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Vol. 1 of 2

FINAL REPORT ON THE EVALUATION
OF THE RAC INPUT DATA ELEMENTS

Volume I: Findings, Conclusions
and Recommendations

October 27, 1980

Contract No: 240-79-0038

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VOLUME I
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INTRODUCTION

This document was prepared by Washington Consulting & Management Associates, Inc. (WCMA), as Volume I of the Final Report on the Evaluation of the RAC Input Data Elements (Contract No. 240-79-0038). Volume I of the Final Report is presented in two chapters. They are:

- Chapter I: Background and Purpose of the Engagement
- Chapter II: Findings, Conclusions and Recommendations

Together these two chapters give a brief history of IHS and the development of RAC, the intended purpose of the study, its results and final conclusions and recommendations.

Questions or comments regarding the contents of these documents should be directed to:

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The final report includes a four-part Statistical Appendix reference document which supports the sensitivity analysis performed during Task 5 of the engagement. Due to the volume of this reference material, it has not been included in this document. It is available for inspection at the Department of Health and Human Services, Office of Program Evaluation and Legislation.

I. BACKGROUND AND PURPOSE OF THE ENGAGEMENT

I. BACKGROUND AND PURPOSE OF THE ENGAGEMENT

This chapter of Volume I of the Final Report presents a brief history of the IHS and the development of RAC, the purpose of the engagement, tasks accomplished, and modifications necessary to the original task plan in order to ensure satisfactory completion of the work.

A. IHS HISTORY AND THE DEVELOPMENT OF RAC

In 1954, the Department of the Interior relinquished its responsibility for American Indian and Alaska Native health care to the Public Health Service, and the Indian Health Service (IHS) was established. The IHS is the primary health resource for Native Americans. It is responsible for providing comprehensive health services to Native Americans through direct delivery of health services and the funding of services through contract mechanism when direct services are not available.

The mandate of the IHS since its inception has been to raise the health status of American Indians and Alaska Natives to the highest possible level with maximum use of P.L. 93-638. Thus, the core planning and management issue of the IHS is the proper allocation of resources required to provide the necessary level of care. Due to the labor intensive nature of health care delivery, resource allocation is primarily a question of manpower and contract dollar management. These resources must be allocated in a rational manner across all IHS Area and Program Offices. In addition, the allocation process must comply with the DHSS requirement that each agency justify all manpower-related budgetary requests on the basis of a certified Manpower Management Program (MMP).

In 1972, responding to management requirements, the IHS began to develop the Resource Allocation Criteria (RAC). RAC is basically a series of mathematical algorithms describing the relationships between the demand for health services and the personnel and contract dollar resources required to meet this demand. Working through an advisory committee, functions and associated tasks required to provide quality resources for each component of the health care delivery system were identified. The number of each personnel category required to carry out these functions and tasks was then determined. Calculation of contract dollars was developed in a related fashion. Today, RAC serves as the principal management tool of the IHS Manpower Management Program, and is utilized by the IHS to allocate its manpower and contract dollar resources.

The development of RAC is a dynamic process and has continued to be modified and expanded since its inception in 1972 as more definitive relationships between tasks, functions and personnel requirements have been established. Considerable flexibility and innovation has been applied to the RAC to meet the needs of tribes which are isolated and provide accessibility to care so that utilization more accurately reflects demand. Such innovations include tribal programs, transportation systems, health stations and application of personnel at a local level, such as the Community Health Aides.

In 1977, the RAC documents were standardized so they would be understandable and could be easily applied by tribal health planners. The standardization process included a review of the existing demand

forecasting techniques and modules for technical consistency. The RAC documents were rewritten to a reference manual and workbook format to facilitate step-by-step instructions. A series of worksheets with detailed instructions were included for those instances where calculations must be made.

RAC is applied annually by IHS Area and Program Offices. The results of the application of the RAC are currently used for three primary purposes:

- The distribution of any non-earmarked increases in positions or program funds, including resources made available through the Indian Health Care Improvement Act (P.L. 94-437)
- Justification for position requests in annual budget submissions (based upon RAC staffing criteria and standards)
- Justification for the staffing requirements used for new and replacement facilities.

B. PURPOSE OF THE ENGAGEMENT

RAC now plays a key role as the major resource planning and allocation tool within the IHS. Therefore, it is of benefit to the IHS to develop a better understanding of the sensitivity of the RAC input data and strive to improve the quality and reliability of that data.

