed in order that he might "breathe a little better."

The private duty nurse made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>156/84</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
<tr>
<td>T</td>
<td>95.6</td>
</tr>
</tbody>
</table>

The patient was restless and crying out. Physician 5 visited the patient to check the venous pressure. He asked the private duty nurse to record it on the recovery room record. Demerol, 10 mgm,
and phenergan, 10 mgm, were given intravenously by nurse 5.

5:17 p.m.

Physician 10 visited the patient. He checked the patient's pulse and asked the private duty nurse about his blood pressure and urinary output.

5:20 p.m.

Physician 1 visited the patient, observed him, checked the chest suction and intravenous infusion.

5:30 p.m.

The private duty nurse made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>P</th>
<th>R</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>150/86</td>
<td>100</td>
<td>24</td>
<td>96</td>
</tr>
</tbody>
</table>

A regulatory strategy was initiated to reduce the patient's discomfort -- thus to maintain him in a desired state.

Because of the Level I monitoring activity of the nurse, the physician must ask for information about patient condition.

The physician performed the Level I monitoring activity for himself.

The nurse's behavior is categorized as Level I monitoring activity.
5:45 p.m.

The private duty nurse made these measurements and recorded the data:

BP  144/88
P   98
R   22

Physician 11 visited the patient. He checked the patient's pulse, asked about the blood pressure, and then took a blood pressure reading. He called the patient by name and reassured him that "all was going well."

5:50 p.m.

The private duty nurse made these measurements and recorded the data:

BP  132/70
P   80

She measured the catheter drainage, 30 cc of urine, and recorded the amount and the

The physician seeks information about patient condition by visiting the patient.

The nurse is engaged in Level III monitoring activity.
specific gravity. She suctioned the patient's airway.

5:53 p.m.

The private duty nurse suctioned the patient's airway. She obtained assistance from nurse 1 and orderlies 1 and 2 to pull the patient up in bed.

5:56 p.m.

Nurse 1 made these measurements and recorded the data:

BP 154/90
P 96
R 28
T 96

She checked the chest suction, telethermometer, fluid therapy, and the oxygen tent.

6:00 p.m.

Physicians 3 and 4 visited the patient and checked his pulse and blood pressure. They did not report or record any data.
6:10 p.m.

Nurse 1 made these measurements and recorded the data:

BP 160/100
P 92
R 28

6:12 p.m.

Physician 2 visited the patient. Nurse 1 reported the elevated blood pressure to him. He checked the patient's recovery room record and asked, "Is he taking a while to wake up?"

There was no further communication between nurse and physician.

6:14 p.m.

Nurse 1 took the patient's blood pressure and recorded this reading:

BP 166/100

The patient's systolic blood pressure is at the upper limit of that which had been specified.

No action is taken by nurse or physician as a consequence of patient state information.

Nurse 1 does not measure the pulse and respiration as has been done here-to-fore. These measurements do not appear to be used
6:16 p.m.

Nurse 1 took the patient's blood pressure and pulse and recorded these readings:

BP 168/70
P 96

She called the patient by name repeatedly, and asked him to breathe deeply.

6:17 p.m.

Nurse 1 reported to physician 2 that the patient's blood pressure was going up. He asked her to check the chest suction equipment to be certain that it was working properly. Nurse 1 checked the

As a Level II monitor, she reported this information to a physician, and she carried out his directives.

in ascertaining patient condition.
Although the systolic blood pressure is 6 points over the specified limit, no action is taken.

The patient's systolic blood pressure is 8 points over the specified upper limit.
chest suction, intravenous infusion, and the oxygen tent.

6:20 p.m.

Physician 1 visited the patient, and nurse 1 asked him to check the recovery room record. He gave a verbal order for a medication to relieve pain. The physician ascertained the actual state of the patient.

6:25 p.m.

The private duty nurse made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>160/80</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>96</td>
</tr>
<tr>
<td>R</td>
<td>26</td>
</tr>
<tr>
<td>T</td>
<td>96.4</td>
</tr>
</tbody>
</table>

Nurse 1 gave the verbal order for demerol 10 mgm to the private duty nurse. The latter gave the medication intravenously. A regulatory strategy was employed to reduce the patient's discomfort.

Level I monitoring activity characterizes the nurse's behavior.
Summary

System input information was characterized by (1) statements about the patient's condition prior to his admission to the recovery room, (2) the specification of regulatory strategies which had been initiated in the operating room and were to be continued in the recovery room, and (3) the specification of limits for one variable: systolic blood pressure.

System output information consisted of measurements of the variables blood pressure, pulse, respiration, temperature, urinary output and specific gravity, and venous pressure. The state of the patient was ascertained at intervals which varied from one minute to fifteen minutes.

Patient state information which initiated nurse-physician action was composed of these three essential variables: (1) pain, (2) systolic blood pressure, and (3) occluded airway.

Nurse response to patient signals was categorized as Level I, Level II, and Level III monitoring activity. At the first level, it was observed that the nurse acquired patient state information and recorded it (for example, blood pressure, pulse, and respiration). As a second level monitor, the nurse reported difference information to the physician-regulator. She reported, for example, the systolic blood pressure when it exceeded the
specified upper limit. She also, as another illustration, reported the patient's pain to the physician-regulator. At the third level of monitoring, the nurse acquired patient state information, compared it with the desired behavior of the patient, and on the basis of this difference information, took steps to minimize the difference between the two. An example of Level III monitoring activity was the nurse's detection of the patient's occluded airway which represented a departure from the desired state. She initiated regulatory action by suctioning the patient's airway and removing the occlusion -- thus returning the patient to a desired state.

Physician behavior was categorized as controller-comparator-regulator activity. While the nurse-anesthetist specified system input information, it was under the direct supervision of the physician-controller. It is noted that there were occasions when the physician visited the patient, acquired patient state information, and as a consequence, performed the comparator-regulator function independently of the monitor. Most often, however, the physician-regulator received difference information from the nurse-monitor. Dependent upon the characteristics of the difference information, the physician-regulator prescribed corrective action to return the patient to a
desired state (prescribing a medication to relieve the patient's pain, for example).

Regulatory strategies initiated in the recovery room were (1) oxygen therapy, (2) change of position, (3) medication, and (4) aspiration of airway.

The patient vector changing in value over time is readily noted in this description of triad behavior. The reader's attention is directed to the period from 5:20 p.m. to 6:25 p.m. The state of the patient may be described as a multidimensional vector composed of these three essential variables: systolic blood pressure, pain, and occluded airway. It can be seen that during this period the systolic blood pressure fluctuated from a low of 132 to a high of 168. The latter reading was 8 points over the specified upper limit. No immediate, direct, corrective action was observed as a consequence of this difference information. During this period, the patient's airway became occluded. The nurse suctioned the airway to remove the occlusion on two occasions. She also changed the patient's position and asked him to breathe deeply. These activities aided in the correction of respiratory and cardio-vascular disequilibrium.

During this period, too, the patient experienced pain. As a consequence, he received a medication to reduce his discomfort. Thus it is apparent that the values
of these essential variables change over time, and that nurse-physician action is dependent upon the acquisition of information about them (patient state information). The consequence of nurse-physician action was the regulation of patient condition -- the re-establishment and maintenance of the patient in a desired state.

Six nurses, eleven physicians, and a nurse-anesthetist were involved in performing monitoring, comparator, regulatory, and control activities.

The patient remained in the recovery room because his blood pressure had not stabilized and he was not fully conscious.

**Triad Behavior in the Care of Patient B**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:37 a.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient B was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. A splenectomy had been performed under general anesthesia.

The physician performed the control activity of specifying system performance.
2. The patient was four months pregnant.

3. The estimated blood loss was 250 cc.

4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-140 mm.

5. The patient was to receive intravenous fluid therapy of 1000 cc of 5 per cent dextrose in water and 1000 cc of 5 per cent dextrose with 0.2 normal saline.

6. The Levine tube which had been inserted in the operating room was to be attached to low suction.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 132/80

This information characterizes system input information. Note that limits were specified for only one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.
Nurse 2, who had been observing the patient, reported the latter's restlessness to physician 2. Demerol, 10 mgm, and phenergan, 10 mgm, were ordered to be given intravenously. Nurse 2 administered the medication.

10:40 a.m.

Physician 2 visited the patient. He observed her, called her by name, and told her repeatedly that the operation was over.

10:45 a.m.

Nurse 4 checked the patient's intravenous infusion and added 1000 cc of 5 per cent dextrose in water.

The nurse's activity is categorized as Level II monitoring. The physician performs the regulator function. The medication represents a regulatory strategy instigated to relieve the patient's discomfort.

Ascertaining the patient's level of consciousness is also an example of an attempt to elicit patient response.
10:55 a.m.

Nurse 1 checked the intravenous infusion and Levine tube suction. She made these measurements and recorded the data:

BP 127/78
P 88
R 16

11:15 a.m.

Nurse 1 checked the intravenous infusion and Levine tube section. She made these measurements and recorded the data:

BP 130/70
P 92
R 16

11:25 a.m.

Nurse 2 called the patient by name. She checked the intravenous infusion and Levine tube section. She made these

The nurse's behavior is categorized as Level I monitoring activity.
measurements and recorded
the data:

BP   122/70
P    80
R    24

11:38 a.m.

Nurse 2 called the patient
by name. She checked the
intravenous infusion and Levine
tube suction. She made these
measurements and recorded the
data:

BP   108/72
P    64
R    24

11:45 a.m.

Nurse 3 checked the intra-
venous infusion and Levine tube
suction. She made these
measurements and recorded the
data:

BP   108/70
P    72
R    20
12:00 p.m.

Nurse 5 made these measurements and recorded the data:

- BP: 102/70
- P: 72
- R: 20

She checked the intravenous infusion and Levine tube suction. The patient was restless and nurse 5 asked physician 4 to see the patient. He checked the chart, observed the patient, and ordered demerol, 10 mgm, and phenergan, 10 mgm, intravenously. This was given by nurse 5.

In the past 45 minutes, the systolic blood pressure has dropped from 130 to 102. Yet it is the patient signal of restlessness to which the nurse responds -- as does the physician.

This is Level II monitoring on the part of the nurse. The physician performs the regulator function.

12:11 p.m.

Nurse 5 checked the intravenous infusion and Levine tube suction. She made these measurements and recorded the data:

- BP: 112/66
12:22 p.m.

Nurse 5 checked the intravenous fluids and Levine tube suction. She made these measurements and recorded the data:

BP 118/70
P 64
R 16

12:50 p.m.

The patient was restless, crying, and moaning. Nurse 3 asked physician 1 to see the patient. He checked the patient's chart, observed the patient, checked the patient's abdomen, and requested that she be catheterized. This was done by nurse 3, and 180 cc of clear yellow urine was obtained.

Nurse 3 reported difference information directly to the physician -- Level II monitoring activity. She did not take the next step of attempting to determine the cause of the disturbance. The procedure of catheterization represents a regulatory strategy instigated to reduce the patient's discomfort. The physician
1:10 p.m.

Nurse 3 called the patient by name, checked the intravenous infusion and Levine tube suction. She made these measurements and recorded the data:

BP 108/58
P 64
R 20

1:25 p.m.

Nurse 3 made these measurements and recorded the data:

BP 110/60
P 76
R 20

Nurse 3 called the patient by name. The latter responded fully to her name. The nurse performed the comparator-regulator function and made the decision to send the
Summary

In the preceding description of triad performance, system input information was characterized by (1) explicit statements of actual system performance as it had occurred prior to the patient's admission to the recovery room, (2) the specification of regulatory strategies which had been initiated in the operating room and were to be continued in the recovery room, and (3) system performance as it was desired for the immediate postoperative period. Limits were specified for one variable: systolic blood pressure.

System output information consisted of measurements of the variables blood pressure, pulse, and respiration. A fourth variable, pain, was a part of system output information only at those times when the patient revealed the presence of pain. It can be seen from the data that it was the patient signal of pain which initiated nurse-physician action. While measurements were made of the patient's blood pressure, pulse, and respiration, it was not possible to observe the use of these measurements in the regulation of patient condition. The state of the
patient was ascertained, as the reader may note, at intervals which varied from three to twenty minutes.

Nurse response to patient signals was categorized as Level I, Level II, and Level III monitoring activity. At the first level, it was observed that the nurse acquired patient state information and recorded it. As a second level monitor, the nurse reported difference information to the physician based on her comparison of the desired patient state with the actual state of the patient. If the physician prescribed further action, the nurse carried out the order (for example, administration of a medication). As a third level monitor, the nurse acquired actual patient state information, compared it with the desired state of the patient, and made the decision to return the patient to her room.

Physician behavior was categorized as controller-regulator activity. As controller, he specified system input information: what the patient's previous state had been (in the operating room, for example), and what the desired state of the patient was to be with respect to systolic blood pressure.

As regulator, the physician received difference information from the comparator and, as a consequence, prescribed corrective action to return the patient to a desired state. In the care of Patient B, for example, the
nurse, as a Level II monitor, reported the patient's restlessness to the physician. He visited the patient, observed her, and ordered that she be catheterized. The consequence of nurse-physician action was that the patient's pain was diminished following the completion of the procedure.

Regulatory strategies initiated in the recovery room were (1) medication and (2) catheterization.

Five nurses and four physicians were involved in performing monitoring, regulatory, and control activities.

**Triad Behavior in the Care of Patient C**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3:45 p.m.</strong></td>
<td></td>
</tr>
<tr>
<td>Patient C was admitted to the recovery room accompanied by a nurse-anesthetist.</td>
<td>The nurse-anesthetist performed the control activity of specifying system performance.</td>
</tr>
<tr>
<td>She gave the following information to nurse 1 who received the patient:</td>
<td></td>
</tr>
<tr>
<td>1. A left lobectomy of the thyroid had been performed under general anesthesia.</td>
<td>This information characterizes system input</td>
</tr>
<tr>
<td>2. The estimated blood loss was minimal.</td>
<td></td>
</tr>
</tbody>
</table>
3. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 90-150 mm.

4. The intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride which had been started in the operating room was to continue in the recovery room.

Nurse 1 reported the following information to the nurse-anesthetist and recorded the data:

BP 110/76
P 92
R 26

The nurse-anesthetist suctioned the patient's airway. Nurse 1 started nasal oxygen.

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.

A regulatory strategy was instigated to remove an obstruction to the patient's airway and thus return the patient to a desired state.
3:50 p.m.

Physician 1 visited the patient. He noted the patient's difficulty in breathing. He inserted a Levine tube into the stomach. He inserted an oral airway into the mouth.

4:00 p.m.

Nurse 3 made these measurements and recorded the data:

BP  114/70
P   84
R   22

Physician 1 utilized bag and mask breathing to relieve the patient's apparent laryngospasm.

4:05 p.m.

Physician 1 removed the oral airway.

The physician compared the difference between the desired state of the patient (airway not obstructed) and the actual state of the patient (airway obstructed). Because the latter condition prevailed, he took corrective action to reduce the difference between the two states.

Further corrective action is taken by the physician-regulator.
4:10 p.m.

Nurse 3 made these measurements and recorded the data:

BP 114/70
P 76
R 20

The nurse's behavior is categorized as Level I monitoring activity.

4:20 p.m.

Nurse 4 made these measurements and recorded the data:

BP 110/70
P 88
R 20

The patient became very restless and combative.
Nurse 3 asked two orderlies to stay with the patient.

4:40 p.m.

Nurse 5 made these measurements and recorded the data:

BP 126/P
P 84
R 18
4:56 p.m.

Nurse 5 made these measurements and recorded the data:

BP 108/P
P 96
R 18

She checked the intravenous infusion and nasal oxygen. The patient continued to be very agitated. Nurse 5 called her name repeatedly but without any response.

5:10 p.m.

Nurse 4 made these measurements and recorded the data:

BP 114/P
P 72
R 18

The patient continued to thrash about. Nurse 2 asked nurse 4 if the patient had had anything for pain. The answer was in the negative and no further action was taken. Nurse 2 detected the patient's restlessness and apparently she questioned whether or not it was due to pain. No corrective action was taken.
5:24 p.m.

Nurse 4 made these measurements and recorded the data:

BP  122/82
P    60
R    16

She called the patient by name repeatedly but the patient did not respond. She checked the nasal oxygen and the intravenous infusion.

5:35 p.m.

Nurse 4 made these measurements and recorded the data:

BP  118/80
P    72
R    20

Nurses 3, 4, and 6 attempted to quiet the patient's agitation by calling her name repeatedly and telling her that the operation was over. The patient removed the nasal oxygen catheter.
5:40 p.m.

Physician 2 visited the patient. He observed her and talked to her in a low voice. The patient became less restless.

6:00 p.m.

Nurse 6 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>118/80</td>
</tr>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>18</td>
</tr>
</tbody>
</table>

6:15 p.m.

Nurse 5 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>116/78</td>
</tr>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

6:30 p.m.

Nurse 6 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>108/60</td>
</tr>
<tr>
<td>P</td>
<td>88</td>
</tr>
<tr>
<td>R</td>
<td>16</td>
</tr>
</tbody>
</table>
6:45 p.m.

Nurse 6 made these measurements and recorded the data:

BP 112/60
P 88
R 18

She discontinued the intravenous infusion which was completely absorbed.

7:00 p.m.

Nurse 6 made these measurements and recorded the data:

BP 116/60
P 88
R 18

The patient continued to be restless though she responded when her name was called. Nurse 6 returned the patient to her room.

As a Level III monitor, the nurse made an independent decision to return the patient to her room.
Summary

In the description of triad behavior in the care of Patient C, system input information was characterized by (1) explicit statements about the patient's condition prior to her admission to the recovery room, (2) the specification of regulatory strategies to be continued in the recovery room, and (3) the specification of limits for one variable: systolic blood pressure. The control function was assumed by the nurse-anesthetist under the supervision of physician 1.

