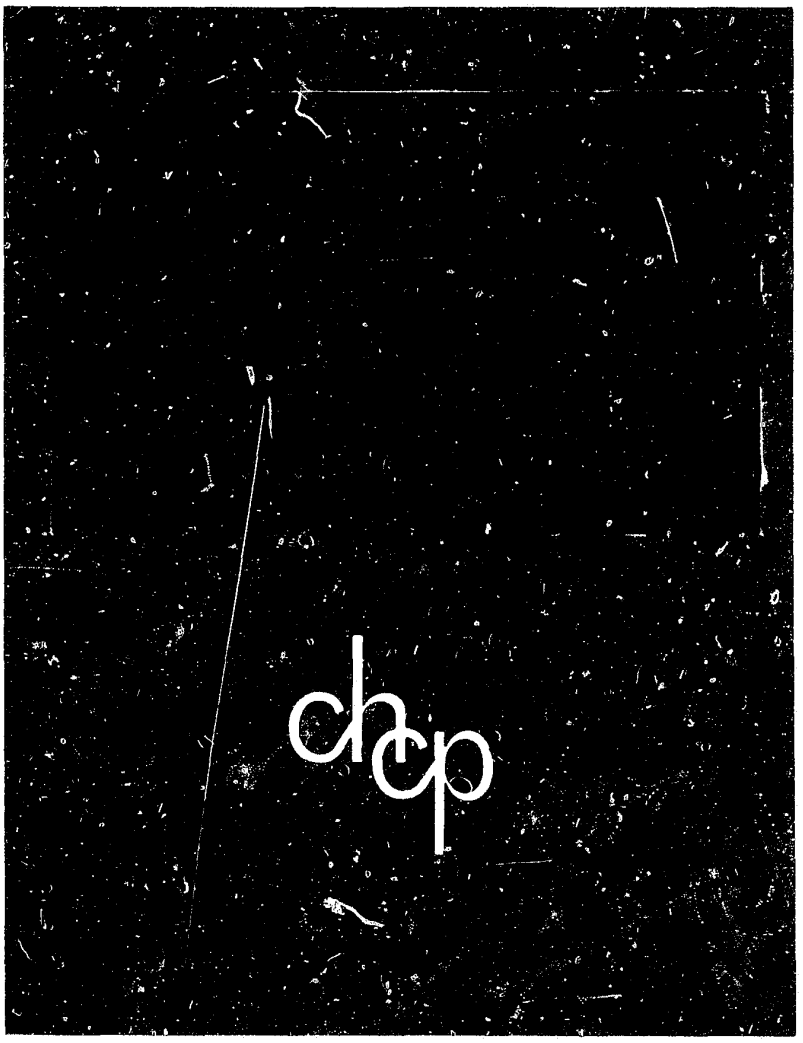

CORRECTIONAL HEALTH CARE PROGRAM

Correctional Health Care Program

RESOURCE MANUAL

MAKE-BUY DECISION ANALYSIS
FOR CORRECTIONAL HEALTH CARE

MICHIGAN DEPARTMENT OF CORRECTIONS
OFFICE OF HEALTH CARE

LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
UNITED STATES DEPARTMENT OF JUSTICE

Correctional Health Care Program
Michigan Department of Corrections
Office of Health Care

MAKE-BUY DECISION ANALYSIS

FOR CORRECTIONAL HEALTH CARE

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C H C P P R O J E C T S T A F F

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FOREWORD

The issues of adequacy, accessibility, and quality of health care service delivery in correctional institutions are increasingly receiving well-merited attention. Long plagued by neglect and paucity of resources, most correctional agencies throughout the country have recognized the need for clear direction in addressing these issues. The unique characteristics of prison populations and facilities pose a problem in applying directly the standards and policies which prevail in community health care settings. Once the basic ingredients common to good health care practice have been identified, the challenge remains of their adaptation without essential compromise to the correctional environment. Implementation of a system which meets statutory and professional standards is the responsibility of correctional health care administrators in the 1980's.

Through a grant from the Law Enforcement Assistance Administration, the Michigan Department of Corrections has provided technical assistance to ten states with a view to improving their health care system for residents of correctional institutions. This manual is one of a series published under auspices of the grant. Together, the manuals will support and extend the training sessions and technical assistance efforts of the past two years. Their purpose is to define concisely the major elements which must constitute a comprehensive health care program for a correctional agency.

There is no substitute for proper planning, adequate resources and good management. These manuals can assist in the planning effort to identify the kind of resources which will comprise an adequate program. In addition, they address the alternatives which must be considered, the integration of various components, and establish a foundation for the decisions which must be made by each agency.

The manuals have been compiled by persons who are experts in their professional field and by persons active in the delivery of health services to correctional residents. There are too many divergencies among correctional agencies to permit a single approach to be universally applicable. For this reason, the manuals are intentionally broad in scope and will require careful analysis and specification by each user.

A health care system does not stand alone and isolated from its environment. It can succeed only through a cooperative and carefully planned effort which involves health care personnel, staff of the correctional system, community health resources, and residents as interested consumers of the services. Where multiple institutions exist within a state correctional agency, appropriate central direction and coordination are essential for coherent and consistent form and quality of the services provided. It is at this level, in particular, that the overall planning, resource development, and management of policy should occur.

These manuals are written in a simple "how-to" format and are intended to be self-explanatory. Local regulatory agencies and other community and professional health resources can be helpful in their interpretation and application.

The goal which has prompted development and issuance of this manual and of others in the series has been attainment of professional quality health care for residents of correctional institutions comparable to that available in the community. The sponsors will consider their efforts well rewarded if, as a result, changes are implemented which improve access and cost-efficient delivery of needed health services.