The input or "driving variables" of RAC is demand; the output is the amount of manpower and contract dollars required to meet the demand. The driving variables of RAC are based upon projected demand, in turn, based upon population estimates and empirically

derived utilization experience. It is essential to the integrity of the output information to determine the degree of accuracy/inaccuracy of the driving variables and modify or change RAC inputs to assure a desirable degree of accuracy in the resultant output information.

The purpose of this engagement was to "determine the reliability of the data inputs to RAC, the degree to which the quality of the input affects the reliability of the output, and the identification of means to improve the quality of input data."

Objectives to be achieved included:

- Determining the methods by which input data are collected and/or estimated
- Assessing the adequacy of these methods of input creation
- Conducting a sensitivity analysis of the RAC to determine the level of input data accuracy required
- Assessing the ability of current input creation methods to meet the input accuracy error requirements
- Developing recommendations for input creation to improve the overall accuracy of RAC output.

The primary objective was to determine the degree of confidence one could place on the results obtained through RAC. The results of the engagement will be used by IHS officials to modify and improve the performance of RAC. Based on this, WCMA conducted the engagement by accomplishing the following tasks.

TASK 1: INITIATE THE ENGAGEMENT

The focus of the engagement and the Project Officer's goals for the engagement were confirmed, working relationships and communication channels established, and IHS representatives and information sources identified.

TASK 2: IDENTIFY INPUT DATA ELEMENTS

The focus of Task 2 was to identify the input data elements and the processes and procedures by which these elements were collected, transformed and presented for use in the RAC demand forecasting and application. Accomplishing this task necessitated an inventory of the RAC data elements, identification of original data sources for these elements as well as personnel at each place of data handling, identification of the IHS data source reports by report number, and interviewing appropriate IHS personnel to determine the flow of data from origination through formatting, processing, transformation and reporting. From this information, flow charts and individual data element profile sheets were developed documenting data element collection, processing and transformation procedures (see Volume II, Attachment 2).

TASK 3: SELECT SAMPLE SERIES OF INPUT DATA AND COLLECT HISTORICAL DATA

During this task, WCMA obtained IHS summary utilization data, budget and cost data for use in stratifying IHS Area and Program Offices for sampling. WCMA developed site selection criteria and

defined criteria which impact upon the projection of demand and the application of RAC. The sites and data elements to be studied were then selected, and survey and data collection instruments designed (see Volume II) by which to gather historic utilization and RAC application data at each site.

Site visits were begun during this task, with a preliminary visit being made to Oklahoma. The purpose of the preliminary site visit to Oklahoma was:

- To pre-test the survey and data collection instruments
- To assess the volume of data and estimate the time and manpower necessary on-site to collect the data
- To establish parameters necessary to efficient and effective sampling of contract and direct inpatient and ambulatory care records during subsequent site visits.

The WCMA site visit team sampled inpatient and outpatient records, met with systems development personnel to review the methods used to project demand, interviewed local finance and contract personnel to determine the volume of and tracking method for contract care services, observed the outpatient department and medical records areas in direct care facilities and actual data generation, processing, and keytaping procedures. Flowcharts were then developed to document the flow of data from collection through final processing and utilization in RAC.

TASK 4: DETERMINE TREND LINE INPUT DATA ESTIMATES

The focus of Task 4 was on the analysis of input data elements and utilization data over time. Data estimates were developed for a trend analysis, and the same data was used to determine the extent and degree of accuracy of input data. Testing of the appropriateness of trend line analysis forecasting versus RAC demand forecasting was accomplished during this task, and SPSS processing was utilized for the analyses.

TASK 5: DETERMINE THE EXTENT AND DEGREE OF ACCURACY OF INPUT DATA

Task 5 entailed a comparison of projected to actual data for FY 1976, FY 1977, and FY 1978. Pearson's correlation was applied to test whether a significant difference exists between the projected input data and the actual historical data, thereby evaluating the degree of accuracy of the projection procedures. The same data utilized in the regression analysis of Task 4 was required for Task 5; however, the test was performed with both projected and actual data for each year separately rather than over time. The results of this task were analyzed and documented to highlight those areas where demand projections were accurate and those modules where demand projections significantly over or under estimate actual utilization. SPSS programming was again utilized for the analyses.

TASK 6: CONDUCT SENSITIVITY ANALYSIS OF THE RANGE OF SAMPLE INPUT DATA ON THE OUTPUT OF RAC

The purpose of this task was to explicitly determine how much error is caused in the output for some given error in the input to the RAC. The sensitivity analysis methodology was

developed based upon the amount of input data, what documentation of RAC and the functional relationships within its modules exists, and the complexity of the functional relationships. The major constraints to accomplishing the actual sensitivity analysis were:

- Modifications have been made to the staffing tables over time so that there is no longer one formula which characterizes each table
- The modifications to the staffing tables have led to discontinuities in the staffing function and made it impractical to attempt to characterize the tables by deriving new functions
- The sensitivity analysis required examination of several permutations of the input variables to determine how sensitive the output was to these changes.