System output information was obtained by the measurement of blood pressure, pulse, and respiration. The state of the patient was determined at intervals which varied from five minutes to twenty minutes.

Patient state information which initiated nurse-physician action was an occluded airway.

Nurse response to patient signals was categorized as Level I, Level II, and Level III monitoring activity. As a Level I monitor, the nurse acquired patient state information and recorded it. As a Level II monitor, the nurse compared the actual state of the patient with the desired state, but in this situation, she did not transmit difference information to the regulator. This example was noted at 5:10 p.m. when the nurse observed the patient's restlessness and questioned whether or not it was
due to pain. She took no further action with respect to this variable. As a third level monitor, the nurse made an independent decision to return the patient to her room.

Physician behavior was categorized as controller-comparator-regulator activity. An illustration of this activity is evident at 3:50 p.m. when the physician visited the patient, observed her, and detected respiratory difficulty. As a consequence of this information, he took immediate corrective action to counteract the disturbance affecting this essential variable.

Regulatory strategies initiated in the recovery room were (1) insertion of an oral airway, (2) insertion of a Levine tube, (3) aspiration of the airway, (4) bag and mask breathing assistance, and (5) nasal oxygen.

Six nurses, two physicians, and a nurse-anesthetist were involved in regulating patient condition.

**Triad Behavior in the Care of Patient D**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15 a.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient D was admitted to the recovery room accompanied by two physicians.

One gave the following
information to nurse 1 who received the patient:

1. A mitral commissurotomy had been performed under general anesthesia.

2. The estimated blood loss was 600 cc.

3. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 90-160 mm.

4. The patient was to receive the remainder of an intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride which had been started in the operating room.

5. The chest tube was to be attached to low suction.

Nurse 1 reported the following information to

The physician performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.
physician 1 and recorded the data:

BP  118/60
P   80
R   26

She started nasal oxygen. She connected the chest tube to 20 cm low suction. She checked the intravenous infusion.

11:20 a.m.

Nurse 1 observed the patient's respirations, which she termed "dyspneic." She left the room to locate a physician to see the patient. Nurse 2 remained with the patient.

11:25 a.m.

Physician 2 returned with nurse 1 to observe the patient.

These data represent system output information.

As a second level monitor, the nurse compared desired patient condition and actual patient condition with respect to the patient's respiration. On the basis of this difference information, she sought the authority of the physician-regulator.
11:30 a.m.

A nasal airway was inserted by physician 2.

The physician-regulator took corrective action to re-establish the patient in the desired state.

11:35 a.m.

Nurse 3 made these measurements and recorded the data:

BP  120/66
F  88

Physician 3 visited the patient, observed him, and ordered numorphan 0.3 mgm intravenously. This was given by nurse 3. The patient still had difficulty in breathing. The nasal airway was removed by physician 3 and an endotracheal tube was inserted. Oxygen was started by nurse 3 via the endotracheal tube.

The physician detected the patient signal of an occluded airway. He took corrective action to remove the occlusion.
11:45 a.m.

Nurse 3 made these
measurements and recorded
the data:

BP  120/64
P   84
R   30

11:55 a.m.

Because of his extreme
restlessness, nurse 2
restrained the patient's arms.

12:00 p.m.

Nurse 3 made these
measurements and recorded
the data:

BP  112/64
P   90
R   28

12:05 p.m.

Nurse 4 observed the
patient and scanned the
recovery room record. Nurse 3
left the room to locate a
physician and obtain a
Nurse 3 detected the
patient's signal of rest-
lessness, and as a second
medication order to relieve the patient's restlessness. Nurses 2 and 4 checked the intravenous infusion, chest suction, and the endotracheal tube.

12:10 p.m.

Nurse 3 returned with a verbal order from physician 4 for demerol, 10 mgm, and phenergan, 10 mgm. He did not visit the patient. The medication was given intravenously by nurse 3. Physician 5 visited the patient. He observed him and read the recovery room record. Nurse 5 observed the patient and read his chart.

12:14 p.m.

Nurse 3 made these measurements and recorded the data:

BP 126/74

level monitor, she reported this information to the physician.
12:15 p.m.

Nurse 4 covered the patient with an extra blanket, checked the intravenous infusion, the endotracheal tube, oxygen equipment, and chest suction.

12:20 p.m.

Nurses 4 and 5 restrained the patient by holding his arms and legs. They called his name repeatedly. The patient was very restless.

12:23 p.m.

Physician 4 visited the patient and observed him.

12:30 p.m.

Nurse 4 assisted by nurse 5 suctioned the patient's airway via the endotracheal tube.
12:32 p.m.

Nurse 3 removed the endotracheal tube and the oxygen catheter. She suctioned the patient's airway. Nurse 4 assisted her.

The nurse's activity is categorized as Level III monitoring activity. She apparently ascertained that the patient could breathe adequately without the assistance of the endotracheal tube and the nasal oxygen.

12:36 p.m.

Nurse 5 took the patient's blood pressure and recorded this reading:

\[ \text{BP} \quad 126/74 \]

The patient's pulse and respirations were not measured at this time. It does not appear that physician-nurse action has resulted from the data obtained from these measurements.

12:45 p.m.

Nurse 5 checked the chest suction and drainage and the intravenous infusion. She found that the latter had infiltrated.
12:55 p.m.

Nurse 5 restarted the intravenous infusion assisted by nurse 4.

1:00 p.m.

Nurse 4 made these measurements and recorded the data:

- **BP**: 114/70
- **P**: 100
- **R**: 24

1:15 p.m.

Nurse 5 made these measurements and recorded the data:

- **BP**: 124/68
- **P**: 98
- **R**: 26

She checked the intravenous infusion and chest suction. She reassured the patient that he was "all right." The patient responded to his name. He was still
very restless. Nurses 4 and 5 restrained him by holding his arms and legs.

1:29 p.m.

Nurse 5 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>120/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>96</td>
</tr>
<tr>
<td>R</td>
<td>26</td>
</tr>
</tbody>
</table>

Nurse 4 checked the intravenous infusion and chest suction. She asked the patient to breathe deeply.

1:45 p.m.

Nurse 6 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>120/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>92</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

She checked the intravenous infusion and chest suction.
1:50 p.m.

Nurse 5 made these measurements and recorded the data:

BP  120/70
P   98
R   28

She called the patient by name repeatedly and he responded. He asked for something to relieve his pain. Nurse 5 decided to send him to his room: "If we give him anything, we'll have to keep him another half hour."

The patient stated that he had pain. Instead of taking corrective action as a result of this information, the nurse, as a third level monitor, made the decision to return him to his room.

Summary

System input information consisted of (1) patient state information prior to his admission to the recovery room, (2) regulatory strategies initiated in the operating room and to be continued in the recovery room, and (3) the
specification of patient performance with respect to one variable: systolic blood pressure.

System output information consisted of the measurement of these variables: blood pressure, pulse, and respiration. In addition, the variables pain and occluded airway gave patient state information and initiated nurse-physician action. The state of the patient was determined at intervals which varied from two to fifteen minutes.

Nurse behavior was categorized as Level I, II, and III monitoring activity in response to patient signals. As a Level I monitor, the nurse acquired and recorded patient state information. At Level II, the nurse transmitted difference information to the physician. As a Level III monitor, the nurse took action to terminate a regulatory strategy which had been utilized to re-establish the patient in a desired state: she removed the artificial airway.

Physician behavior was categorized as controller-comparator-regulator activity. As controller, he specified desired patient behavior. As comparator-regulator, he ascertained patient condition and, as a consequence, initiated corrective action to return the patient to a desired state. The data illustrated this behavior when at 11:35 a.m. the physician visited the patient, observed
his respiratory difficulty, and inserted an endotracheal tube to counteract the disturbance.

Regulatory strategies initiated in the recovery room were (1) oxygen therapy, (2) nasal airway, (3) endotracheal tube, (4) aspiration of airway, and (5) medication.

Six nurses and four physicians were involved in triad behavior in this situation.

### Triad Behavior in the Care of Patient E

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:20 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient E was admitted to the recovery room accompanied by two physicians.

One gave the following information to nurse 1 who received the patient:

1. An abdominal hysterectomy had been performed under general anesthesia.

2. The estimated blood loss was 400 cc.

3. The lower and upper limits of systolic blood pressure within which the patient

The physician performed the control activity of specifying system performance.

This information characterized system input information. Limits were specified for one
was to be maintained were 90-100 mm.

4. An oral airway was in place.

5. The patient had received trilafon during the operation.

6. The intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride was to be completed in the recovery room and 500 cc of 5 per cent dextrose in water was to be added to keep the intravenous open.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 110/70
P 88
R 20

She started nasal oxygen and checked the intravenous infusion.

variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.
1:30 p.m.

Nurse 1 made these measurements and recorded the data:

BP  88/50*

P  92

R  20

Nurse 1 elevated the foot of the bed, and checked the intravenous infusion.

The nurse's activity is categorized as Level I monitoring behavior.

On the basis of difference information (systolic blood pressure), the nurse takes corrective action.

1:50 p.m.

Nurse 2 added the prescribed fluid to the intravenous infusion.

2:10 p.m.

Nurse 1 made these measurements and recorded the data:

BP  100/50

P  100

R  20

The nurse's behavior is categorized as Level I monitoring activity.
2:30 p.m.

Nurse 2 made these measurements and recorded the data:

- BP 82/50*
- P 100
- R 16

Nurse 2 asked nurse 1 to repeat the blood pressure measurement:

- BP 76/50*

2:32 p.m.

Physician 1 visited the patient and ordered 500 cc of whole blood. The patient was very restless and complained of feeling cold.

2:35 p.m.

Nurse 2 gave the patient neo-rinse 1 cc intravenously as ordered verbally by physician 1.
Nurse 2 made this measurement and recorded the reading:

BP  72/60*

2:40 p.m.

Nurse 2 made these measurements and recorded the data:

BP  90/50
P   100
R   24

The whole blood transfusion was started by physician 1.

2:43 p.m.

Nurse 3 made this measurement and recorded the reading:

BP  96/50

The patient was still restless, crying, and complaining of being very cold. Nurse 3 obtained extra blankets for her. Physician 1 visited the patient,
observed her, and ordered
numorphan 0.3 mgm intraven­
ously. This was given by
nurse 3.

2:48 p.m.

Nurse 3 made these
measurements and recorded
the data:

\begin{align*}
\text{BP} & \quad 90/48 \\
\text{P} & \quad 90 \\
\text{R} & \quad 20 \\
\end{align*}

She checked the nasal
oxygen, intravenous infusion,
and asked the patient to
breathe deeply.

2:50 p.m.

Nurse 3 made these
measurements and recorded
the data:

\begin{align*}
\text{BP} & \quad 86/50^* \\
\text{P} & \quad 86 \\
\text{R} & \quad 20 \\
\end{align*}
2:51 p.m.

Nurse 2 made this measurement and recorded the reading:

**BP 88/P**

She checked the dressing over the incision and found it to be dry.

The nurse was unable to detect the blood pressure audibly, so she used the method of palpating the radial pulse to obtain the measurement.

2:52 p.m.

Nurse 2 made this measurement and recorded the reading:

**BP 90/54**

She had the ward secretary page physician 1 to come to the recovery room.

2:57 p.m.

Nurse 2 made these measurements and recorded the data:

**BP 86/50**

**P 96**

**R 24**
3:03 p.m.

Nurse 2 made this measurement and recorded the reading:

BP 90/60

3:07 p.m.

Nurse 2 made this measurement and recorded the reading:

BP 90/50

Physician 1 arrived and observed the patient. He asked nurse 2 to "run the blood in fast."

Increasing the rate of flow of the intravenous infusion (blood) is a means of taking corrective action to regulate patient condition.

3:10 p.m.

Nurse 2 made these measurements and recorded the data:

BP 84/50*

P 104

R 20
Physician 1 took the patient's pulse and listened to her chest. He urged the patient to breathe deeply. She complained of pain in her abdomen and of being cold.

3:13 p.m.

Nurse 2 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>90/50</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

3:17 p.m.

Nurse 2 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>86/50*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>108</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

Physician 1 lowered the head of the bed and elevated the foot. The physician took corrective action by changing the position of the bed.

The physician detects or gathers patient state information.
3:24 p.m.
Nurse 2 made this measurement and recorded the reading:
BP 92/60

3:28 p.m.
Nurse 2 made this measurement and recorded the reading:
BP 88/50*

3:32 p.m.
Nurse 2 made this measurement and recorded the reading:
BP 98/P

Physician 2 visited the patient and elevated the head of the bed.

Corrective action was taken by the physician-regulator.

3:34 p.m.
Nurse 2 made these measurements and recorded the data:
BP 98/48
P 104
R 24
3:39 p.m.

Nurse 2 made this measurement and recorded the reading:

BP 98/54

She discontinued the blood transfusion which was completely absorbed.

3:49 p.m.

Nurse 3 made these measurements and recorded the data:

BP 100/54
P 96
R 24

4:00 p.m.

Nurse 4 made these measurements and recorded the data:

BP 100/50
P 120
R 24
4:20 p.m.

Nurse 4 made these measurements and recorded the data:

BP  110/60
P   100
R   20

4:35 p.m.

Nurse 4 made these measurements and recorded the data:

BP  108/58
P   104
R   22

4:45 p.m.

Nurse 4 made these measurements and recorded the data:

BP  106/60
P   104
R   20

She checked the intravenous infusion and nasal
oxygen. The patient appeared to be sleeping.

5:00 p.m.

Nurse 4 made these measurements and recorded the data:

BP  100/60
P  104
R  20

5:25 p.m.

Nurse 4 made these measurements and recorded the data:

BP  102/56
P  118
R  20

The patient remained in the recovery room because the systolic blood pressure continued to fluctuate, although readings revealed that the variable was within the specified limits.
Summary

System input information was characterized by (1) explicit statements about the patient's condition prior to her admission to the recovery room, (2) the specification of regulatory strategies which were initiated in the operating room and were to be continued in the recovery room, and (3) the specification of desired patient condition with respect to systolic blood pressure.

System output information was obtained by the measurement of blood pressure, pulse, and respiration. The state of the patient was determined at intervals which varied from one minute to twenty-five minutes. System output information which initiated nurse-physician action was systolic blood pressure and pain.

Nurse action was categorized as monitoring activity at three levels of response to patient signals. At the first level, she detected patient state information and recorded it. At the second level, she reported difference information (systolic blood pressure below the specified lower limit) to the physician-regulator. At the third level of monitoring, she took action to minimize the difference between the actual state of the patient and the desired state. For example, she elevated the foot of the bed to combat the disturbance and thus regulate patient condition.
Physician behavior was categorized as controller-comparator-regulator activity. As controller, he specified desired patient condition with respect to the systolic blood pressure.

As comparator-regulator, the physician acquired patient state information and, on the basis of difference information, took corrective action. He ordered a blood transfusion, for example, and, subsequently, ordered that the rate of flow be increased in order to return the patient to a desired state.

Regulatory strategies initiated in the recovery room were (1) nasal oxygen, (2) blood therapy, (3) change of position, (4) medication, and (5) increase in rate of flow of blood transfusion.

Four nurses and two physicians were involved in the regulation of patient condition.

**Triad Behavior in the Care of Patient F**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:50 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient F was admitted to the recovery room accompanied by two physicians.

One gave the following information to nurse 1

The physician performed the control activity
who received the patient:

1. An appendectomy had been performed under general anesthesia.

2. The estimated blood loss was 50 cc.

3. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-150 mm.

4. The patient was to receive the remainder of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride. This intravenous infusion had been started in the operating room.

Nurse 1 reported the following information to physician 1 and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>102/74</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>88</td>
</tr>
<tr>
<td>R</td>
<td>16</td>
</tr>
</tbody>
</table>

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

These data represent system output information.
She checked the intravenous infusion and started nasal oxygen.

1:03 p.m.

Nurse 1 made these measurements and recorded the data:

BP 112/72
P 80
R 20

1:10 p.m.

Nurse 1 went to the operating room to locate a physician to obtain an order for a medication to relieve the patient's pain and restlessness.

1:15 p.m.

Physician 3 gave a verbal order for demerol, 25 mgm, intramuscularly. He did not visit the patient. The medication was given by nurse 1.

The nurse's behavior is categorized as Level I monitoring activity.

The nurse's behavior is categorized as Level II monitoring activity. She reported difference information to the physician-regulator.

The medication represents a regulatory strategy used to combat patient disequilibrium.
1:20 p.m.

Nurse 1 made these measurements and recorded the data:

- **BP**: 112/68
- **P**: 78
- **R**: 20

1:28 p.m.

Nurse 1 made these measurements and recorded the data:

- **BP**: 108/62
- **P**: 78
- **R**: 18

1:50 p.m.

Nurse 1 made these measurements and recorded the data:

- **BP**: 110/64
- **P**: 74
- **R**: 16

She checked the intravenous infusion and nasal oxygen.
2:10 p.m.

Nurse 2 made these measurements and recorded the data:

BP  110/64
P    80
R    18

The patient responded as nurse 2 called him repeatedly by name.

2:30 p.m.

Nurse 2 made these measurements and recorded the data:

BP  112/68
P    76
R    20

She discontinued the nasal oxygen and raised the head of the bed slightly. The patient was awake and talked to the nurse.

The nurse's behavior is categorized as Level III monitoring activity as she terminated the administration of nasal oxygen and changed the position of the bed.
2:40 p.m.