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C O N T E N T S

INTRODUCTION

Purpose of the Manual:

This manual is intended to serve as a guide to administrators in dealing with decisions concerning whether to directly provide health services inside the prison or to contract for health services with outside providers. This is called a "make-buy" decision. The overall approach to analyzing this type of decision will be the same regardless of the specific health services being considered, (such as laboratory, radiology, pharmacy or physician services).

The purpose of this manual is to familiarize the administrator with the basic steps in the analytical process for determining whether it is more desirable to "make" or to "buy" health services for prison residents. The reader is first given a step-by-step description of the overall decision framework and is then presented with an example problem to better illustrate how to work through each step.

The example used in this manual deals with the decision of whether to "make" or to "buy" pharmacy services. Data has been collected from actual prison pharmacies for use in this example analysis. However, the reader should keep in mind that the pharmacy issue has been simplified here, in order to demonstrate as clearly as possible how the decision process works. This manual is not intended to serve as a blueprint for making pharmacy decisions. The data that are presented here should not be viewed as standards for prison pharmacies. Each administrator interested in the pharmacy issue will need to collect data which is relevant to his own institution.

In using this manual, the reader should focus on the overall process for decision-making, the step-by-step application of this process and the types of data and information that are required.

This manual is organized into three sections. Section I describes the overall decision framework and outlines each step involved in the analytical process. Section II carries the reader through a step-by-step application of the decision process using the question of whether to "make" or to "buy" pharmacy services as an example. Section III is a summary of the major points identified in the two preceeding sections and can serve as an easy reference or checklist for the reader. A glossary of terms is also included as an appendix.

SECTION I

OVERVIEW OF THE FRAMEWORK FOR DECISION-MAKING

Before discussing the steps in the process for analyzing "make-buy" decisions, a few general comments are necessary. The approach to decision-making suggested in this manual represents an attempt to systematically sort out and analyze the various elements of a problem. These elements need to be separated into those which can be quantified and evaluated objectively using certain formulas or mathematical calculations, and those which must be evaluated subjectively according to the judgement of the individual decision-maker.

Disecting a problem and analyzing it systematically step-by-step helps the administrator to more fully understand the nature of the problem itself. This approach also helps him to formulate the objectives or end results he hopes to achieve, as well as his priorities related to these objectives and the range of possible actions he might take to reach these desired end results.

Working through the decision process step-by-step should shed some light on the possible outcomes or consequences of one decision versus another; by making more information available to the decision-maker. However, the decision process discussed below is only a tool to help guide the thinking of the administrator, it cannot make the decision for him. No magic formulas or recipes exist which can automatically produce the "right" solution or decision when someone plugs in certain numbers. Human judgement will always be required in making any decision.

The reader should recognize that certain values, priorities or political constraints most likely exist which are unique to his prison or state correction system. While these factors should not carry a disproportionate weight in making a decision, they cannot be ignored and will require that each administrator exercise a certain amount of personal judgement when using this decision process.

Steps to Decision-Making:

There are six basic steps in the analysis of "make-buy" decision problems. These steps are listed below and each will be discussed individually in the remainder of this section.

Step #1:

Define the problem and state the objectives to be achieved.

Step #2:

Identify alternative solutions or actions which might be taken to reach the objectives.

Step #3:

Identify the decision variables (inputs and outputs) related to each alternative.

Step #4:

Collect the necessary data for determining values and assigning numbers to each decision variable.

Step #5:

Solve the "Total Cost" formula and review your objectives to determine the "best" alternative.

Step #6:

Sensitivity Analysis - Re-evaluate the decision made in Step #5 by testing the sensitivity of your choice to possible errors in any of the above steps.

Step #1: Define the problem and state objectives

In order to define a specific problem, clarify why you are considering a change in the means of providing this service. How is this service being provided now? - Is it being made in-house?; or is it being purchased from an outside source? What leads you to suspect that a change in the manner of providing this service might be more desirable?

* Is the quantity of service that is required by the residents increasing or decreasing?

* Are costs of supplying this service under the present arrangement increasing?

* Are there specific problems in obtaining this service on a timely basis when it is needed?

* Are there specific security problems related to providing this service?

* Is the quality of service satisfactory?

* Are there any specific types or parts of this overall service which cannot be made available to residents under the current arrangement?

* Are there specific laws or regulations which govern the provision of this service in your state?

* What additional issues or concerns are related to supplying this service to residents?

Once you have identified all of the major elements of the problem, develop statements of the objectives you would like to achieve related to each of these elements. At a later stage in the decision process your objectives will serve as a guide in selecting an appropriate decision alternative. Therefore, it is important to develop your objectives carefully and with as much detail as possible.

Your objectives should identify the specific end results or outcomes you are seeking such as:

* To minimize the total costs involved in supplying services to residents.

* To provide "x" quantity (or units) of service per year (or per month or per week).

* To provide this service in a manner which does not jeopardize the security of the prison, (e.g. to minimize the number of persons coming into the prison, etc.).

* To insure that the services being provided are appropriate to the medical needs of the residents and are being provided by competent and well-trained practitioners.

* To insure that no state laws or regulations governing the provision of this service are being violated by the prison's arrangements for making this service available to residents.

* To insure that services are available to residents within a specified amount of time (e.g. within no more than 24 hours of request).

* To insure that the method of supplying this service adequately covers the emergency medical needs of residents.

These objective statements are only a sample of some of the possible end results or outcomes that might be sought in connection with providing a specific health service. This is not necessarily a complete list of the type of objectives you may desire, nor is it suggested that all of the objectives listed here would always be appropriate.