Essentially these problems were addressed by using the staffing tables themselves to perform the sensitivity analysis. The analysis included complete derivation and mathematical justification for the conclusions. The analysis provides a basis from which IHS may make a decision regarding the wisdom of expending additional time and dollars in gathering more accurate input data than is now provided.

TASK 7: PREPARE RECOMMENDATIONS TO IMPROVE THE QUALITY OF INPUT DATA

Much of the results of the efforts of previous tasks were utilized in Task 7 to pinpoint the input data most likely to contain errors and those which most effect the output of RAC. Areas for

possible introduction of input data error(s) during data collection and processing were noted during the Task 3 site visits. These areas were analyzed during Task 7. Recommendations were made to refine data collection and data processing procedures, where possible, with emphasis on those input data which impact most on the output.

TASK 8: DEVELOP METHODS FOR ASSURING ONGOING
RELIABILITY OF THE INPUT DATA

Task 8 was conducted concurrently with Task 7 because of the interrelationship of the quality of input data to its reliability. Again, the results of previous tasks were utilized to identify those factors influencing the reliability of the input data. Once the factors were identified, a review was made of the input data collection, collation, transformation and processing procedures to determine those places and methods in the data system where data safeguards and systems checks could be applied. Techniques were then recommended for ensuring ongoing reliability of the input data.

TASK 9: FINAL REPORT AND EXECUTIVE DEBRIEFING

Task 9 is the final task of this segment of the engagement. Its focus is the preparation of this report to include, at a minimum:

- An executive summary containing an overview of the evaluation and major findings and recommendations
- A description of the research methodology utilized by the project team including appropriate data collection instruments and analytical techniques

- Presentation of the results of the sensitivity and trend analyses
- A detailed description of findings and recommendations
- A description of methods and techniques for assuring ongoing reliability of the input data.

A draft outline of the final report was prepared and submitted for review and comment. Once approved, preparation of this report was finalized.

The final activity of this segment of the engagement is an oral debriefing of appropriate OPEL personnel to provide an opportunity to discuss specific areas of interest and issues related to the engagement but not necessarily encompassed in the scope of work.

C. MODIFICATIONS TO THE ENGAGEMENT

As the engagement developed, information surfaced necessitating changes and modifications to the original task plan to ensure a satisfactory final product. The following describes the significant modifications made.

1. Expansion of Transformation Procedures to Two Levels

Task 2 of the engagement specified that WCMA would identify, document and flowchart the RAC input data element transformation procedures. It was anticipated that the transformation procedures could be easily documented from the demand forecasting schedules, and that there was only one level of transformation. However, it was soon discovered that both mechanical and nonmechanical transformation procedures existed which were not documented in the RAC.

For example, projecting the population base to be used in applying certain components of RAC requires a transformation of 1970 census data into population data projected for the upcoming year for which RAC is to be applied. While such transformation procedures do not actually occur in the application of RAC, they are essential to its proper application.

Two levels of transformation were designated, T_1 and T_2 . The T_1 designation applies to those transformation procedures that take place prior to and in preparation of a data element for use in the RAC schedules. These T_1 transformation procedures are, in large part, documented based upon interviews with knowledgeable IHS personnel. The T_2 designation applies to those transformation procedures which occur and which are documented in the RAC Workbook.

2. Site Selection Constraints

The IHS currently has eight Area and four Program Offices. Based upon the following criteria, WCMA was to select a representative sample of three, from among the twelve Offices, as those sites to be visited during this engagement:

- Population
- Type of service
- Geographic size and location
- Urban and rural service locations
- Number of IHS facilities
- Geographic distance of population centers from Service Units
- Proportion of expenditures for direct care and for contract services

- Changes in staffing levels over time
- Utilization patterns.