Nurse 2 made these measurements and recorded the data:

BP  110/60
P    78
R    20

The patient stated that he was having "a lot of pain."
Nurse 2 told him to wait until he was in his own room and then he would receive "something to help."

2:45 p.m.

Nurse 2 took the patient's blood pressure and recorded this reading:

BP  110/60

She then sent the patient to his room.

The patient stated that he had pain. The nurse made the decision not to take corrective action. As a Level III monitor, she made the decision to return the patient to his room.
Summary

The state of the patient was determined at intervals which varied from five minutes to twenty-two minutes.

Although the patient's blood pressure, pulse, and respiration were measured at these times, information obtained from these measurements did not appear to initiate nurse-physician action.

The patient signal which initiated nurse-physician action was pain. Two regulatory strategies were utilized to return the patient to a desired state: medication and change of position.

Two nurses and three physicians were involved in regulating patient condition.

Triad Behavior in the Care of Patient G

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:25 a.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient G was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. A bilateral Caldwell-Luc had been performed

The physician performed the control activity of specifying system performance.
under general anesthesia.

2. An oral airway was in place.

3. The estimated blood loss was 350 cc.

4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-160 mm.

5. The patient was to receive the remainder of an intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride which had been started in the operating room.

Nurse 1 reported the following information to physician 1 and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>118/68</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>88</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.
Nurse 1 started nasal oxygen.

11:30 a.m.

Nurse 2 placed the patient in low semi-Fowler's position. She suctioned the patient's airway.

11:37 a.m.

Nurse 1 made these measurements and recorded the data:

- BP 134/72
- P 80
- R 22

Nurse 3 observed the patient, checked the intravenous infusion, and scanned the recovery room record.

11:53 a.m.

Nurse 4 made these measurements and recorded the data:

- BP 124/74
- P 68
- R 16

The nurse's behavior is categorized as Level III monitoring activity.
12:00 p.m.

Nurse 2 checked the intravenous infusion and suctioned the patient's airway.

12:08 p.m.

Nurse 4 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>132/72</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>84</td>
</tr>
<tr>
<td>R</td>
<td>16</td>
</tr>
</tbody>
</table>

12:20 p.m.

Nurse 5 observed the patient and checked the intravenous infusion and nasal oxygen.

12:25 p.m.

Physician 2 visited the patient. Together, he and nurse 5 suctioned the patient's airway.
12:30 p.m.

Nurse 4 suctioned the patient's airway.

12:35 p.m.

Nurse 3 suctioned the patient's airway. Physician 1 visited the patient and assisted nurse 3.

12:40 p.m.

Nurse 3 made these measurements and recorded the data:

BP 120/80  
P 88  
R 20

Physician 1 lowered the head of the bed, suctioned the patient's airway, removed the oral airway, and inserted a clean one. He moved the patient up in bed assisted by nurse 3.

The physician-regulator took corrective action to return the patient to a desired state.
12:50 p.m.

Nurse 3 made these measurements and recorded the data:

BP  118/80
P  68
R  20

She suctioned the patient's airway and checked the intravenous infusion. The patient did not respond although she called his name repeatedly.

1:05 p.m.

Nurse 1 made these measurements and recorded the data:

BP  112/90
P  64
R  20

She suctioned the patient's airway.
1:20 p.m.
Nurse 1 made these measurements and recorded the data:

- **BP**: 120/90
- **P**: 60
- **R**: 16

She suctioned the patient's airway.

1:30 p.m.
Nurse 4 made these measurements and recorded the data: The nurse's behavior is categorized as Level I monitoring activity.

- **BP**: 132/64
- **P**: 56
- **R**: 18

1:43 p.m.
Nurse 3 made these measurements and recorded the data:

- **BP**: 132/50
- **P**: 80
- **R**: 20

She suctioned the patient's airway.
1:45 p.m.

Nurse 3 telephoned physician 2 to report bloody drainage on the dressing covering the incision.
Nurse 5 suctioned the patient's airway. Nurse 3 reinforced the dressing over the incision.

1:55 p.m.

Physician 2 visited the patient.

2:00 p.m.

Nurse 3 made these measurements and recorded the data:

- BP 130/60
- P 64
- R 24

2:10 p.m.

Nurse 3 made this measurement and recorded the reading:

- BP 112/60
2:20 p.m.

Nurse 3 made these measurements and recorded the data:

BP 112/60
P 60

Physician 2 visited the patient and observed him.

Nurse 3 suctioned the patient's airway. She called the patient's name repeatedly. The nurse's behavior is categorized as Level III monitoring activity.

2:35 p.m.

Nurses 1 and 3 suctioned the patient's airway and moved him up in bed.

2:45 p.m.

Nurse 3 made these measurements and recorded the data:

BP 110/66
P 100
R 20
3:00 p.m.

Nurse 4 made these measurements and recorded the data:

- BP 116/72
- P 100
- R 20

She suctioned the patient's airway. She asked the patient to breathe deeply.

3:15 p.m.

Nurse 6 observed the patient, checked the intravenous infusion, suctioned his airway, and scanned his chart.

She made these measurements and recorded the data:

- BP 120/70
- P 68
- R 20
3:30 p.m.

Nurse 7 made these measurements and recorded the data:

BP  120/72
P  68
R  20

She suctioned the patient's airway. She called him repeatedly by name but with little response. The patient remained in the recovery room because he had not awakened fully from the anesthesia.

Summary

The state of the patient was determined at intervals which varied from two minutes to sixteen minutes.

Patient state information derived by measuring blood pressure, pulse, and respiration did not appear to initiate nurse-physician action.

The patient signal which elicited nurse-physician action was an occluded airway. To correct this difference between the desired state of the patient and his actual state, three regulatory strategies were utilized: (1) an artificial airway was inserted, (2) the airway was suctioned frequently, and (3) the patient's position was changed.

Seven nurses and two physicians participated in the regulation of patient condition.
Triad Behavior in the Care of Patient H

Triad Behavior

11:20 a.m.

Patient H was admitted to the recovery room accompanied by a nurse anesthetist and two physicians. A physician gave the following information to nurse 1 who received the patient:

1. A Wertheim hysterectomy had been performed under general anesthesia.

2. The estimated blood loss was 2300 cc.

3. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 90-150 mm.

4. Fluid therapy which had been started in the operating room was to be continued: 2000 cc of whole blood, 1000 cc of 5 per cent

Interpretation of Behavior

The physician performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.
dextrose in water with 0.2 sodium chloride at 60 drops per minute, and 500 cc of 5 per cent dextrose in water.

5. The patient had a "hive reaction" in the operating room.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 120/80
P 92
R 20

She started nasal oxygen. She gave benadryl, 50 mgm, intravenously per verbal order of physician 1. Nurse 1 checked the physicians' order sheet for additional information regarding the care of the patient in the recovery room:

1. Attach the Foley catheter to a straight drain.

2. Following the fluid therapy started in the operating
room, keep the intravenous open with 1000 cc of 5 per cent dextrose in water at twenty drops per minute.

3. Peri-pads whenever necessary and keep a pad count.

4. Call the house officer if the peri-pad count is greater than 1 pad every 2 hours.

5. This patient is allergic to adhesive tape.

11:30 a.m.

Nurse 2 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>106/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
</tbody>
</table>

Physician 1 visited the patient and called her name repeatedly.

The physician-controller specified limits for this variable, also: bleeding.

The nurse's behavior is categorized as Level I monitoring activity.
11:50 a.m.

Nurse 2 made these measurements and recorded the data:

- BP: 104/70
- P: 64
- R: 20

She checked the intravenous infusion and nasal oxygen.

12:12 p.m.

Nurse 1 made these measurements and recorded the data:

- BP: 102/64
- P: 76
- R: 24

Physician 1 visited the patient and noted her restlessness. He gave a verbal order for demerol, 10 mgm, and phenergan, 10 mgm, to be given intravenously. This was given by nurse 2.

The physician detected the patient signal of restlessness and interpreted it to be a signal of pain. As a consequence, he ordered a medication (a regulatory strategy) to reduce the patient's discomfort.
12:36 p.m.

Nurse 3 made these measurements and recorded the data:

   BP  100/76
   P    72
   R    20

12:48 p.m.

Nurse 2 made these measurements and recorded the data:

   BP  114/70
   P    72
   R    22

She noted a large amount of bright red drainage on the bed linen. Physician 2 visited the patient. Nurse 2 reported the excessive bleeding to him.

1:05 p.m.

Nurse 2 made these measurements and recorded

The nurse's behavior is categorized as Level II monitoring activity.
the data:

BP 100/80
P 60
R 24

The second peri-pad was applied by nurse 2.

1:14 p.m.

Nurse 4 made these measurements and recorded the data:

BP 100/60
P 64
R 20

She checked the peri-pad, found it to be saturated with bright red blood, and she applied the third peri-pad.

1:25 p.m.

Nurse 4 made these measurements and recorded the data:

BP 126/70
P 68
R 20

The nurse's behavior is categorized as Level I monitoring activity.
1:37 p.m.

Nurse 4 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>100/70</td>
</tr>
<tr>
<td>P</td>
<td>68</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

She discontinued the nasal oxygen.

1:55 p.m.

Nurse 2 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>100/64</td>
</tr>
<tr>
<td>P</td>
<td>68</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

2:05 p.m.

Nurse 2 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>110/64</td>
</tr>
<tr>
<td>P</td>
<td>68</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

Nurse 2 called the patient by name and she responded at once.
2:19 p.m.

Nurse 2 made these
measurements and recorded
the data:

BP  102/64
P    72
R    30

Nurse 2 returned the
patient to her room.

Summary

Patient state information was acquired at intervals
which varied from ten minutes to twenty-two minutes.

The measures of blood pressure, pulse, and respira­
tion did not appear to reveal essential patient state
information which initiated nurse-physician action.

The patient signals which did elicit nurse-physician
response were the excessive amount of vaginal bleeding
and pain.

Regulatory strategies initiated in the recovery room
to regulate patient condition were (1) medication and
(2) oxygen therapy.

Four nurses and two physicians were involved in the
regulation of patient condition.
2:10 p.m.

Patient I was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. An abdominal hysterectomy had been performed under general anesthesia.

2. An oral airway was in place.

3. The estimated blood loss was 400 cc.

4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-190 mm.

5. The patient might cough and complain of chest pain due to a previous auto accident.
6. A urinary catheter which had been inserted in the operating room was to be attached to a straight drain.

7. An additional 1000 cc of 5 per cent dextrose in water was to be added to the intravenous infusion started in the operating room.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 120/80
P 80

She checked the intravenous infusion and attached the urinary catheter to a straight drain.

2:25 p.m.

Nurse 1 added the prescribed fluids to the intravenous infusion. Physician 3 visited the patient, observed her restlessness, and gave

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.
a verbal order to nurse 1 for demerol, 10 mgm, and phenergan, 10 mgm. She gave the medication intravenously.

The physician, as comparator-regulator, detected the patient signal of restlessness and interpreted it as pain. He ordered a medication to reduce the patient's discomfort and return her to a desired state.

2:30 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 118/70
- P 76
- R 24

2:43 p.m.

Nurse 2 made these measurements and recorded the data:

- BP 122/70
- P 84
- R 20

The nurse's behavior is categorized as Level I monitoring activity.
The patient stated that
she was having intense pain.
Nurse 2 left the recovery
room to locate a physician to
prescribe a medication for the
patient's pain and restlessness.
2:50 p.m.
Nurse 2 returned with a
verbal order from physician 2
who did not visit the patient.
Demerol, 10 mgm, and phenergan,
10 mgm, were given intravenously by nurse 2.
3:00 p.m.
Nurse 3 made these
measurements and recorded
the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>114/68</td>
</tr>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>

As a Level II monitor, the
nurse reported difference
information to the
physician-regulator who,
in turn, prescribed cor-
rective action.
The nurse's behavior is
categorized as Level I
monitoring activity.
3:15 p.m.

Nurse 1 made these measurements and recorded the data:

BP  112/70
P   72
R   24

She checked the intravenous infusion. The patient was restless.

3:20 p.m.

Nurse 1 located physician 4, outside the recovery room, who prescribed numorphan, 0.3 mgm -- he did not visit the patient. This was given intravenously by nurse 1.

3:23 p.m.

Nurse 1 and nurse 4 checked the intravenous infusion. Nurse 4 made these measurements and recorded the data:

BP  108/60
3:40 p.m.

Nurse 4 made these measurements and recorded the data:

BP 112/72
P  68
R  16

3:45 p.m.

Nurse 5 observed the patient and called her name repeatedly.

3:50 p.m.

Nurse 1 made these measurements and recorded the data:

BP 122/74
P  68
R  16

3:55 p.m.

Nurse 1 called the patient by name. At her response, the nurse's behavior is categorized as Level I monitoring activity.
nurse made the decision to send her to her room. As a Level III monitor, the nurse made the decision to return the patient to her room.

Summary

Patient state information was ascertained at intervals which varied from three minutes to seventeen minutes.

The measurements of blood pressure, pulse, and respiration did not appear to reveal critical information which led to nurse-physician action. The patient signal which did initiate nurse-physician response was pain. The regulation of patient condition was accomplished by administering medications.

Five nurses and four physicians participated in the care of the patient.

Triad Behavior in the Care of Patient J

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:55 a.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient J was admitted to the recovery room accompanied by two physicians. One gave the following information to The physician performed the control activity of specifying system performance.
nurse 1 who received the patient.

1. A cholecystectomy and appendectomy had been performed under general anesthesia.

2. The estimated blood loss was 200 cc.

3. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 90-170 mm.

4. The patient was to receive the remainder of an intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride which had been started in the operating room.

5. The patient was to be encouraged to breathe deeply.

Nurse 1 reported the following information to
physician 1 and recorded
the measurement:

BP  210/100*

Nurse 2 started nasal
oxygen and checked the intra-
venous infusion. Physician 1
raised the head of the bed
slightly before leaving the
patient.

11:00 a.m.

Nurse 1 made these
measurements and recorded
the data:

BP  186/98*
P  116
R  24

Physician 1 visited the
patient, observed him, and
scanned his chart.

11:13 a.m.

Nurse 1 made these
measurements and recorded
the data:

BP  154/94
She checked the intravenous infusion and called the patient by name repeatedly.

11:27 a.m.

Nurse 3 made these measurements and recorded the data:

\[
\begin{align*}
\text{BP} & \quad 122/80 \\
\text{P} & \quad 80 \\
\text{R} & \quad 24
\end{align*}
\]

11:35 a.m.

Nurse 3 made these measurements and recorded the data:

\[
\begin{align*}
\text{BP} & \quad 160/80 \\
\text{P} & \quad 80
\end{align*}
\]

11:40 a.m.

Nurse 1 took the patient's blood pressure and recorded this reading:

\[
\begin{align*}
\text{BP} & \quad 132/74
\end{align*}
\]
Nurse 2 checked the intravenous infusion and called the patient by name repeatedly.

11:52 a.m.

Nurse 3 made these measurements and recorded the data:

BP 134/80  
P 104  
R 20  

She discontinued the nasal oxygen.

12:00 p.m.

Nurse 4 observed the patient and scanned the chart. She called to the patient repeatedly.

12:06 p.m.

Nurse 3 made these measurements and recorded

As a Level III monitor, the nurse terminated a regulatory strategy which had been initiated to maintain the patient in a desired state.
the data:

BP  144/78
P   88
R   18

12:10 p.m.

Nurse 4 observed that the patient was having pain. She asked physician 2 for an order for a medication to relieve pain. She gave demerol, 10 mgm, and phenergan, 10 mgm, intravenously per the physician's verbal order. She noted on the recovery room record that there was "a small amount of sanguinous drainage on the dressing," but she did not report this.

12:34 p.m.

Nurse 2 made these measurements and recorded the data:

BP    134/90

As a Level II monitor, the nurse reported difference information to the physician-regulator who prescribed corrective action.
P 100
R 24

She checked the intravenous infusion and inspected the dressing.

12:50 p.m.

Nurse 4 made these measurements and recorded the data:

BP 140/84
P 96
R 22

1:05 p.m.

Nurse 1 made these measurements and recorded the data:

BP 140/84
P 96
R 22

As a Level III monitor, the nurse returned the patient to her room.

She checked the intravenous infusion, called the patient by name, inspected the dressing, and sent the patient to her room.

The nurse's behavior is categorized as Level I monitoring activity.
Summary

The state of the patient was determined at intervals which varied from four minutes to twenty-four minutes. The patient signals which initiated nurse-physician action were (1) systolic blood pressure and (2) pain.

Regulatory strategies utilized to return the patient to a desired state were (1) oxygen therapy, (2) change in position, and (3) medication.

Four nurses and two physicians participated in the regulation of patient condition.

Triad Behavior in the Care of Patient K

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:10 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient K was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. A gastroenterostomy had been performed under general anesthesia.

2. The estimated blood loss was 2200 cc.

The physician performed the control activity of specifying system performance.
3. The intravenous infusion started in the operating room was to be continued with 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride. Blood therapy, started in the operating room, was to be continued until it had all been absorbed.

4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 108-160 mm.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 136/88
P 72
R 20

Nurse 2 started nasal oxygen.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been started in the operating room.

These data represent system output information. As a Level III monitor, the nurse took corrective action to return the patient to a desired state.
12:22 p.m.

Physician 2 visited the patient. He observed the patient and asked that the drain from the incision be attached to low suction.

The physician-regulator requested that corrective action be taken.

12:24 p.m.

Nurse 1 made these measurements and recorded the data:

- **BP**: 120/80
- **P**: 68
- **R**: 20

She added the prescribed fluid to the intravenous infusion. Physician 3 visited the patient and observed him.

12:35 p.m.

Nurse 1 attached the drain from the incision to low suction.