When you are dealing with a particular service, your objective statements can be more precise. For example, you may have a limited budget for providing a particular service and you may want to state a specific dollar figure which cannot be exceeded. The development of more detailed objective statements will be dealt with in Section II when we work through the pharmacy example.

Since your objectives will eventually be used as criteria to help you choose among various alternatives, you should attempt to identify the relative importance of each objective. You will need to have a clear sense of your institution's priorities in order to select the one alternative which meets the majority of your needs. If the quality of health services currently being provided is a significant concern in your institution, you may be willing to give up a little on the issue of costs or the issue of security in order to achieve some gains in quality; of course, there will always be limits as to what you can give up on any particular issue. Therefore,

detailed statements of your objectives and a clear sense of which objectives are most important for your institution at this point in time will make it possible for you to determine the most appropriate alternative.

Step #2: Identify possible alternatives

This step involves setting up a list of the possible alternative arrangements for supplying a particular health service. All realistic alternatives should be identified with the help of knowledgeable health care professionals as well as other administrative personnel in the prison system.

The two most obvious alternatives for supplying health services to residents are to "make" services inside the prison by acquiring the necessary equipment, personnel and supplies, or to "buy" services from an outside source through a contractual arrangement. However, it is not necessary to restrict your consideration to these two options. Certain variations of the make or buy options might also be possible, such as to share or make services jointly with another prison or group of prisons; or perhaps to make a limited quantity of services and to purchase additional quantities to supplement as necessary.

The range of alternatives available to you will depend upon the specific service that is being considered, and upon certain characteristics relative to the prison system or health care system which exist in your state or local community.

Step #3: Identify the decision variables for each alternative

This step involves the identification of the "inputs" needed to produce certain "outputs" of the particular health service you are considering. These inputs and outputs are the decision variables.

The input variables include such things as equipment, personnel, and supplies; and the output variables are the units of health services such as a physician's exam, an x-ray or a drug prescription. Each of your alternatives listed in Step #2 will use different combinations of inputs to produce a certain quantity of output.

In order to understand the relationship between the inputs and outputs of each alternative, it is necessary to use a mathematical model or formula. For the "Make-Buy" decision, the "Total Cost" formula is the most helpful. In this formula, total costs are calculated by adding the fixed costs and variable costs of each alternative.

Total Costs (TC) = Fixed Costs (FC) plus Variable Costs (VC)

(TC = FC + VC)

The "Fixed Costs" are those costs which will not change when the quantity of output (services) produced is increased or decreased. Fixed costs are those costs that will remain the same if you are producing 100 units of a service or 500 units of a service. These costs are usually related to capital investments for such things as construction and equipment. In some cases fixed costs will include the salaries of personnel. (When production of a health services is being done on a small scale, the number of personnel is generally fixed or stable over the entire range of output. However, with large scale production, the number of personnel is likely to vary in relation to the quantity of output produced, over fairly wide ranges of output).

The "Variable Costs" are those costs which can be tied more directly to the production of each unit of output and which will vary with the quantity of services being produced. The most obvious example of variable cost is the cost of medical supplies such as drugs, bandages, syringes, etc.

It will be necessary for you to identify the fixed costs and variable costs associated with each of your alternatives and to calculate the total costs of each. The total costs of your alternatives can then be compared, along with other criteria, (such as those related to the issues of quality or security) to aid in making your decision.

The fixed and variable costs associated with the "Make" alternative might include:

Fixed Costs

* Costs of constructing a certain square foot area in which to provide your service.

* Cost of all major pieces of medical equipment and furniture.

* Salaries per year (or per month) for personnel.

Variable Costs

* Costs of the various medical supplies and materials which go into the provision of each unit of service (such as syringes, drugs, bandages, etc.).

The costs associated with the "Buy" alternative are all variable costs. There are no fixed costs, since there is no capital investment involved in this alternative.

The variable costs of the "Buy" alternative might include:

* Costs of the contract (the fees paid to the supplier for the non-health services associated with the contract agreement, such as transportation or record keeping, etc.).

* Costs per unit of health service purchased.

In this step of the decision process, it will also be necessary to identify the way in which you will measure output. What is the unit or measurement for the health service being considered; a physician exam? a dental exam? a drug prescription? a laboratory test? etc.

The identification of units of measurement for the input and output variables to be used in evaluating each of your alternative decision options will be dealt with further in Section II; when the pharmacy example is discussed.

However, in addition to these measurable or quantifiable variables, it is also necessary to describe to the extent possible, the non-quantifiable elements of each alternative in terms of the benefits or disadvantages which might be related to such issues as security or quality. Your objectives should serve to guide your description of these elements.

Step #4: Collect data and assign numerical values to each decision variable

Once you have established how you will measure the inputs and outputs related to the production of a particular health service, it is possible to collect the appropriate data for calculating the numerical value of each variable.

Output Variable:

In order to determine the approximate output or quantity of services that will be demanded by your prison population, it is necessary to collect data related to the average number of units of a particular service used by your total resident population during a specific period of time. If, for example, you are dealing with the issue of radiology services, it will be necessary to know the number of x-rays that are required by your total resident population on the average each week, month or year. It may be desirable to define "radiology" breaking down the x-rays (or any unit of service) by specific type of procedure. Since certain procedures may be used infrequently and have such high costs, it would not be practical to provide them on-site at the prison. They would, therefore, be excluded from the analysis.

When estimating future demand for a service, it is first necessary to define the planning horizon by selecting an appropriate year(s) in the future for which the service provision is being planned. When the planning year(s) has been selected, it is then necessary to project the size of the prison's population in this year by estimating a rate of growth (if any) for the inmate population.