12:40 p.m.

Nurse 1 asked physician 1 for a medication order for As a Level II monitor, the nurse reported difference
the patient's pain and restlessness. Demerol, 10 mgm, and phenergan, 10 mgm, were given intravenously by nurse 1. The patient removed the nasal oxygen catheter.

12:43 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>118/P</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

The nurse's behavior is categorized as Level I monitoring activity.

12:55 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>132/82</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>

Nurse 3 checked the intravenous infusion, gastric suction, and noted the patient's continued information to the physician-regulator who prescribed corrective action.

As a Level II monitor, the nurse reported difference information to the physician-regulator.
restlessness. She asked physician 1 for an order for a medication to relieve the patient's pain.

1:00 p.m.

Nurse 3 gave demerol, 25 mgm, intravenously.

1:15 p.m.

Nurse 1 made these measurements and recorded the data: The nurse's behavior is categorized as Level I monitoring activity.

BP 152/88
P 64
R 24

1:26 p.m.

Nurse 2 made these measurements and recorded the data:

BP 144/86
P 64
R 22

She checked the intravenous infusion and gastric
suction. She called the patient's name repeatedly.

1:45 p.m.

Nurse 3 made these measurements and recorded the data:

BP 142/84
P  70
R  24

Physicians 3 and 4 visited the patient. The latter observed the patient's restlessness and ordered demerol, 10 mgm, and phenergan, 10 mgm, intravenously. This was given by nurse 3.

1:53 p.m.

Nurse 3 made these measurements and recorded the data:

BP 146/80
P  72
R  24

The physician, as comparator-regulator, ascertained the state of the patient and prescribed corrective action as a consequence of difference information.

The nurse's behavior is categorized as Level I monitoring activity.
She called the patient by name repeatedly.

2:10 p.m.

Nurse 3 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>150/84</td>
</tr>
<tr>
<td>P</td>
<td>70</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>

She checked the intravenous infusion, gastric suction, and set the patient to his room.

As a Level III monitor, the nurse made the decision to return the patient to his room.

Summary

The state of the patient was determined at a frequency which varied from two minutes to seventeen minutes.

The patient signal which initiated nurse-physician action was pain. Corrective action was taken by the administration of medications. A second regulatory device was the administration of oxygen to enhance the patient's respiratory function.

Three nurses and four physicians were involved in the regulation of patient condition.
Triad Behavior in the Care of Patient L

Triad Behavior

11:10 a.m.

Patient L was admitted to the recovery room accompanied by a physician and a nurse anesthetist. The latter gave the following information to nurse 1 who received the patient:

1. A splenectomy and esophagogastrectomy had been performed under general anesthesia.

2. The estimated blood loss was 800 cc.

3. One chest tube, which had been inserted during the surgical procedure, was to be attached to 20 cm low suction.

4. The Levine tube, which had been inserted during the operative procedure, was to be

Interpretation of Behavior

The nurse anesthetist performed the control activity of specifying system performance.

This information characterizes system input information.

This information specifies regulatory strategies which were initiated in the operating room.
attached to low Wangensteen suction.

5. The patient was to receive the remainder of an intravenous infusion of whole blood started in the operating room, and the remainder of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride.

6. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-150 mm.

Nurse 1 reported the following information to the nurse anesthetist and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>98/68*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>76</td>
</tr>
<tr>
<td>R</td>
<td>32</td>
</tr>
</tbody>
</table>

11:17 a.m.

Nurse 2 connected the chest tube to low suction.

Limits were specified for one variable: systolic blood pressure.

These data represent system output information.
11:20 a.m.

Nurse 2 started nasal oxygen.

As a third level monitor, the nurse instigated this regulatory strategy to return the patient to a desired state.

11:22 a.m.

The patient complained of nausea and pain. Nurse 2 advised him to "take a deep breath."

11:25 a.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>132/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>92</td>
</tr>
<tr>
<td>R</td>
<td>32</td>
</tr>
</tbody>
</table>

Nurse 2 checked the chest suction and intravenous infusion.

The nurse's behavior is categorized as Level I monitoring activity.

11:30 a.m.

The patient said that he was very cold. Nurse 3
brought him extra blankets.
She checked the chest suction and intravenous infusion.
Nurse 2 observed the patient.

11:40 a.m.
Nurse 1 made these measurements and recorded the data:

| BP   | 124/80 |
P     | 88     |
|R     | 32     |

11:50 a.m.
Nurse 3 observed the patient. He complained of severe pain. She left the recovery room to locate a physician for a medication order. Physician 1 did not visit the patient but gave a verbal order for demerol, 10 mgm, intravenously. This was given by nurse 3. Nurse 4 checked the chest suction and drainage and intravenous

As a second level monitor, the nurse reported difference information to the physician-regulator who prescribed corrective action.
infusion. She discontinued the nasal oxygen.

12:05 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 124/80
- P 72
- R 28

12:15 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 118/70
- P 72
- R 24

She checked the chest suction and drainage and the intravenous infusion.

12:20 p.m.

Nurse 5 observed the patient and scanned his chart.

As a third level monitor, the nurse terminated a regulatory strategy.

The nurse's behavior is categorized as Level I monitoring activity.
12:27 p.m.

Nurse 4 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>P</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>70</td>
<td>24</td>
</tr>
</tbody>
</table>

12:45 p.m.

Nurse 3 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>P</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>72</td>
<td>24</td>
</tr>
</tbody>
</table>

She checked the chest suction and drainage and the intravenous infusion.

1:00 p.m.

Nurse 3 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>P</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>64</td>
<td>28</td>
</tr>
</tbody>
</table>
Nurse 4 checked the chest suction and drainage and the intravenous infusion. Assisted by two others, she moved the patient up in bed and placed the bed in a low Trendelenburg position. Nurse 3 restarted the nasal oxygen.

1:08 p.m.

Nurse 3 left the recovery room to locate a physician to whom she could report the patient's low systolic blood pressure. She returned with a verbal order from physician 1 for atropine, 0.2 mgm. This was given intravenously by nurse 3. The patient was restless and complained of general discomfort. Nurse 3 obtained extra pillows in order to position him more comfortably.

In response to the patient signal of disequilibrium (systolic blood pressure exceeded specified lower limit), regulatory action was taken by the monitor at the third level of operation.

As a Level II monitor, the nurse reported difference information to the physician-regulator who prescribed corrective action.
1:15 p.m.

Nurse 5 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>120/70</td>
</tr>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

The nurse's behavior is categorized as Level I monitoring activity.

1:30 p.m.

Nurse 3 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>114/70</td>
</tr>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

She checked the chest suction and drainage and the intravenous infusion. She discontinued the nasal oxygen. The nurse's behavior is categorized as Level III monitoring activity.

She placed the bed in the flat position.

1:48 p.m.

Nurse 3 made these measurements and recorded
the data:

BP  110/66
P   80
R   32

2:00 p.m.

Physician 2 visited the patient. He observed him, checked the chest drainage, and scanned the recovery room record.

He increased the rate of flow of the intravenous infusion.

Nurse 3 made these measurements and recorded the data:

BP  116/70
P   76

She checked the intravenous infusion, chest suction and drainage, and sent the patient to his room.

As a third level monitor, the nurse made the decision to return the patient to his room.
Summary

Patient state information was acquired at a frequency which varied from two to eighteen minutes.

Patient signals of disequilibrium which initiated nurse-physician response were (1) pain and (2) systolic blood pressure which had exceeded the specified lower limit.

The administration of medications was the regulatory device utilized to reduce the patient's pain. To regulate the patient's blood pressure, the regulatory strategies of oxygen therapy, increased rate of intravenous infusion flow, and change of position were initiated.

Five nurses and two physicians participated in the regulation of patient condition.

Triad Behavior in the Care of Patient M

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:15 p.m.</td>
<td>Corrective action was</td>
</tr>
<tr>
<td></td>
<td>initiated by the physician-</td>
</tr>
<tr>
<td></td>
<td>regulator on the basis of</td>
</tr>
<tr>
<td></td>
<td>difference information</td>
</tr>
<tr>
<td></td>
<td>with respect to an</td>
</tr>
<tr>
<td>Patient M was admitted to the recovery room accompanied by a nurse anesthetist and a physician. The patient was having respiratory difficulty, and as a consequence, physician 1 inserted an occluded airway.</td>
<td>occluded airway.</td>
</tr>
</tbody>
</table>
endotracheal tube, started oxygen via this airway, and inserted a Levine tube. After placing the patient in low semi-Fowler's position, he gave the following information to nurse 1 who received the patient:

1. A thyroid lobectomy had been performed under general anesthesia.

2. The estimated blood loss was 200 cc.

3. The intravenous infusion of 5 per cent dextrose in water with 0.2 sodium chloride, which had been started in the operating room, was to be continued by the addition of 1000 cc in the recovery room.

4. The lower and upper limits of systolic blood pressure within which the patient

The physician performed the control activity of specifying system performance.

This information characterizes system input information.

This information specifies a regulatory strategy which had been initiated in the operating room.

Limits were specified for one variable: systolic blood pressure.
was to be maintained were 100-160 mm.

Nurse 1 reported the following information to physician 1 and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>132/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>68</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

12:25 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>134/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

These data represent system output information.

Physicians 1 and 2 visited the patient. The former removed the endotracheal tube and inserted a nasal airway. An oxygen catheter was inserted in the nasal airway. The Levine tube was attached to low suction by nurse 1.

The nurse's behavior is categorized as Level I monitoring activity.

The physician-regulator is engaged in initiating regulatory activities.
12:35 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>134/80</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

She checked the intravenous infusion, Levine tube suction, and nasal oxygen. She suctioned the patient's airway. Nurse 1 called the patient by name repeatedly but she did not respond.

12:45 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>184/20*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

She observed the patient and noted that the area around the dressing appeared edematous. Nurse 2 notified As a Level II monitor, the nurse reported difference information to the physician.
Physician 3 by telephone.
Physicians 2 and 4 visited the patient and observed her.

Physician 2 decreased the rate of flow of the intravenous infusion.

This action on the part of the physician represents a regulatory strategy to reduce the systolic blood pressure.

12:50 p.m.

Nurse 1 made these measurements and recorded the data:

BP 200/90*
P 84
R 22

Physicians 3, 4, and 5 visited the patient. Physician 3 removed the skin suture. Profuse bleeding occurred. The patient was restless and appeared to be having severe respiratory difficulty.

The nurse's behavior is categorized as Level I monitoring activity.

The physician-regulator took corrective action to return the patient to a desired state.
12:55 p.m.

Nurse 1 took the patient's blood pressure and recorded this reading:

BP 144/100

Physician 4 telephoned physician 6 to come to the recovery room.

1:08 p.m.

Physician 6 ordered that the patient be returned to the operating room immediately.

2:15 p.m.

Patient M was readmitted to the recovery room accompanied by three physicians. One gave the following information to nurse 1 who received the patient:

1. A bleeding blood vessel deep in the wound had

The physician relinquished his authority as regulator, and as comparator, reported difference information to another physician.

The latter made the decision, as controller, to return the patient to the operating room.

On the patient's return to the recovery room, no change was made regarding the specified limits of systolic blood pressure.
been found and ligated under general anesthesia.

2. The estimated blood loss was 100 cc.

3. The Levine tube was to be removed before the patient left the recovery room.

4. A nasal airway was in place.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 134/80
P 64
R 18

She started nasal oxygen and placed the patient in low semi-Fowler's position.

2:25 p.m.

Nurse 1 made these measurements and recorded the data:

BP 134/80
She attached the Levine tube to low suction. She checked the intravenous infusion and nasal oxygen.

2:30 p.m.

Nurse 2 made these measurements and recorded the data:

BP 130/80
P 72
R 18

The nurse's behavior is categorized as Level I monitoring activity.

2:45 p.m.

Nurse 2 made these measurements and recorded the data:

BP 164/90*
P 72

She checked the nasal oxygen, Levine tube suction, and intravenous infusion. Nurse 2 called the patient by name repeatedly, but she did not respond.
2:55 p.m.

Nurse 2 made these measurements and recorded the data:

BP 160/90
P 72
R 24

She telephoned physician 3 to report increasing edema around the dressing.

As a Level II monitor, the nurse reported difference information to the physician.

3:07 p.m.

Physician 3 visited the patient and observed her. He loosened a strip of tape over the dressing. Nurse 3 made these measurements and recorded the data:

BP 160/90
P 64
R 24
3:20 p.m.

Nurse 3 made these measurements and recorded the data:

BP  134/90
P  68
R  24

The nurse's behavior is categorized as Level I monitoring activity.

3:35 p.m.

Nurse 3 made these measurements and recorded the data:

BP  156/90
P  74
R  24

She checked the Levine tube suction and drainage, the intravenous infusion, nasal airway, and nasal oxygen.

3:50 p.m.

Nurse 4 made these measurements and recorded
the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| BP | 164/90 *
| P  | 72 |
| R  | 22 |

4:00 p.m.

Nurse 4 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>112/86</td>
</tr>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

4:05 p.m.

Nurse 4 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>140/70</td>
</tr>
<tr>
<td>P</td>
<td>68</td>
</tr>
<tr>
<td>R</td>
<td>20</td>
</tr>
</tbody>
</table>

4:15 p.m.

Nurse 1 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>142/70</td>
</tr>
</tbody>
</table>
Physician 3 visited the patient and observed her. Nurse 1 checked the intravenous infusion, Levine tube suction and drainage, and the nasal airway and nasal oxygen.

4:25 p.m.

Nurse 4 made these measurements and recorded the data:

BP  140/76
P   68
R   20

Nurse 4, assisted by two others, moved the patient up in bed.

4:35 p.m.

Nurse 5 made these measurements and recorded the data:

BP  136/76
She called the patient by name repeatedly with little response.

4:45 p.m.

Nurse 6 made these measurements and recorded the data:

BP 142/70
P 68
R 20

She discontinued the nasal oxygen. She attempted to arouse the patient by calling her name repeatedly.

4:55 p.m.

Nurse 5 made these measurements and recorded the data:

BP 142/76
P 68
R 20

The nurse's behavior is categorized as Level III monitoring activity.
She suctioned the patient's nasopharynx before removing the nasal airway and the Levine tube. She checked the intravenous infusion and called the patient by name repeatedly.

5:00 p.m.

Nurse 5 made these measurements and recorded the data:

- BP 142/70
- P 68
- R 20

The patient responded to her name and she was returned to her room. The nurse's behavior is categorized as Level III monitoring activity.

Summary

Immediately upon the patient's admission to the recovery room, regulatory action was imperative due to an occluded airway. To correct this disequilibrium, an artificial airway was inserted, oxygen therapy was started, the patient was placed in a position which facilitated her respiratory function, and a Levine tube was inserted.
Subsequent nurse-physician action focused on re-establishing and maintaining the patient in a desired state with respect to an occluded airway and an elevated systolic blood pressure. Regulatory strategies utilized to regulate patient condition were (1) the rate of flow of the intravenous infusion was decreased, (2) skin sutures were removed to relieve pressure on the airway, and (3) the patient was returned to the operating room.

In this situation, it was observed that physician behavior was different from the usual pattern. The physician controller-regulator relinquished his authority and, as comparator, transmitted difference information to a second physician controller-regulator. The latter made the decision to return the patient to the operating room.

Patient state information was acquired at intervals which varied from five minutes to fifteen minutes.

During the patient's second period in the recovery room, patient signals which initiated nurse-physician action were an elevated systolic blood pressure and occluded airway. Corrective action was taken by (1) administering oxygen, (2) changing the patient's position, and (3) aspirating the airway.

Six nurses and six physicians were involved in the regulation of patient condition.
Triad Behavior in the Care of Patient N

Triad Behavior

2:49 p.m.

Patient N was admitted to the recovery room accompanied by three physicians. One gave the following information to nurse 1 who received the patient:

1. A total laryngectomy had been performed under general anesthesia.

2. The estimated blood loss was 1400 cc.

3. A tracheostomy tube was in place.

4. Fluid therapy, which had been started in the operating room, was to be continued with 1000 cc of 5 per cent dextrose in water.

5. The lower and upper limits of systolic blood pressure within which the patient

Interpretation of Behavior

The physician performed the control activity of specifying system performance.

This information characterizes system input information.

This information specifies a regulatory strategy which had been initiated in the operating room.

Limits were specified for one variable: systolic blood pressure.
was to be maintained were 100-150 mm.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 132/68  
P 88

She started oxygen via the tracheostomy tube.

2:56 p.m.

Nurse 1 made these measurements and recorded the data:

BP 138/82  
P 92

She added the prescribed fluids to the intravenous infusion.

3:05 p.m.

Nurse 1 suctioned the patient's airway via the tracheostomy tube.

These data represent system output information.

The nurse's behavior is categorized as Level III monitoring activity.

The nurse's behavior is categorized as Level I monitoring activity.

The nurse's behavior is categorized as Level III monitoring activity.
3:10 p.m.

Nurse 1 made this measurement and recorded the reading:

BP 140/80

Physician 2 visited the patient, observed him, and commented on his restlessness.

3:12 p.m.

Physician 1 visited the patient and observed him.

3:25 p.m.

Nurse 2 made these measurements and recorded the data:

BP 134/80
P 88

3:35 p.m.

Nurse 2 suctioned the patient's airway. The patient was very restless. Nurse 2 called him by name repeatedly.

No corrective action is taken in response to the patient signal of restlessness.
3:40 p.m.

Nurse 3 made these measurements and recorded the data:

BP 140/82
P 92

3:45 p.m.

Physicians 2 and 3 visited the patient. Physician 2 reinforced the dressing after observing the excessive bloody drainage on it. Nurse 1 suctioned the patient via the tracheostomy tube.

3:55 p.m.

Nurse 2 made these measurements and recorded the data:

BP 140/80
P 92

She checked the intravenous infusion and called the patient by name repeatedly.
4:00 p.m.  
Nurse 1 suctioned the patient's airway. She noted excessive bleeding from his nose.

4:05 p.m.  
Nurse 1 made these measurements and recorded the data:

\[
\begin{align*}
\text{BP} & \quad 140/80 \\
\text{P} & \quad 88
\end{align*}
\]

She suctioned the patient's airway.

4:10 p.m.

Nurses 3 and 4 moved the patient up in bed and elevated the head of the bed slightly. Physicians 1 and 3 visited the patient and observed him. They asked that physician 2 be called. The patient was extremely restless and complained that he had a headache.

The physicians, as comparators, requested that difference information be transmitted to a particular physician-regulator.
4:15 p.m.

Nurse 3 recorded this reading of the patient's respiration:

R  26

She also recorded that the patient's face "appears dusky."

Nurse 4 suctioned the patient's trachea and nasopharynx. His nose continued to bleed. Nurse 4 reported the patient's dusky color to physician 2 by telephone.

4:20 p.m.

Nurse 4 made these measurements and recorded the data:

BP  140/80
P  88
R  26

She checked the intravenous infusion. She then
left the recovery room to
obtain a medication order to
relieve the patient's pain.

As a second level monitor,
the nurse reported differ-
ence information to the
physician-regulator, and
as a consequence, cor-
rective action was taken.

4:25 p.m.

Physician 4 visited the
patient. He asked that the
patient be pulled up in bed
and that he receive demerol,
10 mgm, and phenergan,
10 mgm, intravenously.

4:30 p.m.

The above medication was
given by nurse 4. Nurses 3
and 4 pulled the patient up
in bed and positioned him
with extra pillows.

4:35 p.m.

Nurse 4 made these
measurements and recorded
the data:

BP    142/80
P     84
R     26

4:50 p.m.

Nurse 4 made these measurements and recorded
the data:

BP    144/78
P     76
R     16

She checked the intravenous infusion and suctioned
the patient's airway.

Physician 5 visited the patient, observed him, and
scanned the recovery room record.

5:05 p.m.

Nurse 4 made these measurements and recorded
the data:

BP    140/80
P     80
The patient was quiet. As a third level monitor, he responded when his name was called. Nurse 4 sent the patient to his room.

Summary

Patient state information was acquired at intervals which varied from two minutes to fifteen minutes.

Patient signals which elicited nurse-physician action were an occluded airway and pain. Regulatory strategies utilized to return the patient to a desired state were: (1) change in position, (2) aspiration of airway, (3) administration of oxygen, and (4) medication.

Four nurses and five physicians were involved in the regulation of patient condition.

**Triad Behavior in the Care of Patient 0**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 a.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient 0 was admitted to the recovery room accompanied by two physicians and a nurse anesthetist. A physician gave the following information to
nurse who received the patient:

1. A cholecystectomy had been performed under general anesthesia.

2. The estimated blood loss was 400 cc.

3. An oral airway was in place.

4. The patient had been hypotensive during surgery.

5. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 90-160 mm.

6. An additional 1000 cc of 5 per cent dextrose in water was to be added to the intravenous infusion which had been started in the operating room.

7. The Levine tube, which had been inserted in the operating room, was to

The physician performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.
be connected to low suction.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 100/60
P 72
R 20

Nurse 2 attached the Levine tube to low suction.

11:35 a.m.

Nurse 1 made these measurements and recorded the data:

BP 100/P
R 80

She added the prescribed fluids to the intravenous infusion and checked the Levine tube suction.

12:50 p.m.

Nurse 2 made these measurements and recorded

These data represent system output information.

The nurse's behavior is categorized as Level I monitoring activity.
the data:

BP  112/70
P   64
R   20

Nurse 1 checked the intravenous infusion and Levine tube suction.

12:55 p.m.

Nurse 3 observed the patient and scanned the recovery room record.

1:20 p.m.

Nurse 3 made these measurements and recorded the data:

BP  104/70
P   64
R   20

She checked the intravenous infusion, Levine tube suction, and called the patient by name repeatedly.
1:32 p.m.

Nurse 3 made these measurements and recorded the data:

BP  100/60
P   68
R   20

1:45 p.m.

Nurse 3 made these measurements and recorded the data:

BP  96/60
P   72
R   20

2:00 p.m.

Nurse J made these measurements and recorded the data:

BP  100/62
P   72
R   20

She checked the intravenous infusion and Levine tube suction. She obtained
extra blankets for the
patient. She attempted to
arouse the patient by calling
her name repeatedly.

2:15 p.m.
   Nurse 1 made these
measurements and recorded
the data:
   BP  100/72
   P    72
   R    20

2:30 p.m.
   Nurse 3 made these
measurements and recorded
the data:
   BP  102/74
   P    72
   R    20

2:45 p.m.
   Nurse 3 made these
measurements and recorded
the data:
   BP  108/80
2:55 p.m.

Nurse 3 made these measurements and recorded the data:

BP 104/64
P 68
R 20

Nurse 1 checked the intravenous infusion and Levine tube suction. She called the patient's name repeatedly. She placed the patient in low semi-Fowler's position. A private duty nurse reported on duty and received a report on the patient's condition from nurse 3.

3:10 p.m.

The private duty nurse made these measurements and
The nurse's behavior is categorized as Level III monitoring activity.

3:15 p.m.

The private duty nurse made these measurements and recorded the data:

BP 116/66
P 72
R 20

She started nasal oxygen. She attempted to arouse the patient by calling her name repeatedly.

3:30 p.m.

The private duty nurse made these measurements and recorded the data:

BP 118/76
P 72
R 20

She checked the intravenous infusion, Levine tube
suction, and nasal oxygen. She attempted to awaken the patient.

3:35 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 116/78
- P 80
- R 20

3:40 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 112/76
- P 80
- R 20

She checked the intravenous infusion, Levine tube suction, and discontinued the nasal oxygen. The patient responded to her name. As a third level monitor, the nurse made the decision to discontinue a regulatory strategy and to return the patient to her room.
3:50 p.m.

The private duty nurse conferred with nurse 1 before returning the patient to her room.

Summary

The state of the patient was ascertained at intervals which varied from five minutes to twenty-five minutes.

Patient state information was acquired by measuring blood pressure, pulse, and respiration. According to patient state information, there was no difference between desired patient condition and actual patient condition.

As a Level III monitor, the nurse changed the patient's position and started nasal oxygen in an effort to hasten the patient's return to consciousness.

Four nurses and one physician were involved in maintaining the patient in a desired state.

Triad Behavior in the Care of Patient P

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:40 p.m.</td>
<td>Patient P was admitted to the recovery room accompanied by three physicians. One gave the following information to</td>
</tr>
</tbody>
</table>
nurse who received the patient:

1. An exploration of the common bile duct and the removal of gall stones had been performed under general anesthesia.

2. The estimated blood loss was 300 cc.

3. The patient has hypertension.

4. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 110-200 mm.

5. The patient has diabetes -- which is controlled by diet only.

6. In addition to the intravenous infusion started in the operating room, the patient was to receive 500 cc of whole blood and 1000 cc of

The physician performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.

This information specifies a regulatory strategy which had been initiated in the operating room.
5 per cent dextrose in water.

7. A T-tube, inserted in the operating room, was to be attached to a straight drain.

8. The Levine tube, which had been inserted in the operating room, was to be attached to low suction.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP  160/90
P   96
R   28

She checked the intravenous infusion and started nasal oxygen. She attached the T-tube to a straight drain.

1:50 p.m.

Nurse 1 attached the Levine tube to low suction.
1:55 p.m.

Nurse 1 made these measurements and recorded the data:

BP  170/90
P   80
R   32

She added 1000 cc of 5 per cent dextrose in water to the intravenous infusion.

1:58 p.m.

Nurse 1 paged physician 2 to start the blood transfusion.

2:00 p.m.

Physician 2 started the blood transfusion assisted by nurse 1.

2:08 p.m.

Nurse 1 checked the nasal oxygen, T-tube drain, Levine tube suction, and the intravenous infusion.
2:20 p.m.
Nurse 1 made these measurements and recorded the data:

BP 156/84
P 80
R 28

She checked the nasal oxygen, T-tube drain, Levine tube suction, and intravenous infusion.

2:30 p.m.
Nurse 1 made these measurements and recorded the data:

BP 196/90
P 76
R 24

The nurse's behavior is categorized as Level I monitoring activity.

2:40 p.m.
Nurse 1 made these measurements and recorded the data:

BP 170/90
P 80
R 24
2:55 p.m.

Nurses 3 and 4 observed
the patient and read her
chart.

3:00 p.m.

Nurse 5 made these
measurements and recorded
the data:

BP  220/90*
P  88
R  18

She checked the intra-
venous infusion, nasal oxygen,
T-tube drain, and Levine tube
suction. She obtained another
blanket for the patient, and
elevated the head of the bed
slightly.

3:15 p.m.

Nurse 6 made these
measurements and recorded
the data:

BP  230/110*

As a Level III monitor,
she took action to return
the patient to the
specified limits of
systolic blood pressure.
Nurse 1 checked the T-tube drain, Levine tube suction, and intravenous fluids. She discontinued the nasal oxygen. The patient began to awaken and respond when nurse 1 called her name. Nurse 5 left the recovery room to locate a physician to report the elevated blood pressure. She discussed the problem with physician 3. The latter did not visit the patient.

3:30 p.m.

Nurse 1 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>210/110*</td>
</tr>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>18</td>
</tr>
</tbody>
</table>

As a Level II monitor, the nurse reported difference information to the physician-regulator. The nurse's behavior is categorized as Level I monitoring activity.
3:45 p.m.

Nurse 4 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>208/90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>76</td>
</tr>
<tr>
<td>R</td>
<td>18</td>
</tr>
</tbody>
</table>

She checked the T-tube drain, Levine tube suction, and intravenous infusion.

4:00 p.m.

Nurse 6 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>196/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>

4:10 p.m.

Nurse 4 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>206/90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>
She checked the T-tube drain, Levine tube suction, and intravenous infusion. As a Level III monitor, the nurse made the decision to return the patient to her room. The patient responded well to her name, and she was returned to her room.

**Summary**

Patient state information was acquired at intervals which varied from two minutes to fifteen minutes.

The patient signal of disequilibrium which initiated nurse-physician response was an elevated systolic blood pressure. Corrective action taken to return the patient to a desired state was to change the patient's position. Because of the patient's history of hypertension, the elevated systolic blood pressure may not have been interpreted as a signal of disequilibrium by nurse and physician. The physician-controller did not change the limits specified for systolic blood pressure as a consequence of patient state information. As regulator, the physician did not prescribe specific regulatory strategies to return the patient to a desired state.

Six nurses and three physicians were involved in the regulation of patient condition.
Triad Behavior in the Care of Patient Q

**Triad Behavior**

12:05 p.m.

Patient Q was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. A left hemipelvectomy had been performed under general anesthesia.
2. The estimated blood loss was 2500 cc.
3. The patient was a mild diabetic.
4. The fluid therapy of 3000 cc of whole blood and 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride which had been started in the operating room was to be continued in the recovery room.

**Interpretation of Behavior**

The physician performed the control function of specifying system performance.

This information specifies a regulatory strategy which had been initiated in the operating room.
5. The lower and upper limits of the systolic blood pressure within which the patient was to be maintained were 100-160 mm.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP  116/70
P    80
R    20

Nurse 2 checked the physicians' order sheet for additional information regarding the care of the patient in the recovery room.

1. Connect Levine tube to low suction.
2. Connect Foley catheter to a straight drain.

Nurse 2 assembled the equipment for Levine tube suction and for catheter...
drainage. She checked the intravenous infusion.

12:15 p.m.

Physician 2 inserted the Levine tube and nurse 2 attached it to low suction. Nurse 1 started nasal oxygen.

12:20 p.m.

Nurse 1 made these measurements and recorded the data:

| BP  | 130/80    | The nurse's behavior is categorized as Level I monitoring activity.
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>80</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

She called his name repeatedly.

12:35 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>150/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>72</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>
Physician 3 visited the patient, observed him, and took his pulse -- he did not record it. Nurse 1 checked the intravenous fluids, catheter drainage, nasal oxygen, and Levine tube suction.

12:40 p.m.

The patient complained of pain. Nurse 1 raised the head of the bed slightly and obtained pillows to position him more comfortably. The patient's profuse diaphoresis was noted by nurse 1.

12:47 p.m.

Nurse 2 made these measurements and recorded the data:

The nurse's behavior is categorized as Level III monitoring activity. She took corrective action on the basis of difference information to reduce the patient's discomfort.

<table>
<thead>
<tr>
<th>BP</th>
<th>170/90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>88</td>
</tr>
<tr>
<td>R</td>
<td>24</td>
</tr>
</tbody>
</table>
12:49 p.m.

Physician 1 visited the patient, observed him, and gave a verbal order for demerol, 10 mgm, and phenergan, 10 mgm, to be given intravenously. This was given by nurse 2.

1:04 p.m.

Nurse 2 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>162/88*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>76</td>
</tr>
<tr>
<td>R</td>
<td>22</td>
</tr>
</tbody>
</table>

1:24 p.m.

Nurse 1 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>164/82*</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>60</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>
1:37 p.m.

The patient complained of severe pain. Nurse 3 made these measurements and recorded the data:

BP  162/82*
P   72
R   32

She checked the nasal oxygen, intravenous infusion, catheter drainage, and Levine tube suction.

1:54 p.m.

Nurse 3 made these measurements and recorded the data:

BP  164/86*
P   74
R   30

2:08 p.m.

Nurse 3 made these measurements and recorded

Although the patient stated that he had pain -- no corrective action was taken.

The nurse's behavior is categorized as Level I monitoring activity.
the data:

BP  162/86
P    76
R    30

2:24 p.m.

Nurse 3 made these measurements and recorded the data:

BP  178/86
P    70
R    36

She discontinued the nasal oxygen.

As a Level III monitor, the nurse terminated a regulatory strategy.

2:35 p.m.

Physician 1 visited the patient. The patient told him of his intense pain. The physician gave a verbal order for numorphan, .3 mgm. This was given intravenously by nurse 3. The blood transfusion was completed at this time.

The patient stated he had pain. The physician-regulator prescribed a regulatory strategy to return the patient to a desired state.
2:45 p.m.

Nurse 4 checked the intravenous infusion, catheter drainage, and Levine tube suction. She, assisted by two orderlies and two nurses, moved the patient up in bed.

2:50 p.m.

Nurse 4 made this measurement and recorded the reading:

BP 188/80

2:55 p.m.

Nurse 4 left the recovery room to locate physician 1 and report the elevated blood pressure. Physician 1 visited the patient, observed him, and left without further communication with nurse 4.

As a Level II monitor, the nurse reported difference information to the physician. There was no further nurse-physician action.
3:00 p.m.

Nurse 3 made this measurement and recorded the reading:

BP 182/90*

She raised the head of the bed slightly. The patient appeared to be in severe pain.

3:08 p.m.

Nurse 3 left the recovery room to locate a physician to whom she could report patient condition. Physician 4 gave a verbal order for numorphan, .2 mgm, intravenously. He ordered the rate of flow of the intravenous infusion to be decreased. Both orders were carried out by nurse 3.

As a Level III monitor, the nurse changed the patient's position in the attempt to bring the systolic blood pressure to the desired range.

As a Level II monitor, the nurse reported difference information to the physician-regulator who prescribed corrective action.
3:18 p.m.

Nurse 1 made these measurements and recorded the data:

BP  182/88*
P  68
R  28

She added 1000 cc of 5 per cent dextrose in water to the intravenous infusion.

3:30 p.m.

Nurse 1 made these measurements and recorded the data:

BP  182/86*
P  72
R  22

3:35 p.m.

Nurse 3 made this measurement and recorded the reading:

BP  180/P*
3:40 p.m.

Nurse 4 made this measurement and recorded the data:

BP 176/90*

3:50 p.m.

Nurse 2 made these measurements and recorded the data:

BP 192/96*
P 70
R 28

She checked the intravenous infusion, catheter drainage, and Levine tube suction. The patient complained of severe pain.

4:00 p.m.

Nurse 1 observed the patient and read his chart.

4:08 p.m.

Nurse 2 made these measurements and recorded

Although the patient stated that he had severe pain, no corrective action was taken.
the data:

BP  180/92*

P   84

R   24

She reported the patient's pain and elevated blood pressure to physician 5. He gave a verbal order for a medication, but it was not given. Nurses 1 and 2 decided to send the patient to his room. Nurse 2 located physician 4 who gave a verbal order for the patient to be returned to his room.

As a Level II monitor, the nurse reported difference information (pain and elevated systolic blood pressure) to the physician-regulator. She did not carry out his directive. She sought the authority of another physician to return the patient to his room "where he will be more comfortable."

**Summary**

Patient state information was acquired at intervals which varied from two minutes to sixteen minutes.

Patient signals of disequilibrium which initiated nurse-physician response were pain and an elevated systolic blood pressure.
Regulatory strategies utilized to regulate patient condition were to (1) change the patient's position, (2) administer medications, and (3) decrease the rate of flow of the intravenous infusion.

The patient was returned to his room while still in an unstable state, because, in the nurse's judgment, he could be made more comfortable there.

Four nurses and five physicians were involved in the care of the patient.