Data to estimate the volume of services that will be demanded by a prison's inmate population might easily be obtained if internal records have been kept over time for each episode of service provision. However, if internal records have not been maintained, it will be necessary to estimate the volume of services that will be required by developing standards from the experiences of other similar prisons. The standards needed are those related to the rate at which a prison population is likely to use a particular service. To establish this "use rate", you might obtain data from a similar prison which has records of how many units of service were used by their population over a specified period of time. This "use rate" can be calculated by dividing the total number of service units consumed by the total number of residents in the prison. For example:

If prison "X" has 500 residents, and last year they provided a total of 1,500 physician exams, then that population's average annual "use rate" for physician exams would be:

1,500 exams ÷ 500 residents = 3 exams per resident per year

Once you determine an average "use rate" based on data collected from the past experiences of another similar prison, you can then apply this rate to your population. By multiplying the average use rate per resident times the total number of residents in your facility, you can get a reasonable estimate of the total number of service units you will need to provide within a specified period of time in order to meet the future service demand of your resident population. This total number of service units will be the output variable in your decision analysis.

It should be noted here that if you obtain data from another prison to calculate a use rate, you will need to compare various characteristics of your resident population with the characteristics of the resident population of that facility in order to insure that it is indeed a "similar" prison. The characteristics to be compared might differ somewhat depending upon the specific service under consideration, but generally you would compare such characteristics as age, sex, security level, etc.

Input Variables

As indicated in Step #3, the inputs will be somewhat different for each alternative. In Step #3 the inputs associated with the "Make" alternative were facility space, major equipment, furnishings and personnel. For each of these inputs you will need to know:

* The approximate costs for a single unit of each of your fixed and variable costs, such as:
    - construction costs per square foot of secure area;
    - cost of each piece of equipment and furniture;
    - average annual (or monthly or hourly) salary for each category of personnel;
    - costs of medical supplies (syringes, drugs, etc.); and
    - other costs.
* The number of each of these inputs required to produce the total volume of output (or total units of service) that will be demanded.

The data necessary to determine the average costs associated with each of your inputs might be obtained from a variety of sources, such as:

Variable	Possible Source of Data
* Construction costs per square foot of secure area	* Local architectural firms (state civil service contractor) or
* Approximate number of square feet required	
* Cost of medical equipment or office furniture	* Local manufacturing firms (state civil service purchasing dept.) or
* Salaries for each category of personnel	* Local professional groups (state civil service personnel dept.) or
* Number and type of equipment and furnishings required	* State laws (regulations) related to a particular health service; or another similar prison providing this service
* Number and type of personnel required	* State laws and regulations; or another similar prison providing this service

Once you know the approximate costs per unit for each of the above inputs and the approximate number of units of each that you will require, it is possible to calculate the numerical values for all of the input variables associated with the "Make" alternative. For example:

> If construction costs for secure areas are $50 per square foot, and you need an area of at least 200 square feet in which to provide your service, then the costs for your facility space input will be:
>
> 50 x 200 = $10,000

Similarly, the value of each of your input variables can be calculated and then added together with those which are fixed costs and those which are variable costs. The fixed costs will be a total figure that will not change according to the quantity of services provided. The variable costs will be the costs per unit of service and will vary with the quantity of services provided.

In Step #3 the inputs associated with the "Buy" alternative were the individual units of a health service provided to residents and the cost of the contract agreement itself for various support services (such as transportation, record keeping, etc.). For each of these inputs you will need to know:

* The cost per unit of service (cost per lab test or cost per x-ray, etc.) purchased from an outside source.

* The contract fees per unit of service over and above the cost of the service itself.

The data necessary for determining the value of each of these inputs might be obtained from the following sources:

Variable	Possible Source of Data
* Cost per unit of service	* Current experience of other prisons which have contracts for the service.
* Contractual fees per unit of service	* Estimates from potential contractual providers.

The value of each of your inputs for the "Buy" alternative can then be added together to determine the total costs per unit of service under this arrangement.

Step #5: "Solve" to select best alternative

The values established in the previous step for your desired output and the inputs associated with each alternative can now be used in the "Total Cost" formula discussed in Step #3.

Total Costs = Fixed Costs + Variable Costs

The formula will yield the total costs of each alternative for a specific quantity of service output. For example:

If output = 2,000 physician exams/year

"Make" Alternative

Total Costs = Fixed Costs + 2,000 (Variable Costs)

"Buy" Alternative

Total Costs = Zero Fixed Costs + 2,000 (Variable Costs)

The total costs of the "Make" alternative and the total costs of the "Buy" alternative relative to the level of output which you expect to provide can then be compared.

Although this comparison of costs will most likely be a major consideration in your decision, it will not necessarily be the decisive factor. At this point you will need to return to Step #1 and review your objectives and their priorities as part of the evaluation of your alternatives.

If the difference in the total costs of each alternative are quite significant, or if the cost of the alternative is clearly beyond the reach of your budget, then this cost comparison may prove to be a conclusive decision factor. However, if the cost differential between your alternatives is only slight, then other non-quantifiable factors (such as the benefits or disadvantages of each alternative relative to the quality of care or prison security) may take on more significance. The weight assigned to any decision factor will, of course, depend upon your own objectives and priorities.

You might also wish to solve the total cost formula for a wide range of output levels. This would enable you to determine at what level of output the costs of each alternative are equal (the "break-even point"), and which alternative is more desirable if output goes above or below this break-even point. This approach would be advisable if you had uncertainty about the level of output you might need to provide.