**Triad Behavior in the Care of Patient R**

<table>
<thead>
<tr>
<th><strong>Triad Behavior</strong></th>
<th><strong>Interpretation of Behavior</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient R was admitted to the recovery room accompanied by one physician. He gave the following information to nurse 1 who received the patient:

1. A right radical neck dissection had been performed under general anesthesia.
2. The estimated blood loss was 600 cc.
3. The lower and upper limits of systolic blood pressure.

The physician performed the control activity of specifying system performance.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.
pressure within which the patient was to be maintained were 110-200 mm.

4. A neo drip was to be started and the physician notified if the blood pressure reached 110 or dropped below 110.

5. A tracheostomy tube was in place.

6. The intravenous infusion of 1000 cc of 5 per cent dextrose in water with 0.2 sodium chloride started in the operating room was to be continued in the recovery room.

Nurse 1 reported the following information to physician 1 and recorded the data:

BP 122/70  
P 108  
R 26

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information
She checked the intravenous infusion and started oxygen via the tracheostomy tube.

12:35 p.m.

Physician 2 visited the patient and elevated the head of the bed. He checked the oxygen catheter, intravenous infusion, and observed the patient. The physician's behavior is categorized as comparator-regulator activity.

12:40 p.m.

Nurse 2 made these measurements and recorded the data:

- BP 120/70
- P 100
- R 26

Physicians 3 and 4 visited the patient, observed him, and checked the recovery room record. The nurse's behavior is categorized as Level I monitoring activity.
12:43 p.m.

Nurse 2 made these measurements and recorded the data:

BP 120/P
P 104
R 28

12:54 p.m.

Nurse 1 made these measurements and recorded the data:

BP 122/72
P 96
R 24

She checked the tracheostomy tube, the oxygen catheter, and the intravenous infusion.

1:08 p.m.

Nurse 1 made these measurements and recorded the data:

BP 146/92
P 96
R 24
Physician 5 visited the patient and observed him. The patient began to cough and nurse 1 suctioned his airway via the tracheostomy tube. The nurse's behavior is categorized as Level III monitoring activity.

1:23 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 130/94
- P 98
- R 24

The patient responded to his name. Nurse 1 suctioned the patient. Nurse 2 obtained extra pillows to position him in a semi-upright position.

1:45 p.m.

Nurse 1 suctioned the patient's airway via the tracheostomy tube.
1:50 p.m.

Nurse 1 made these measurements and recorded the data:

BP 118/90
P 104
R 26

She checked the oxygen catheter and the intravenous infusion.

2:15 p.m.

Nurse 3 made these measurements and recorded the data:

BP 120/86
P 112
R 26

2:32 p.m.

Nurse 3 made these measurements and recorded the data:

BP 136/88
P 112
R 20

The nurse's behavior is categorized as Level I monitoring activity.
The patient responded when his name was called by nurse 3.

2:40 p.m.

Nurse 2 made these measurements and recorded the data:

- BP 132/80
- P 104
- R 22

She discontinued the oxygen and checked the intravenous infusion.

3:00 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 132/84
- P 92
- R 30

She suctioned the patient's airway via the tracheostomy tube. The
patient appeared to be fully awake.

3:12 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 128/82
- P 100
- R 30

3:22 p.m.

Nurse 3 made these measurements and recorded the data:

- BP 134/80
- P 96
- R 30

She suctioned the patient's airway via the tracheostomy tube and checked the intravenous infusion.

3:40 p.m.

Nurse 2 suctioned the patient's airway via the
tracheostomy tube and returned the patient to his room.

As a Level III monitor, the nurse made the decision to return the patient to his room.

Summary

Patient state information was acquired at intervals which varied from three minutes to twenty-two minutes.

The patient signal of disequilibrium which initiated nurse-physician action was an occluded airway. Regulatory strategies utilized to return the patient to a desired state were the administration of oxygen and aspiration of the patient's airway.

Three nurses and five physicians were involved in the care of the patient.

Triad Behavior in the Care of Patient S

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

Patient S was admitted to the recovery room accompanied by four physicians. One gave the following information to nurse 1 who received the patient:

1. The excision of an
abdominal aneurysm and the insertion of a graft had been performed under general anesthesia.

2. The estimated blood loss was 5200 cc.

3. The 6000 cc of whole blood, which had been started in the operating room, was to be continued until completed in the recovery room. The intravenous infusion of 1500 cc of 5 per cent dextrose in water with 0.2 sodium chloride, which had been started in the operating room, was to be continued in the recovery room.

4. The Levine tube was to be attached to low suction.

5. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 105-190 mm.

This information specifies a regulatory strategy which had been initiated in the operating room.

This information characterizes system input information. Limits were specified for one variable: systolic blood pressure.
Nurse 1 reported the following information to physician 1 and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>180/106</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>88</td>
</tr>
<tr>
<td>R</td>
<td>38</td>
</tr>
</tbody>
</table>

These data represent system output information.

Nurse 2 aspirated the patient's airway. She started nasal oxygen. She checked the physicians' order sheet for additional information:

1. Attach the gastrostomy tube to low Wangensteen suction.
2. Attach the Foley catheter to a straight drain.
3. Record the urinary output every hour and measure the specific gravity.
4. Apply an abdominal binder.
5. Record the femoral pulses and temperature of both feet every hour.
12:35 p.m.

Nurse 1 attached the Foley catheter to a straight drain and connected the gastrostomy tube to low suction. She recorded a urinary output of 130 cc, with a specific gravity of 1.022. Physicians 1 and 2 visited the patient, observed him, and tried to obtain a femoral pulse.

12:40 p.m.

Nurse 2 made these measurements and recorded the data:

BP 160/100
T 95.2

Physician 3 visited the patient, observed him, and ordered numorphan, 0.3 mgm, to be given intravenously. On the basis of difference information, acquired by the physician, regulatory action was taken to return the patient to a desired state.

This was given by nurse 1.
12:42 p.m.

Nurse 1 made these measurements and recorded the data:

BP  182/100
P   84
R   36

She checked the intravenous infusion, nasal oxygen, Levine tube suction, and gastrostomy tube suction.

12:50 p.m.

Nurse 1 made these measurements and recorded the data:

BP  188/100
P   84
R   36

The nurse’s behavior is categorized as Level I monitoring activity.

1:00 p.m.

Nurse 1 made these measurements and recorded the data:

BP  180/108
P   104
R   40
1:05 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 184/110
- P 100
- R 36

She applied an abdominal binder to the patient. She checked the intravenous infusion, Levine tube suction, and gastrostomy tube suction.

Nurse 3 observed the patient and scanned his chart.

1:15 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 184/110
- P 112
- R 38

The patient's restlessness increased.
1:25 p.m.

Physician 4 visited the patient, observed him, and ordered numorphan, 0.1 mgm, intravenously. This was given by nurse 1.

1:30 p.m.

Nurse 1 recorded that the patient's legs and feet were warm, of good color, and that pulses could be felt in each.

1:33 p.m.

Nurse 3, at the request of nurse 1, recorded that the patient's pupils appeared equal, but that they did not appear to react to light.

Nurse 3 made these measurements and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>178/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>108</td>
</tr>
<tr>
<td>R</td>
<td>40</td>
</tr>
</tbody>
</table>
She recorded that the patient's face and neck appeared to be of a "dusky color." She also recorded that the patient's respirations seemed to be more dyspneic and that they sounded moist.

1:35 p.m.

Nurse 1 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>178/104</td>
</tr>
<tr>
<td>P</td>
<td>118</td>
</tr>
<tr>
<td>R</td>
<td>40</td>
</tr>
</tbody>
</table>

The patient stated that everything looked black to him.

1:40 p.m.

Nurse 2 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>182/120</td>
</tr>
<tr>
<td>P</td>
<td>128</td>
</tr>
</tbody>
</table>
She recorded that the patient was extremely dyspneic and "gasping for breath." She recorded also that the urinary output was 15 cc and that the urine was grossly bloody. The specific gravity, therefore, could not be measured.

1:45 p.m.

Nurse 3 left the recovery room to locate physician 1. She returned with physician 5 and they observed the patient.

1:50 p.m.

Nurse 2 made these measurements and recorded the data:

BP 180/110
P 120

Physician 1 gave bag and mask breathing assistance to the patient. Physician 6 observed the patient and assisted physician 1.

The nurse's behavior is categorized as Level I monitoring activity. The nurse's behavior is categorized as Level II monitoring activity.

The physician, as comparator-regulator, takes corrective action to return the patient to a desired state.
1:55 p.m.

Nurse 2 made these measurements and recorded the data:

BP  182/114
P    112
R    32

She recorded that the patient's color was improving with continued bag and mask breathing assistance.

1:58 p.m.

Nurse 2 recorded the patient's respiratory rate:

R    41

She checked the intravenous infusion, Levine tube suction, and gastrostomy tube suction.

2:00 p.m.

Physician 4 visited the patient, observed him, and ordered numorphan, 0.1 mgm, intravenously. This was
given by nurse 2. She made these measurements and recorded the data:

- BP 176/118
- P 128
- R 32

Physician 1 attempted to discontinue the bag and mask breathing device, but the patient could not breathe independently; therefore, the procedure was resumed.

2:05 p.m.

Nurse 1 made these measurements and recorded the data:

- BP 184/116
- P 128

Physician 6 visited the patient, observed him, and removed the abdominal binder.

The nurse's behavior is categorized as Level I monitoring activity.

The physician, as comparator-regulator, removed the abdominal binder in order to help the patient breathe more easily.
2:10 p.m.

Physician 1 continued to use the bag and mask breathing device. He ordered tensilon, 5.0 mgm, intravenously. This was given by nurse 1. Physician 2 visited the patient, observed him, and suggested a small towel rolled under the patient's neck to extend his neck and head. This was done by nurse 1.

2:15 p.m.

Nurse 3 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>176/106</td>
</tr>
<tr>
<td>P</td>
<td>120</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

Physician 1 discontinued the bag and mask breathing assistance to the patient.
2:20 p.m.

Nurse 3 made these measurements and recorded the data:

BP  170/110
P   120
R   40

After observing that the patient was shivering and seemed cold, physician 1 requested that the patient be "warmed." Nurse 3 obtained additional blankets and covered the patient.

2:25 p.m.

Physician 1 resumed the bag and mask breathing assistance because of the patient's extreme dyspnea, cyanosis, and apprehension. He urged the patient to breathe deeply along with the manual manipulation of the bag and mask.
2:27 p.m.

Nurse 3 made these measurements and recorded the data:

BP 170/108
P 115
R 32

Physician 1 ordered tensilon, 5 mgm, to be given slowly intravenously. This was given by nurse 3.

2:30 p.m.

Physician 1 discontinued the bag and mask breathing assistance to the patient. Nurse 3 recorded the patient's pulse rate:

P 102

She recorded a urinary output of 7 cc, and because it was grossly bloody, the specific gravity was not measured.
2:30 p.m.

Physician 6 visited the patient, observed him, and ordered atropine, 0.1 mgm, to be given intravenously. Nurse 3 checked the patient's intravenous infusion, nasal oxygen, Levine tube suction, and gastrostomy tube suction. She checked the temperature and pulses in both feet, and recorded that his feet were "warm, of good color, and with pulses." She recorded, too, that the patient was complaining of sharp pains in his legs and chest.

2:38 p.m.

Physician 6 visited the patient, observed him, and requested that he receive tensilon, 5 mgm, intravenously. This was given by nurse 3.

The nurse's behavior is categorized as Level I monitoring activity.

The physician, as comparator-regulator, ascertained the state of the patient, and prescribed corrective action.
2:40 p.m.

Nurse 4 made these measurements and recorded the data:

BP  176/110
P   136
R   44

2:48 p.m.

Nurse 4 made these measurements and recorded the data:

BP  170/108
P   124
R   40

She recorded that the patient was very dyspneic. Nurse 4 left the recovery room to locate physician 1 to report the patient's respiratory difficulty.

2:55 p.m.

Physician 1 resumed bag and mask breathing assistance to the patient. Nurse 4 made

The nurse's behavior is categorized as Level I monitoring activity.

As a Level II monitor, the nurse reported difference information to the physician-regulator.
these measurements and recorded the data:

BP 174/110
P 120

2:58 p.m.

Physician 3 visited the patient, observed him, and ordered atropine, 0.2 mgm, and prostigmine, 0.5 mgm, intravenously. This was given by nurse 4.

The medications that the patient has been receiving are categorized as regulatory strategies utilized to return the patient to a desired state with respect to his respiratory difficulties.

3:04 p.m.

Physician 3 ordered prostigmine, 0.5 mgm, intravenously. This was given by nurse 4. A private duty nurse came on duty and received a report of the patient from nurse 4.
3:10 p.m.

Physician 1 removed the bag and mask breathing device. The private duty nurse made these measurements and recorded the data:

BP  182/110
P  112

She checked the intravenous infusion, Levine tube suction, gastrostomy tube suction, and nasal oxygen. She spoke to the patient in a low voice all the while she proceeded with her work. He appeared to be reassured by her presence and attention.

3:15 p.m.

The private duty nurse made these measurements and recorded the data:

BP  160/118
P  100
R  46
She recorded that the patient's respirations were becoming increasingly shallow.

3:30 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 160/104
- P 96
- R 32

The nurse's behavior is categorized as Level I monitoring activity.

The patient became very restless and apprehensive.

3:35 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 160/92
- P 118
- R 24

She checked the gastrostomy tube suction, Levine tube suction, nasal oxygen, and intravenous infusion. She recorded
that the patient "moves all extremities with force and agitation."

3:40 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 160/110
- P 120
- R 54

She recorded a urinary output of 8 cc of grossly bloody urine. The specific gravity was not measured. She recorded that the patient's skin was cool and dry to touch.

3:45 p.m.

The private duty nurse made these measurements and recorded the data:

- BP 170/110
- P 104
- R 44
She slowed the intravenous infusion down to 4 drops per minute.

3:50 p.m.

The private duty nurse made these measurements and recorded the data:

- BP: 158/118
- P: 120
- R: 32

She recorded that the patient was having involuntary jerking movements with increasing frequency, and that his respirations were "more abdominal."

4:00 p.m.

Physician 1 visited the patient, observed him, and resumed bag and mask breathing assistance. The nurse's behavior is categorized as Level I monitoring activity.

The physician ascertained the actual state of the patient and, as a consequence, took corrective action.
4:11 p.m.

The private duty nurse made these measurements and recorded the data:

- BP: 170/110
- P: 120
- R: 36

Physician 1 ordered tensilon, 5 mgm, to be given intravenously. This was given by the private duty nurse.

4:20 p.m.

Physicians 2 and 3 visited the patient and observed him. The private duty nurse made these measurements and recorded the data:

- BP: 158/102
- P: 120

She recorded that the patient's lips were dusky.

Physician 4 visited the
patient, and after discussing the problem with the other physicians, obtained and started the Bird respirator to provide breathing assistance to the patient.

4:25 p.m.

The private duty nurse made these measurements and recorded the data:

BP 140/102
P 128

The Bird respirator was removed by the physicians in order to check its functioning. Physician 1 resumed bag and mask breathing assistance to the patient.

4:30 p.m.

The private duty nurse made this measurement and recorded the data:

BP 148/110
Physician 4 visited the patient, observed him, and ordered tensilon, 5 mgm, and atropine, 0.2 mgm, intravenously. This was given by the private duty nurse.

The patient remained in the recovery room because of his inability to breathe without a mechanical breathing device.

Summary

The state of the patient was determined at intervals which varied from two minutes to fifteen minutes.

Patient signals of disequilibrium which initiated nurse-physician action were an occluded airway and decreased urinary output. It is noted that throughout the observation period the patient's pulse and respiratory rates were rapid. While no upper and lower limits were specified for these variables, their measurement was recorded and, therefore, available to the physician comparator-regulator as he observed the patient and scanned the recovery room record to detect trends and changes in patient condition.

Regulatory strategies selected to return the patient to a desired state were (1) medications, (2) change in position, (3) oxygen therapy, and (4) mechanical breathing devices.
At the end of four hours, patient condition had not been regulated. Due to his critical state (unable to breathe without mechanical aid), he remained in the recovery room.

Five nurses and six physicians were involved in the care of the patient.

**Triad Behavior in the Care of Patient T**

<table>
<thead>
<tr>
<th>Triad Behavior</th>
<th>Interpretation of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11:05 a.m.</strong></td>
<td></td>
</tr>
</tbody>
</table>

Patient T was admitted to the recovery room accompanied by two physicians. One gave the following information to nurse 1 who received the patient:

1. A nephrectomy and cholecystectomy had been performed under general anesthesia.

2. An oral airway was in place.

3. The estimated blood loss was 700 cc.

This information characterizes system input.
4. The patient has a left-side paralysis due to a previous cardiovascular accident.

5. The lower and upper limits of systolic blood pressure within which the patient was to be maintained were 100-180 mm.

6. The intravenous infusion of 1500 cc of 5 per cent dextrose in water with 0.2 sodium chloride started in the operating room was to be continued in the recovery room.

Nurse 1 reported the following information to physician 1 and recorded the data:

<table>
<thead>
<tr>
<th>BP</th>
<th>142/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>32</td>
</tr>
</tbody>
</table>

This information specifies a regulatory strategy which had been initiated in the operating room.

These data represent system output information.
She started nasal oxygen and checked the intravenous infusion.

11:12 a.m.

Physician 2 visited the patient, observed him, and checked his chart. He placed the patient in low Fowler's position.

11:25 a.m.

Nurse 2 made these measurements and recorded the data:

BP  142/80
P   112
R   32

She reinserted an oral airway after the patient removed the one which had been inserted in the operating room.
11:35 a.m.

She checked the patient's oral airway and the intravenous infusion.

11:40 a.m.

Nurse 3 made these measurements and recorded the data:

- BP 148/80
- P 100
- R 32

The patient began to awaken and he attempted to remove the oral airway. Nurse 3 called the patient by name repeatedly.