Step #6: Sensitivity Analysis

The decision made in Step #5 should be viewed as a tentative decision until you have tested the sensitivity of your decision to possible error made in any of the preceeding steps.

How well would your decision hold up if upon closer review you were to discover that:

* The original priority assigned to your objectives was inappropriate?

* You had overlooked a possible alternative?

* You had incorrectly calculated the expected level of output (quantity of services demanded)?

* You had incorrectly calculated one or more of your inputs?

* You had incorrectly solved the total cost formula for one or more of your alternatives?

This step requires that you review each of the previous steps carefully, in that you may have used data or assumptions of questionable validity, and that you make reasonable adjustments and work through the analysis again from that point to test whether or not your final decision would be significantly affected.

This step involves more than simply going over your calculations to insure that your arithmetic is accurate. It requires that you alter the values you have established for any of your decision variables, if you have reason to doubt their correctness, and that you solve the total cost formula again.

SECTION II

PHARMACY EXAMPLE

The following analysis is presented to illustrate how the process described in Section I can be applied to a specific health service. Balford Prison and the data used in this analysis are hypothetical.

Step #1: Define problem and state objectives

Problem:

* Balford Prison currently contracts with an outside provider for pharmacy services. The contractual agreement will expire in six (6) months and it is expected that the overall costs of providing pharmacy services under this arrangement will increase by more than 15%.

* A formulary is not in use under our present contractual arrangement. A formulary is a list of those drugs which are preferred and those which are prohibited for use within the prison. The maintenance of a formulary may prove more difficult under a contractual arrangement since the off-site location would not facilitate the pharmacist's contact with the physicians. Also, this would add to the administrative costs of the contract. However, in the last year there were several incidents of abuse involving drugs commonly prescribed by physicians under normal circumstances to non-institutionalized patients. These incidents might be minimized if a formulary were maintained for the prison.

* Under our present arrangement, thorough and up-to-date patient profiles are not readily accessible to physicians coming into the prison. The patient profile should be a continuing record of each resident's prescription history (including the dates, name of physicians, the drugs, their dosage, the medical conditions for which each drug was prescribed, any drug reactions, etc.).

* At present, consultations between the contract pharmacist and the physicians coming into the prison may not be occurring as frequently as necessary.

* There are presently no contacts between the pharmacist and prison residents. This does not allow for patient education and counseling about either general health issues or drug use.

* If we were to "make" pharmacy services in-house, the following State Board of Pharmacy requirements would have to be met:

  - a licensed pharmacist would be needed to assume legal responsibility for the supervision of the pharmacy.

  - a prescription department of at least 75 sq. ft. would be needed and should include a prescription counter with at least 10 sq. ft. of free working space (total square footage not designated by the law).

  - the area designated for the pharmacy will need to be permanently enclosed by partitions from floor to ceiling. This area should be identified by the words "drugs", "pharmacy" or another similar term, and should be kept locked at all times when the pharmacist is not on-site.

  - the pharmacy department would need to be equipped with the necessary storage cabinets, a hot and cold water sink, and facilities for refrigeration and heating water.

  - other equipment needed would include:

    - Graduates (2 sizes)
    - Spatulas (2 each of metal and non-metal)
    - Funnels (2 sizes with filler paper)
    - Mortar and pestles (2 sizes)
    - Prescription balance (sensitive to 30 milligrams)
    - Ointment slab
    - Prescription files

* If we were to "make" pharmacy services in-house, special design considerations would be required to construct a secure area according to prison standards.

* It is not clear at this time whether it would be more desirable to "make" pharmacy services in-house or to renegotiate our contractual agreement for another three years.

Objectives:

* To minimize the total cost of providing pharmacy services to the prison's 1,130 residents.

* To insure that all state laws and regulations governing pharmacies are adhered to in providing this service to residents.

* To promote higher quality pharmacy services for residents, and to insure good communication between the physicians and the pharmacist toward this end.

* To minimize the incidents of drug abuse within the prison.

* To maintain a high level of general security within the prison.

* To provide as much health education and counseling to residents as possible concerning drug use and other general topics.

* To insure that adequate emergency coverage is provided for the residents' pharmacy needs.

Priorities

* Balford Prison's highest priority for the provision of pharmacy services is to minimize the costs, due to a very limited budget for providing health services to residents.

* The next priority is to improve the quality of pharmacy services being provided; particularly as it relates to guarding against drug reactions or medical complications as well as patient education and counseling and controlling abuse.

Step #2: Describe alternatives

Alternative #1: "Make" pharmacy services on-site

* This alternative would involve the construction of a well-secured area, and the acquisition of certain equipment and licensed or certified personnel.

* The services provided under this alternative would include:

  . the preparation, packaging and dispensing of pharmaceuticals and drugs.

  . the development and maintenance of a formulary.

  . periodic consultations between the pharmacist and all physicians, nurses and other medical personnel or prison staff involved in the treatment of a patient.

  . the development and maintenance of a patient profile system.

  . individual patient counseling by the pharmacist as deemed appropriate.

  . administrative services (including purchasing; inventory control; and control of restricted drugs, etc.).

* The major benefits associated with this alternative would be those related to enhancing the quality of care through:

  . improved lines of communications between prescriber and pharmacist;

  . improved record keeping (patient profiles);

  . greater opportunities for patient and provider education by pharmacist;

  . greater flexibility in ordering and obtaining drugs on a timely basis.