11:45 a.m.

Physician 3 visited the patient, observed him, and reassured him that he was "all right."

11:55 a.m.

Nurse 4 made these measurements and recorded
the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>178/80</td>
</tr>
<tr>
<td>P</td>
<td>120</td>
</tr>
<tr>
<td>R</td>
<td>32</td>
</tr>
</tbody>
</table>

The patient became restless. He did not respond to his name.

12:00 p.m.

Nurse 1 asked nurse 3 to find a physician and obtain an order for a medication to relieve the patient's discomfort.

12:05 p.m.

Nurse 3 was unable to locate a physician in the area, so the office of the department of anesthesia was called.

12:15 p.m.

Nurse 3 made these measurements and recorded...
the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>150/70</td>
</tr>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

Physician 4 answered the telephone request and gave a verbal order for numorphan, 0.3 mgm, intravenously. This was given by nurse 3.

12:25 p.m.

Physician 4 visited the patient, observed him, and checked his recovery room record. He ordered numorphan, 0.3 mgm, intravenously. This was given by nurse 1.

12:40 p.m.

Nurse 3 made these measurements and recorded the data:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>130/70</td>
</tr>
<tr>
<td>P</td>
<td>100</td>
</tr>
<tr>
<td>R</td>
<td>28</td>
</tr>
</tbody>
</table>

The physician, as comparator-regulator, ascertained the state of the patient and prescribed corrective action.

The nurse's behavior is categorized as Level I monitoring activity.
She called the patient by name repeatedly. She checked the intravenous infusion and the nasal oxygen.

12:53 p.m.

Nurse 3 made these measurements and recorded the data:

BP  126/70  
P  96
R  26

1:12 p.m.

Nurse 4 made these measurements and recorded the data:

BP  134/86  
P  112
R  24

The patient became restless and combative. He responded when his name was called by nurse 4.
1:25 p.m.

Nurse 4 made these measurements and recorded the data:

BP  170/90
P   96
R   24

She noted that the intravenous infusion had infiltrated. She attempted to restart the infusion. This appeared to contribute to the patient's restlessness.

1:55 p.m.

Nurse 3 made these measurements and recorded the data:

BP  140/90
P   116
R   24

She continued to try and start the infiltrated intravenous infusion -- without success. The patient's restlessness increased and he
complained of pain. He removed the oral airway and the nasal oxygen catheter. He appeared to respond well when his name was called.

2:15 p.m.

Nurse 3 left the recovery room to locate a physician to start the patient's intravenous infusion. Physician 5 returned with her and restarted the infusion.

2:17 p.m.

Physician 5 gave a verbal order for demerol, 10 mgm, intravenously. This was given by nurse 3. She raised the head of the bed and positioned the patient with pillows.

2:30 p.m.

Nurse 3 made these measurements and recorded
the data:

BP  140/92
P   100
R   24

Physician 5 visited the patient, observed him, and gave a verbal order for demerol, 10 mgm, to be given intravenously. This was given by nurse 3.

2:50 p.m.

Nurse 3 made these measurements and recorded the data:

BP  142/90
P   96
R   24

She checked the intravenous infusion and returned the patient to his room.

The physician, as comparator-regulator, ascertained the state of the patient and prescribed corrective action.

As a Level III monitor, the nurse made the decision to return the patient to his room.
Summary

Patient state information was acquired at intervals which varied from two minutes to thirty minutes.

The patient signal of disequilibrium which initiated nurse-physician corrective action was pain. Regulatory strategies used to return the patient to a desired state were medications and change in position.

Four nurses and five physicians participated in the care of the patient.
CHAPTER V
DISCUSSION OF THE STUDY RESULTS

The data resulting from the observations of nurse-patient-physician behavior will be discussed in the first part of this chapter according to the various components of the triad model. The sections which follow, therefore, deal with (1) system input information, (2) system output information -- the patient vector changing in value over time, (3) monitoring activity, (4) control, comparator, and regulatory activity, and (5) regulatory strategies utilized in the regulation of patient condition.

Implications of the study for (1) nursing research, education, and practice, (2) the design and operation of patient care facilities, and (3) the application of homeostatic models to behavior in other settings are discussed in the second part of this chapter.

Results of the Study

As a preface to a detailed discussion of the study results, the following general summary is made.

Each patient was admitted to the recovery room accompanied by physicians or by a nurse-anesthetist who had
cared for the patient during the operative period. The initial activity upon the arrival of a patient in the recovery room was an exchange of patient state information between physician and nurse.

When the physician left the patient, the nurse assumed responsibility for his care. The nurse's activity in carrying out this responsibility was focused on (1) detecting patient signals which revealed the state of the patient, (2) recording and reporting patient state information, and (3) the ministration of regulatory strategies prescribed by the physician and those which she initiated and modified, within her range of authority, as a consequence of patient behavior.

The physician's activity consisted of (1) specifying system input information, (2) obtaining patient state information, either by direct observation or via the nurse, and (2) initiating regulatory action based on the characteristics of patient state information.

When the regulation of patient condition was such that the patient had awakened from the anesthesia and stability of essential variables had occurred, the patient was returned to his room. If the patient's condition did not meet these requirements, he remained in the recovery room for further observation and care.
Upon examining the data, it was found that in the regulation of patient condition nurse-patient-physician behavior was characterized by regularity and repetitiveness. Such behavior will be illustrated in the following sections.

**System Input Information**

Upon admission to the recovery room, as it was observed in each of the twenty situations, system input information was transmitted to the nurse. Four types of system input information were noted: (1) information about the operative procedure, (2) special care that was required, (3) regulatory strategies initiated in the operating room to be continued in the recovery room, and (4) specification of desired patient behavior.

Information about the operative procedure included the name of the operation that was performed and the estimated blood loss that resulted. Information that special care of the patient might be required included, for example, such explicit statements as these: (1) the patient has hypertension, (2) the patient is four months pregnant, (3) the patient is sensitive to drugs, and (4) the patient has a left side paralysis.

The third component of system input information dealt with such regulatory strategies instigated in the
operating room as (1) intravenous fluid therapy, (2) chest suction and drainage, (3) Levine tube suction and drainage, (4) urinary catheter drainage. These procedures were to be continued in the recovery room in order to regulate patient condition.

The fourth component of system input information, the specification of desired patient behavior, was characterized by the explicit specification of lower and upper limits for one variable: systolic blood pressure. Two variables for which there was an implicit specification of limits were: respiratory airway and pain. It was inferred that there were no upper and lower limits specified for the maintenance of an open airway because it is known that the human organism cannot long survive if there is an obstruction of the airway. This variable, therefore, is considered either open or closed, and if the latter state occurs, action must be taken to remove the occlusion.

The implicit specification for the comfort of the patient may be explained in a like manner. In our culture, human suffering is to be alleviated if at all possible. It is part of the education of nurses and physicians, therefore, to recognize patient discomfort and make the decision when and how to take action to reduce it. The lower and upper limits of systolic blood
pressure as they were specified for each of the twenty patients is found in Table 3.

**System Output Information**

System output information consisted of data acquired by the observation and measurement of the actual state of the patient.

In all twenty observations of triad behavior, blood pressure, pulse, and respiration were measured. The patient's temperature was measured infrequently in two situations.

It was observed that there were seven patients whose output information revealed that the limits specified for systolic blood pressure had been exceeded. It was not observed that the measurements of temperature, pulse rate, and respiration rate initiated nurse-physician action.

Fifteen of the twenty patients manifested pain, and, therefore, pain was a component of system output information. Eight of the twenty patients experienced some degree of respiratory difficulty due to an occluded airway. One patient in the study remained within the specified limits of desired patient condition at all times.

On the basis of the foregoing observations, the writer selected three variables as essential in preserving
<table>
<thead>
<tr>
<th>Patient</th>
<th>Systolic Blood Pressure (Lower and Upper Limits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100-160</td>
</tr>
<tr>
<td>B</td>
<td>100-140</td>
</tr>
<tr>
<td>C</td>
<td>90-150</td>
</tr>
<tr>
<td>D</td>
<td>90-160</td>
</tr>
<tr>
<td>E</td>
<td>90-150</td>
</tr>
<tr>
<td>F</td>
<td>100-150</td>
</tr>
<tr>
<td>G</td>
<td>100-160</td>
</tr>
<tr>
<td>H</td>
<td>90-150</td>
</tr>
<tr>
<td>I</td>
<td>100-190</td>
</tr>
<tr>
<td>J</td>
<td>90-170</td>
</tr>
<tr>
<td>K</td>
<td>108-160</td>
</tr>
<tr>
<td>L</td>
<td>100-150</td>
</tr>
<tr>
<td>M</td>
<td>100-160</td>
</tr>
<tr>
<td>N</td>
<td>100-150</td>
</tr>
<tr>
<td>O</td>
<td>90-160</td>
</tr>
<tr>
<td>P</td>
<td>110-200</td>
</tr>
<tr>
<td>Q</td>
<td>100-160</td>
</tr>
<tr>
<td>R</td>
<td>110-200</td>
</tr>
<tr>
<td>S</td>
<td>105-190</td>
</tr>
<tr>
<td>T</td>
<td>100-180</td>
</tr>
</tbody>
</table>
the homeostasis of the patient. Pain, systolic blood pressure, and an occluded airway were the three essential variables which initiated nurse-physician action in the regulation of patient condition. These essential variables were combined to form a three-dimensional vector. A vector is a compound entity which gives the position of a system at any moment in time (Ashby, 1958, p. 31). In other words, to specify the whole state or condition of the patient at any point in time, it is necessary to know the state of each of the parts.

The data in Table 4 illustrate the patient vector (Patient A) as it changed in value over one hour's time. It will be recalled that system input information relevant to the three variables was (1) to maintain the systolic blood pressure within the limits of 100-160, (2) to maintain an open airway, and (3) to keep the patient comfortable.

It can be seen in Table 4 that in two of the eight readings, the patient's blood pressure exceeded the upper limit that had been set. Two of the readings were precisely at the specified limit (160). His airway was occluded at one point in time, and he was in pain at one point in time. In ascertaining his state or condition at 5:50 p.m., for example, one would examine the protocol for information about these states. If the latter two
### TABLE 4

**PATIENT VECTOR CHANGING IN VALUE OVER TIME**

<table>
<thead>
<tr>
<th>Time</th>
<th>Blood Pressure</th>
<th>Airway</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:30 p.m.</td>
<td>150/86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:45 p.m.</td>
<td>144/88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:50 p.m.</td>
<td>132/70</td>
<td></td>
<td>Occluded</td>
</tr>
<tr>
<td>5:56 p.m.</td>
<td>154/90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:10 p.m.</td>
<td>160/100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:14 p.m.</td>
<td>166/100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:20 p.m.</td>
<td>168/70</td>
<td></td>
<td>Pain</td>
</tr>
<tr>
<td>6:25 p.m.</td>
<td>160/80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aExceeded specified limits.*
states did not obtain, i.e., if the patient was not in respiratory difficulty or in pain, it was unlikely that a notation would be found in the protocol.

It is the change in the value of the vector in excess of the limits prescribed by the controller as being the desired patient state which initiates regulatory action. In the illustration just given, the desired patient state was achieved by (1) removing the respiratory obstruction by aspirating the airway, (2) changing the patient's position, and (3) administering a medication for pain.

The sampling plan for detecting patient states was not specified directly by the physician. In the recovery room, the unwritten sampling plan for observing the patient and making the required measurements was that these procedures be carried out every fifteen minutes unless the patient was in a state of disequilibrium. The data show sampling of patient states ranging from intervals of one minute to thirty minutes.

**Monitoring Activity**

In examining the data for regularities and repetitiveness in monitoring activity, the writer observed that there was a sameness of response in the nurse's behavior. In each of the twenty observations of triad behavior, the three levels of monitoring could be discerned.
As a Level I monitor, the nurse acquired and recorded patient output information and transmitted it only if the physician, as comparator, asked for it. At the second level of monitoring, the nurse performed the Level I function, and, in addition, compared input information with output information. If there was a difference between these two, she transmitted this information to the physician-regulator. As a Level III monitor, the nurse performed the functions of the first two levels, and, on the basis of her findings as comparator, made the appropriate adjustment within the range of her authority to reduce the difference between the two. The nurse is restricted in her activity of selecting and initiating regulatory strategies -- this is the meaning of the phrase "range of authority" as used by the writer. From the study it was found that in the recovery room, the nurse at the third level of monitoring could initiate, adapt, and/or terminate seven regulatory strategies without a physician's order:

1. Change position of the patient
2. Start oxygen therapy
3. Discontinue oxygen therapy
4. Insert oral airway
5. Aspirate any type of airway
6. Discontinue artificial airway
7. Give emotional support to the patient

In addition to measuring the variables which were designated as essential in the regulation of patient
condition, the data show that there were occasions when the nurse recorded or stated that in observing the patient she had detected other signals which revealed patient condition -- for example, appearance of the skin, restlessness, and bleeding from the operative site. It was inferred by the writer that such patient state information supplemented that which was obtained from the three essential variables.

While engaged in monitoring activities, the nurse was observed carrying out various supportive and preventive components of patient care which are part of her nursing skills -- for example, (1) checking intravenous infusions, (2) checking suction-drainage apparatus such as catheters, tubes, and drains, and (3) protecting the patient from injury when he was restless or combative.

Control, Comparator, and Regulatory Activity

The control activity of the physician was characterized by his specification of system input information to nursing personnel. Although this function was assumed by the nurse-anesthetist on three occasions, it was performed under the direct supervision of the physician.

The physician functioned frequently as a comparator in seventeen observations of triad behavior. It was inferred that this behavior was a consequence of Level I monitoring activity, inasmuch as the physician apparently
could not be totally dependent on the nurse to transmit essential patient state information to him. The data show that he sometimes left the patient and nurse without either transmitting patient state information or prescribing corrective action. On other occasions, he proceeded as physician-regulator to specify directives for corrective action in the regulation of patient condition.

In addition to functioning as a regulator, as a consequence of his own intervention, the physician performed this function in response to the nurse's Level II and Level III monitoring activity. The activity of the physician-regulator, regardless of the manner in which he assumed the function, was classified in the protocol by observing the range of regulatory strategies which he utilized in response to patient signals of disequilibrium:

1. Administration of oxygen therapy
2. Administration of blood
3. Adjustment in rate of flow of intravenous infusions
4. Change in position of the patient
5. Medication
6. Insertion of artificial airway
7. Aspiration of airway
8. Use of mechanical breathing devices
9. Levine tube aspiration of stomach
10. Catheterization
11. Surgical intervention (returning the patient to the operating room)
12. Emotional support of the patient

The number of nurses who were engaged in monitoring activity was observed. Since there was no pattern of
assignment of patient to nurse, the number of nurses caring for a patient varied from two to seven.

Multiple medical personnel also were involved in the regulation of patient condition. For example, the data show that the physician summoned by a nurse and to whom she reported patient state information was not necessarily the one who had cared for the patient in the operating room, and who, as controller, had specified system input information.

**Regulatory Strategies as a Consequence of Blood Pressure Disequilibrium**

The regulatory activities of physician and nurse following a disturbance resulting in a change in systolic blood pressure which exceeded the upper limits that had been specified were:

1. Change in position of the patient
2. Oxygen therapy
3. Levine tube aspiration of the stomach
4. Decrease rate of flow of intravenous infusion

Three of the five patients who experienced this disequilibrium were re-established within the desired limits. Two patients were returned to their rooms still unstabilized. It was observed in one instance that the reason given for this decision was that the patient was hypertensive and was stabilized. In other words, the specified limits for the systolic blood pressure might have
been changed on the basis of output information. No such change in specification of limits occurred. In the second instance, the decision to send the patient to the unit before his blood pressure had stabilized was made because the patient was having a great deal of pain and was very restless. It was observed that the nurse based her decision on the fact that if the patient received a medication for pain, he would have to remain in the recovery room under observation for another half hour. She thought he would be more comfortable in his own room.

The regulatory strategies utilized by nurse and physician as a result of the patient exceeding the lower limits of the specified systolic blood pressure were:

1. Change in position of the patient
2. Medication
3. Oxygen therapy
4. Blood therapy
5. Increase rate of flow of intravenous infusion

The two patients who manifested disequilibrium of this variable were re-established within the specified limits.

**Regulatory Strategies as a Consequence of Occlusion of Airway**

The regulatory activity, performed by physician or nurse, following occlusion of the patient's airway with subsequent respiratory distress, was to take immediate
corrective action by utilizing one or a combination of the following means:

1. Change in position of the patient
2. Medication
3. Insertion of an artificial airway
4. Aspiration of the airway
5. Oxygen therapy
6. Levine tube aspiration of the stomach
7. Mechanical breathing devices

The consequence of regulatory activity was the re-establishment of an open airway for seven of the eight patients who had respiratory difficulty following the disturbance of this essential variable. One patient remained in the recovery room at the end of four hours (Patient S) because he was unable to breathe independently of mechanical devices.

Regulatory Strategies as a Consequence of Pain

In the recovery room, the writer noted that the patient signal of pain was detected by the nurse's observation of his (1) restlessness, (2) inarticulate expression of discomfort, and (3) stated expression of pain. For fourteen of the fifteen patients whose behavior signified pain, the nurse, as comparator, reported error information to the physician. As regulator, he prescribed medications to reduce the difference between desired patient state (comfort) and actual patient state (pain). As comparator, the physician acquired error information and
prescribed corrective action. The nurse gave the medications according to the prescribed route of administration.

Four patients were returned to their rooms while still in a state of disequilibrium with respect to pain. One patient (Patient C) appeared to be having pain during the recovery room period, according to the response of the nurse, but no further action was taken.