* The major disadvantages would be:

  . the need to go through the bureaucratic approval processes with both the State Department of Corrections (budgetary approval) and the State Board of Pharmacy (licensure certification);

  . possible difficulty in recruiting an on-site pharmacist;

  . the considerable lead time required between the decision to develop on-site pharmacy, the completion of construction and the opening of the pharmacy. Also in this same vein would be the disruptiveness of a major construction project.

Alternative #2: "Buy" pharmacy services

* This alternative would involve the renegotiation of the existing contract for pharmacy and supportive services, including:

  . filling of prescription orders as needed.

  . periodically monitoring and replenishing the drugs and supplies for the emergency cabinets located within the prison.

  . daily deliveries (transport prescriptions/drugs) and after hours emergency deliveries as needed.

  . development and maintenance of a formulary.

  . development and maintenance of a patient profile system.

* The major benefits of this alternative would be:

  . no need to go through the bureaucratic approval processes.

  . no construction or other capital expenditures would be required.

* The major disadvantages would be:

  . greater difficulty in prescriber - pharmacist communications.

  . greater difficulty in record keeping (e.g. patient profiles).

  . less opportunity for patient and provider education by pharmacist.

  . less flexibility in ordering and obtaining drugs on a timely basis.

Step #3: Identify decision variables

Output Variables:

The measurement for the output variable would be the total number of prescriptions required to meet the service demand of Balford Prison's 1,130 residents.

Input Variables:

"Make" Alternative:

* Fixed cost inputs would include:

  . construction of a secure area of approximately 250 square feet.

  . the minimal equipment and furnishings required for certification by the State Board of Licensure (refer to problem statement in Step #1).

  . one (1) full time equivalent Pharmacist, one (1) full time equivalent Pharmacy Aide and one (1) full time equivalent Clerk/Typist.

* Variable cost inputs would include:

  . average cost of drugs and supplies per prescription.

"Buy" Alternative:

* Average cost per prescription.

* Contract fees per prescription.

Step #4: Collect data and assign numerical values to decision variables

Output

To determine the total number of prescriptions that will be demanded annually by the 1,130 residents of Balford Prison, we collected data from two similar prisons in the state.

Using the data collected from these institutions, we calculated a "use rate" for pharmacy services:

Prison "A"

. Total number of prescriptions filled last year = 20,280 prescriptions

. Total resident population = 988 residents

. Use rate (prescription/per year/per resident) = 20.5

Prison "B"

. Total number of prescriptions filled last year = 106,956 prescriptions

. Total resident population = 5,367 residents

. Use rate (prescription/per year/per resident) = 19.9

Then using the "use rate" of:

20 prescriptions/year/resident

we were able to calculate an expected level of demand (output) for our resident population of 1,130:

Output = 1,130 X 20 = 22,600 prescriptions/year

Inputs

"Make" Alternative

* Fixed cost inputs:

  . cost of construction for secure area = $65/square foot
    (Source: Architect's estimate)

If 250 sq. ft. are needed for the pharmacy, the construction costs would be 250 X 65 = $16,250

  . cost of equipment and furnishings $2,930
    (Source: Manufacturer's estimates)

  . costs of personnel:

    annual salary Pharmacist - $18,950

    annual salary Pharmacy Aide - $12,812

    annual salary Clerk-Typist - $ 7,058

    Total Personnel Costs $38,820

    (Source: State Civil Service Salary Range)

* Variable cost inputs:

  . average cost of drugs and supplies per prescription - $8.65

    (Source: Group purchasing price lists)

"Buy" Alternative

* Average cost per prescription = $8.80

  (Source: Estimate of current contractor)

* Contract fees per prescription = $2.75

  (Source: Fee level reimbursed under Medicaid)

Step #5: "Solve" for best alternative

The "Total Cost" formula can now be solved for each alternative using the expected output level of 22,600 prescriptions/year.

"Make" (M) Alternative

TC (M) = FC (M) + VC (M)

. Output = 22,600 prescriptions/year

. Fixed costs of "M" =

Construction	-	16,250	
Equipment	-	2,930	
Personnel	-	38,820	
		$58,000	(Total Fixed Costs)

. Variable costs of "M" =

average cost per prescription = $8.65

TC = 58,000 + 22,600 (8.65)

TC = 58,000 + 195,490

TC = $253,490

(Total annual costs for the "Make" alternative)

"Buy" (B) Alternative

TC (B) = FC (B) + VC (B)

. Output = 22,600 prescriptions/year

. Fixed costs = 0

. Variable costs =

Average cost per prescription	=	8.80
Contract fees per prescription	=	2.75
		$11.55

TC = 0 + 22,600 (11.55)

TC = $261,030

(Total annual costs for the "Buy" alternative)

Assuming that our figures are correct, it would clearly be more cost efficient to "make" pharmacy services for our residents. Despite the large fixed costs associated with the internal production of services, this alternative would be less expensive given the level of output (22,600 prescriptions per year) we expect to produce.

We have also compared each of our alternatives over a range of output levels and found the break-even point to be at the output level of 20,000 prescriptions per year.

ANALYSIS OF BREAK-EVEN POINT

	OUTPUT LEVEL	TC (M)	TC (B)
	10,000	$144,500	$115,500
	15,000	$187,750	$173,250
*	20,000	$231,000	$231,000
	22,600	$253,490	$261,030
	30,000	$317,500	$346,500

This table clearly indicates that for any output quantity below 20,000 prescriptions per year, the "Buy" alternative is less costly; and for any quantity above 20,000 prescriptions per year, the "Make" alternative would be less costly. This will hold true only as long as the inputs required to produce a certain quantity of output remain unchanged. A re-evaluation of these alternatives would be necessary, for example, if the production of a certain quantity of output required that we increase the number of pharmacists on staff, or that we expand the space which houses the pharmacy department.

According to our analysis of the quantitative decision variables, it would appear that the "Make" alternative is more desirable. However, we must also evaluate the non-quantifiable elements of each alternative as they relate to our overall objectives. The impact of each objective upon the quality of pharmacy services or upon general prison security must be assessed, and we must also consider the disadvantages of each alternative.

The major disadvantages of the "Make" alternative would be:

* The need to go through the bureaucratic approval process to obtain approval from both the State Department of Corrections and the State Board of Pharmacy.

* The necessity of undergoing a period of construction which could be disruptive to the normal routines of the prison.

These disadvantages of the "Make" alternative primarily involve issues of inconvenience, while the disadvantages of the "Buy" alternative, on the other hand, primarily involve issues related to quality (refer back to Steps #1 and #2).

The "Make" alternative would enable the prison to exercise better control over the quality of pharmacy services delivered to residents in several ways:

* Facilitate contacts between the pharmacist and the physicians and other medical or dental providers, thus making it possible to minimize abuse by monitoring the types of drugs brought into the prison through the use of a formulary, thus making it easier for consultations about individual patient needs and providing continuity to patient care through the use of the patient profile record keeping system.

* Make possible direct contact between the residents and the pharmacist, thus affording opportunities for patient education and counseling which would not exist if the pharmacy were located outside the prison.

After reviewing the non-quantifiable variables associated with each alternative as they relate to our objectives and priorities, we will find the "Make" alternative more desirable. The cost savings associated with the "Make" alternative are in actuality rather small ($7,540/year). If the "Buy" alternative were to impact our other objectives more favorably, we might then decide that it was worth $7,540 to achieve certain gains in quality or security. However, this does not appear to be the case. In this case, the "Make" alternative appears to yield greater benefits in relationship to quality, as well as cost-efficiency, while both alternatives appear to be more or less equal in terms of security considerations. Our decision, therefore, is to pursue the necessary activities to construct a pharmacy within the prison and to provide pharmacy services directly to our residents.

Step #6: Sensitivity analysis

After reviewing each of our initial steps, including the definition of the problem, the objectives, priorities and alternatives, we identified only two points in our analysis about which we were somewhat uncertain. These two points were the calculation of the fixed costs associated with the "Make" alternative and the calculation of the expected annual service demand (output) of our resident population.

(1) The fixed costs of the "Make" alternative were calculated to be $58,000 in total. We believed this figure to be reasonably accurate, however, we would like to test the sensitivity of our decision to make pharmacy services for a possible error. Therefore, holding all other variables constant we increased the fixed costs of the "Make" alternative by 10%, and solved the total cost formula again, (Refer back to Step #5).

TC = FC + VC

Output = 22,600

TC (M) = 63,800 + 22,600 (8.65)

63,800 + 195,490

= $259,290

This figure is still less than the total costs of the "Buy" alternative, and we are reassured that our analysis is not particularly sensitive to the possibility of a 10% error in the fixed costs of the "Make" alternative. Furthermore, as we indicated in Step #5, even if there were an error of greater than 10% (which we do not feel is likely), then we might be willing to pay a marginally higher price for the "Make" alternative becasue of the gains in quality associated with this arrangement.

(2) The expected service demand (output) was calculated to be 22,600 prescriptions per year for our residents. We are less certain about this calculation than about the fixed cost calculation above. Therefore, we will reduce the expected output by 15%, while holding all other variables constant, and solve the total cost formula again, (refer back to Step #5).

Output = 19,210

TC (M) = 58,000 + 19,210 (8.65)

= 58,000 + 166, 167

= 224,165

TC (B) = 0 + 19,210 (11.55)

= 221,876

Therefore, if our output were to be closer to this figure of 19,210 prescriptions per year than to our original estimate of 22,600 prescriptions per year, it would result in a slightly higher cost to make services for our residents as opposed to purchasing services outside. However, the additional costs would be in the vicinity of $2,300 per year, which is relatively insignificant. Again we would choose the "Make" alternative, since we would be willing to pay at least $2,300 to obtain the gains in quality associated with this arrangement.

At this point we feel confident that our decision is appropriate and we would begin the necessary steps to gain approval in order to implement our decision to develop a pharmacy department within the prison.