Along with medications, a change in the patient's position was made in seven of the fifteen patients who manifested pain. This included (1) turning the patient, (2) using blankets or pillows to support a part of the body, and (3) adjusting the bed to raise or lower a part of the body. In the care of one patient (Patient B), action was taken to relieve the patient's pain by catheterization -- draining the urinary bladder.

A summary of the frequency of occurrence of regulatory strategies versus patient signals of disequilibrium is given in Figure 4.

**Summary of the Study Results**

The study results showed that the nurse-patient-physician triad functioned as a self-regulating or homeostatic mechanism which exhibited time-varying behavior. The model was descriptive of triad behavior. Triad behavior was directed toward the regulation of patient condition within specified limits, or error bandwidth.
**Figure 4**

Frequency of Occurrence of Regulatory Strategies
Versus Patient Signals of Disequilibrium
Regularity and repetitiveness were noted in nurse-physician response to patient state information. In striving to achieve a state of homeostasis for the patient, the nurse and physician established a state of homeostasis for the group as the triad responded to patient state information. This behavior exemplified that of the error-controlled regulator (Ashby, 1958, p. 222).

The data show that patient state information with respect to three variables elicited nurse-physician action: systolic blood pressure, occluded airway, and pain. Nineteen of the twenty patients in the study exhibited signals of disequilibrium. Seven patients exceeded the limits specified for the systolic blood pressure. Eight patients manifested an occluded airway. Fifteen experienced pain.

Physician and nurse utilized a range of regulatory strategies as a consequence of patient disequilibrium. These were identified and summarized in the study data.

From the data, it was observed that the sampling interval for the detection of patient state information varied from one minute to thirty minutes.

The data show that multiple medical and nursing personnel were engaged in monitoring, control, comparator, and regulator activities. The patient's contribution to
his condition, or actual patient state, was via his internal physiological-psychological regulating mechanism.

The data show that the surgical procedure which had been performed for each patient had no observable effect on subsequent triad behavior in the recovery room. In other words, the three variables which have been described in this study were the essential ones specified for each of the twenty patients. The patient's age and sex, also, did not appear to constitute a change in nurse-physician action in response to patient signals of disequilibrium.

The only display of patient state information was that of the recovery room record and the patient's chart.

**Implications from the Study Results**

**Nursing Research, Education, and Practice**

The results of the study point to this major implication for nursing: to conceptualize nursing as three levels of monitoring holds much promise for nursing research, nursing education, and nursing practice. The triad model and the patient care measure provide a framework for designing and conducting research studies in various nurse-patient-physician settings. Nursing research would be focused on direct patient care. Research results would be of significance in four major areas: (1) the determination of the effect of nursing performance on the quality
of patient care, (2) the identification of nursing principles, (3) the formulation of educational programs for various levels of nursing personnel, and (4) the selection and allocation of nursing personnel to patient care settings according to the information requirements for the regulation of patient condition.

The development of a nursing profile based on the functions of the three levels of monitoring provides a basis for defining "nursing" and "nurse." A definition has long been sought in the nursing profession for each of these words. According to Abdellah and her co-authors (1960, p. 24):

There is absence of sufficient consensus in the profession regarding nomenclature and definition for the activities performed by professional nurses. Professional nursing needs to be defined before identification can be made of the basic elements which the nurse needs to master.

To define nursing as monitoring and the nurse as a monitor holds much promise, therefore, in examining nursing as it presently exists and in planning for the future development of nursing education and nursing practice through research.

As an example of the application of the proposed nursing profile to describe nursing as it presently exists, it is suggested that the three levels of monitoring correspond to three levels of nursing education and practice.
At the first level of monitoring, the nurse detects and records patient signals which reveal his state or condition. It is suggested that this behavior appears to correspond with the performance of a nurse aide or practical nurse. The nurse at the second level of monitoring, on the basis of system input information, compares the actual state of the patient with his desired state. If there is a difference between these two states, she reports difference information to the physician-regulator. She then follows his prescription for regulatory action -- assuming that he makes the decision to take corrective action. The behavior of the nurse at this level may be considered to match the performance of a graduate nurse of a three year diploma program.

At the third level of monitoring, the nurse performs the additional function of regulation by initiating nurse action which will minimize the difference between actual and desired patient condition. Her behavior is contained within the limits of her authority to select a course of action. Her behavior at this level parallels the level of decision-making and performance which would be expected of a graduate nurse of a collegiate nursing program.

While much remains to be learned about the information requirements of various patient settings and the relationships which exist between the characteristics of
resources (nurse and physician) and triad performance (the regulation of patient condition), it is believed that the view of the triad as a homeostatic mechanism and the measure of patient care described in this study will provide the necessary basis for the nursing profession to cope with its problem of defining nursing behavior and nursing content. This view provides the basis, too, for establishing and developing patient education programs. Medical educators should consider the incorporation of information-handling procedures in their curricula as information requirements are specified for particular patient care settings.

In conclusion, the lack of a patient care measure has been a major impediment to the development of nursing as a profession. Abdellah (1961, p. 27) stated the problem in this way:

Criterion measures in nursing are crucial if we are to evaluate the effect of nursing practices on the patient's progress. Discovering criterion measures can help us to clarify the role of the professional nurse and lead us to the identification of a scientific body of knowledge that is uniquely nursing.

Design and Operation of Patient Care Facilities

The study data show that patient state information was acquired and patient condition ascertained at discrete moments in time which varied from one minute to thirty
minutes. It was patient state information which initiated nurse-physician response. In the regulation of patient condition, therefore, it is imperative that patient state information be rapidly and accurately acquired and processed in order to detect trends and changes in patient condition. As a consequence, regulatory action could be instigated with greater rapidity when a trend or change in the state of the patient occurred, and the patient returned to a desired state more promptly.

The advances of science and technology, as manifested in electronic monitoring, diagnostic, and date-processing equipment no doubt will revolutionize practices and policies of the present health system. It is imperative, therefore, that we prepare for the integration of men and machines in the design and operation of patient care facilities.

The implication is made from the study data that patient instrumentation in the recovery room would enhance triad performance in that patient information would be more rapidly available to physician and nurse for decision-making and subsequent action.

Automation in the recovery room setting would apply primarily to such procedures as data processing and the use of computers to store patient state information. Automation refers to the replacement of a man by a machine,
and it is not envisioned that the human administration of patient care will be taken over by a machine. Patient instrumentation, however, holds much promise as an extension of the motor and sensory capabilities of nurse and physician. Just as the stethoscope, mercury thermometer, and the sphgmomanometer extend the senses of the nurse and physician in detecting patient signals, so do such electronic devices as the body function recorder and the rectal telethermometer. Nurse-physician action, dependent upon the detection of patient state information, is not likely to be replaced by a machine. The detection of patient information, however, is quite another matter, and information-processing procedures will be handled by electronic devices with increasing frequency.

To incorporate electronic monitoring equipment into the patient care system demands that investigations be made to determine (1) their effect on the regulation of patient condition, and (2) their effect on the allocation of human resources to various patient care environments.

**Application of Homeostatic Models to Explain Group Behavior in Other Settings**

In the introduction to the present study, Cannon's concept of homeostasis was quoted, inasmuch as it was from this concept that the science of cybernetics evolved, in
part, which, in turn, provided the basis for this investigation. Cannon's words are stated again (1932, pp. 24-25) in order to illustrate the implications from the study data for the application of homeostatic models to explain and control group behavior in other settings:

It seems not impossible that the means employed by the more highly evolved animals for preserving uniform and stable their internal economy (i.e., for preserving homeostasis) may present some general principles for the establishment, regulation and control of steady states, that would be suggestive for other kinds of organization -- even social and industrial -- which suffer from distressing perturbations.

The data from the study described the behavior of the triad to re-establish and maintain the patient in a state of equilibrium at a point in time when he was unable to maintain homeostatic balance for himself. The consequence of this behavior was (1) the regulation of patient condition, and (2) a regular repetitive pattern of nurse-physician action which reflected a state of equilibrium.

The implication is that the application of homeostatic models to specific situations would be useful in describing and organizing group behavior. For example, the educational system of our nation, like the health system, is confronted with critical problems of personnel shortage, rising costs and demands for services, and the need for physical facilities. One might say, to use
Cannon's terminology, that the educational system, like all exceedingly large complex systems, "suffers from distressing perturbations."

In order to identify these perturbations and deal with them in a tangible way, it would be necessary to conceptualize the educational system in terms of a homeostatic model to describe the information, regulation, and control characteristics of the system. The following questions are representative of those which would be asked initially:

1. What goal is pursued in establishing and developing an educational system at all levels of operation?

2. What tasks must be performed to reach this goal(s)?

3. What is the primary focus of concern in an educational system? What is to be controlled and regulated? What information is necessary for control and regulation?

The development of an educational system model based on concepts of cybernetics would provide the framework for (1) an explicit description of the levels of education; for example, elementary, secondary, and higher education, and (2) the design of studies to determine the relationships which exist between the characteristics of resources and the tasks which they perform. The consequence would be that those who are responsible for the administration and operation of an educational system at any level would be aided in their decision-making.
In conclusion, Lawrence Siegel (1960, p. 208) stated the problem which exists in educational research succinctly when he said:

Perhaps the most serious criticism of educational research is that it too often is conducted in the absence of a unifying theoretical framework. The resultant data are thus grossly descriptive, but they indicate little of what occurs during the teaching-learning process and still less about the interaction of the factors which produce the results obtained.

From the results of the study presented here, the inference is made that the conceptualization, development, and application of a cybernetic model to specific situations provides the required unifying theoretical framework for conducting research and for designing and operating large complex systems.

The results of the study have been summarized and discussed in this chapter. The final chapter presents a summary of the investigation and the conclusions that were reached.
CHAPTER VI

SUMMARY AND CONCLUSIONS

The problem of measuring and evaluating the quality of patient care confronts those who, at all levels of hospital administration and operation, are concerned with the provision of patient care. Finding a valid and reliable measure of patient care has been the major impediment to the realization of quality appraisal.

The study which has been reported was based on the homeostatic model of nurse-patient-physician behavior and the measure of patient care conceptualized by the Systems Research Group, The Ohio State University (Project Report 940-6, 1961). The model was formulated according to the cybernetic concepts of information, regulation, and control.

The purpose of this investigation was to apply the homeostatic model of triad behavior to a specific patient care setting in order to describe nurse-physician action in the regulation of patient condition. The investigation was viewed as the first step in building a cybernetic or homeostatic model in that the conceptual model was applied to real world phenomena in order to structure and describe actual group behavior (Thrall, Coombs, and Davis, 1954).
A search of literature made prior to the conduct of the study did not reveal reports of any investigations which had applied homeostatic models to nurse-patient-physician behavior with the resulting formulation of a patient care measure. Representative selections from the literature on patient care were presented, however, to illustrate the approaches to the problem that have been made by others in determining the quality of patient care provided in hospitals.

The procedure for conducting the study was descriptive in design. The hospital setting selected for the study was the recovery room of University Hospital, The Ohio State University, Columbus, Ohio. Data were collected by making systematic continuous observations of nurse-physician action in response to patient state information during the immediate postanesthesia period of twenty patients. The criteria for selecting patients for the study was that (1) each patient had had a major surgical procedure performed, and (2) that a general anesthesia had been used. Of the twenty patients, eleven were men and nine were women. Their ages ranged from eighteen to seventy. The results of the study were organized in the framework of the triad model to describe actual triad performance in the regulation of patient condition.
Conclusions

As a result of the study, it was concluded that a homeostatic model of the nurse-patient-physician triad was descriptive of real world phenomena, i.e., the model was descriptive of actual triad behaviors organized to regulate patient condition.

It was concluded that the triad's primary requirement for the regulation of patient condition was patient state information.

From the data, it was inferred that the essential variables comprising the patient vector in the recovery room setting were: systolic blood pressure, airway, and pain. It was inferred that the patient's age, sex, and operative procedure made no difference in the initiation of nurse-physician action or in the utilization of regulatory strategies as a consequence of patient disequilibrium.

The inference was made that a major factor in the specification of the error bandwidth by the physician-controller is the ability of the nurse to take action as a consequence of patient state information.

It was inferred from the study that a wide range of time intervals for the sampling of patient condition would contribute to a low information environment.
The inference was made that measurements of the patient's pulse and respiration rates did not elicit nurse-physician action.

The inference was made from the study data that the three levels of monitoring activity comprise a profile of nursing which is of significance in (1) identifying nursing principles, (2) developing nursing curriculums, (3) planning nursing research, and (4) selecting nursing personnel for various patient settings.

On the basis of inferences derived from the study, it is recommended that a continuous research program be planned which focuses on the patient care system; the nurse-patient-physician triad, and a measure of patient care -- the regulation of patient condition. Experimental studies to test these hypotheses should be designed:

1. Patient variability would be reduced in an environment in which nurses functioned as Level III monitors.

2. Patient variability would be reduced in an environment which utilized electronic monitoring and data-processing devices.

3. The specification of the lower and upper limits of the error bandwidth is dependent upon the ability of the nurse to detect and respond to patient state information. It is predicted that a wider bandwidth would be specified by the physician-controller in a patient care setting where the nurse functioned as a Level III monitor than in a patient setting where the nurse functioned as a Level I monitor.
For this study, it was assumed that the detection of patient state information was performed with accuracy. The performance of the human monitor may be questioned, however, in the detection of patient state information. Studies should be designed which investigate the performance of the nurse monitor in the regulation of patient condition to determine (1) time lags which occur in the detection of patient signals and subsequent nurse action, and (2) the occurrence and frequency of Type I and Type II errors.

Along with the experimental studies which have been suggested, field studies should be continued to apply the homeostatic model of triad behavior to specific patient care situations. In this way, the conceptual model of triad behavior will be modified and refined as more is learned about the regulation of patient condition.

Questions which are representative of those which will be asked are these:

1. What characterizes triad behavior in various patient care environments -- for example the emergency room, selected nursing units, and the operating room?

2. What essential variables comprise the patient vector in these various settings?

3. How is patient state information detected, transmitted, and displayed for nurse-physician action?
4. What regulatory action is taken by nurse and physician when essential variables are affected by disturbances which threaten or disrupt patient equilibrium?

5. What is the range of authority within which the nurse may act in taking corrective action to return the patient to a state of equilibrium?

6. What effect does the patient's age, sex, and specific disease entity have on the detection of patient state information and subsequent nurse-physician action?

**Perspective**

Following the validation of the homeostatic triad model by conducting field and experimental studies, the data will be organized according to formal logical schemes and manipulated mathematically to specify the relationships which exist between patient condition and nurse-physician resource characteristics. These statements of relationships based on the measure of patient care described in this study will result in providing hospital personnel at all levels of administration and operation with an array of alternative resource allocation decisions. Thus it will be possible to predict the consequences of decision-making for patients.

Alternative resource allocation decisions hold promise, too, for the development and integration of information-handling procedures in education programs for patient, physician, and nurse.
The concepts of cybernetics hold much promise for the study of large systems characterized by complexity. While the focus of this study has been on the nurse-patient-physician triad in a selected area of the hospital system, other social institutions and organizations might well benefit from a similar conceptualization. A steady state in any and every form of life, whether biological, social, or industrial, is crucial if the system is to survive. Survival is based on information, regulation, and control -- executed both internally and externally. Survival is a primary goal towards which all behavior is directed.
SELECTED BIBLIOGRAPHY

Books


Articles, Journals, and Reports


Blumberg, Mark S. "Men, Machines, and Hospitals," Hospital Progress, XL (November, 1959), 71-76.


Haldeman, Jack C. "Progressive Patient Care," Public Health Reports, LXXIV (May, 1959), 405-408.


Krause, C. D. "The Merits of a Medical Audit," Modern Hospital, XXCI (December, 1953), 85-86.


"The Influence of Cybernetics on Hospital Development," Hospital Management, XXCIX (April, 1960), 44-46.


Mortrud, L. C. "The Control of Professional Practice Through the Medical Audit," *Hospitals*, XXVII (September, 1953), 91-93.

New, Peter Kong-Ming, Nite, Gladys, and Callahan, Josephine M. "Nursing Service and Patient Care: A Staffing Experiment," *Community Studies*, Publication No. 119, Kansas City, Mo.: 1959.


Safford, Beverly J., and Schlotfeldt, Rozella M. "Nursing Service Staffing and Quality of Nursing Care," *Nursing Research*, IX (Summer, 1960), 149-54.


Sheps, Mindel C. "Approaches to the Quality of Hospital Care," *Public Health Reports*, LXX (September, 1955), 877-86.


I, Wanda Elizabeth McDowell, was born in Columbus Grove, Ohio, August 3, 1922. I graduated from Columbus Grove High School in 1939 and attended Bluffton College, Bluffton, Ohio, from 1939 to 1941. In 1941 I entered Saint Luke's Hospital School of Nursing, Cleveland, Ohio, and graduated in 1944 with a diploma in nursing. From 1944 to 1951 I was associated with the University of Michigan Hospital, Ann Arbor, Michigan. I completed my undergraduate education at The Ohio State University in 1953 when I was granted the Bachelor of Science degree. From 1954 to the present time, I have been an instructor in the School of Nursing, The Ohio State University. In 1956 I was awarded a fellowship by the National League for Nursing for graduate study. I received the Master of Arts degree in 1957 from The Ohio State University. In 1957, I received a special research fellowship from the Division of Nursing and Division of General Medical Sciences, Public Health Service, United States Department of Health, Education and Welfare. I held the fellowship from June, 1958, to June, 1961. Since 1959 I have held a part-time position as research associate with the Systems Research Group, The Ohio State University.