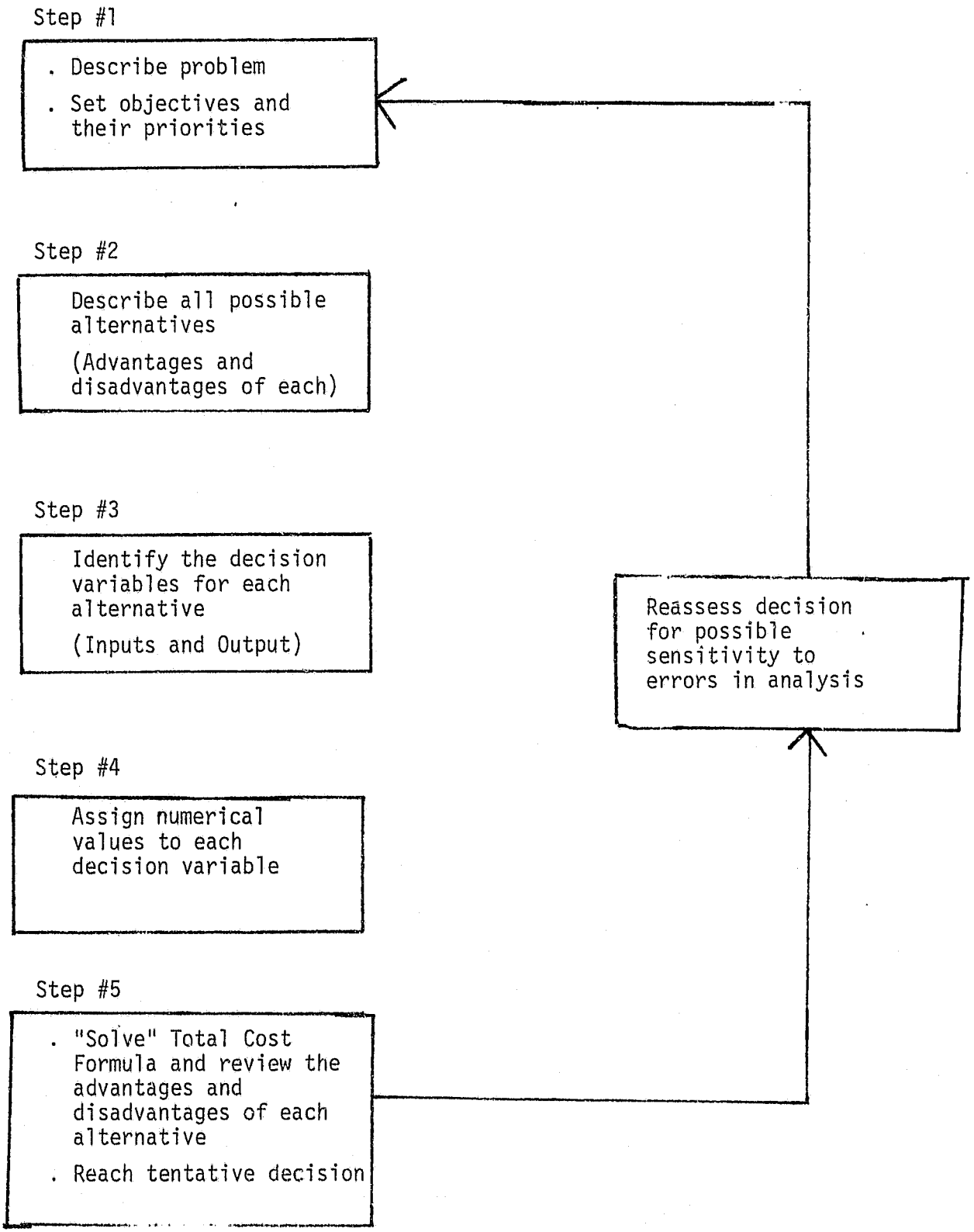
SECTION III

SUMMARY

The "Make-Buy" decision is never irreversible and should always be re-evaluated from time to time. Anytime there is a change in the quantity of services demanded or a change in the costs of providing those services to residents, it would be advisable to go through this type of analysis.

This section contains a flow chart showing the overall decision process and a checklist of questions concerning the steps in this process.

OVERVIEW OF THE DECISION PROCESS



CHECKLIST

* Have you described all aspects of your problem? Do you understand those aspects of the problem related to the issues of: Costs? Quality of health care? Prison Security? State or federal legal requirements? Provider or patient convenience? And the politics of your own prison or the overall correctional system?

* Have you clearly stated the described outcomes or objectives related to each of these issues? And do you have a good sense of their relative importance or priority for your institution?

* Have you obtained input from other knowledgeable prison staff or from persons at the State Department of Corrections to help you define your problem and objectives?

* Is there a realistic alternative which you have not investigated?

* Have you developed appropriate units of measurement for all of your decision variables (inputs and output)?

* How confident are you about the appropriateness and accuracy of the data you have collected? Are there other sources you might check for additional data?

* Do the values calculated for each input and output seem reasonable? Are there standards against which you can check your calculations for reasonableness?

* Have you included all of the possible fixed costs and variable costs that might be involved in each of your alternatives?

* Have you evaluated each alternative subjectively as well as objectively? In other words, have you used your own judgement and the judgement of other knowledgeable persons to look at non-quantifiable advantages and disadvantages of each alternative as well as the quantifiable variables?

* Where are the weak spots in your analysis? How can you recheck your analysis to gain more confidence about your decision?

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GLOSSARY

Alternatives	-	the various means by which a desired end could possibly be achieved.
"Buy"	-	refers in this text to an institution's purchase of services through a contractual agreement with and external provider organization.
Demand	-	the quantity of services consumed or used by a given population during a specified period of time.
Fixed Costs	-	those costs which will be incurred for the production of services and which are the same regardless of the quantity of services produced.
Formulary	-	a list of the drugs that are preferred for use within a particular institution.
Inputs	-	the resources needed to achieve a certain output or end product; (these resources might include raw materials, etc.).
"Make"	-	refers in this text to an institution's internal production of services with resources owned by that institution.
Objectives	-	the end results related to various aspects of a problem or issues that an institution desires to achieve; (objectives might be related to the quantity of service output, the quality of services, institutional security or any number of other concerns).
Output	-	the quantity of services to be produced using any various combinations of inputs.

Patient Profile	-	the recorded history of each incident of an individual patient's use of prescription drugs.
Priority	-	refers in this text to the relative importance of various objectives related to different aspects of a problem.
Problem	-	refers in this text to any issue of concern about which a decision is being sought.
Total Costs	-	refers in this text to the sum of all of the fixed and variable costs associated with a given alternative.
Use Rate	-	the rate at which a given population consumes (or uses) services during a specified period of time, (i.e., the number of units of a service consumed by a given number of persons each week, month or year).
Variable Costs	-	those costs incurred in the production of services which can be directly related to the units of service produced, and which will vary depending upon the quantity of services output required.

END