In compiling and analyzing the required data for final site selection, two facts became obvious:

- The sample could not be a representative one.
- The sites chosen could not be Area/Program Offices currently utilizing the Patient Care Information System (PCIS).

a. Non-Representative Sample

It was impossible to select three sites that would be completely representative, in terms of the above selection criteria, of all the Program/Area Offices, because of the variety and complexity inherent in the IHS service system. In fact, each of the twelve sites offered one or more unique qualities. Therefore, emphasis was placed on obtaining enough variance among the final three sites selected to properly flavor the results.

b. Non-PCIS Sites

In order to understand the elimination from the selection process of Area and Program Offices utilizing PCIS, it is first necessary to have a basic understanding of the data collection process of the PCIS system. The PCIS is meant to supplement the IHS data base in Albuquerque and provide data in a form most useful to health care providers as well as the Area and Program Offices. When data are gathered for use in PCIS, additional information supplements the usual data fed to Albuquerque, and a different

format is used. The result is that two differing file management systems are being serviced by PCIS.

Data are gathered at the time of a patient visit. The usual data are gathered about the diagnosis, treatment, resources used and disposition. In addition, more detailed data about the patient is gathered to be linked with the patient's ongoing history. All of the data are then keytaped to the Data Processing Center in Albuquerque where the appropriate data are extracted for the data base. The data are then forwarded to a private contractor (U.S. Data Corporation) who reorganizes the data in such a way that it can be easily incorporated into a file system organized by patient. These data are then forwarded to the Area Office appropriate for each patient where they are linked to that patient's existing file containing medical history and information.

Unfortunately, since the PCIS medical file comes from the same data stream as the data base in Albuquerque, one cannot be used as a cross-check for the other. Eventually, it may be possible to check the original medical records of a patient with PCIS and determine if any discrepancy exists, but PCIS will not be an adequate measure of what exists at the Data Processing Center even then. Additionally, PCIS is relatively new. It is being implemented at three Area/Program Offices: Anchorage, Billings and Tucson. While one of the systems, Tucson, is now fully operational, none were completely operational during the fiscal year selected for study, FY 1979.

II. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

II. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The engagement necessitated that WCMA personnel develop findings, conclusions and recommendations which address:

- The adequacy of methods currently utilized to collect or estimate RAC input data
- The sensitivity of RAC input data and the required levels of accuracy
- The ability of current input creation methods to meet the accuracy requirements
- The overall accuracy of RAC.

The primary objective of the engagement was to analyze and report on the degree of confidence one can place on the results obtained through RAC.

In this chapter, the WCMA findings, conclusions and recommendations are presented. The chapter is organized to first present the findings and conclusions, and then set forth specific recommendations which are designed to address the four issues identified above.

The findings, conclusions and recommendations have been organized into five categories: IHS Official Population Data, Inpatient and Outpatient Data-Direct, Inpatient and Outpatient Data-Contract, and Miscellaneous. When applicable, the number of data elements affected by each finding and recommendation category is also identified to assist in determining the impact of each recommendation on the quality and reliability of the overall RAC application process.

A. IHS OFFICIAL POPULATION DATA

Population and utilization data are the most significant input categories to the RAC methodology. Population data affects, either directly or indirectly, all of the RAC components except maintenance, housekeeping and environmental health, and, therefore, is a prime component in determining the IHS annual service dollar allowance for direct and contract.

FINDING: There is a lack of confidence by Area Offices in the IHS population figures.

There is an overall lack of confidence by Area Offices in the population figures provided them by IHS Headquarters. In general, Area Offices believe the Native American population figures supplied by IHS Headquarters to be low. Area Office personnel feel that the Native American population was grossly undercounted during the 1970 census due to barriers of geography, language, culture and limitations in the methodology used to calculate total population for a specified group. This belief is based upon a comparison of U. S. Census Bureau data with Native American population data provided by BIA as well as Tribal Organization population counts. U. S. Census Bureau data continually depicts a smaller Native American population.

The problem of undercounting has been perpetuated over the seven years for which the U. S. Census Bureau population data has been used in the application of RAC. IHS uses the Bureau of

the Census population data as its official source of Indian and Alaska Native population figures because:

- All federal programs utilizing population in the distribution of federal benefits are required by Congress to use Census Bureau data
- The Bureau of the Census has expended much effort in the planning, gathering, compiling, presenting and evaluating of the data and data collection procedures
- Data are collected, compiled and presented on a uniform basis throughout the entire United States at the same point in time
- Statistical comparisons can be made between Indian and other population groups.

The methodology currently employed by IHS Headquarters to estimate or project Indian and Alaska Native population figures utilizes:

- 1970 Bureau of the Census population data, by county, for Indians and Alaska Natives
- Increase or decrease (births minus deaths), by county from Bureau of the Census data
- Net migration factor (in-migrants minus out-migrants) from Bureau of the Census data.

The products of the last two are added to the first to arrive at an estimated population by county.

CONCLUSION: There are limitations in the current method used to estimate and project Native American population.

The limitations in the current method of estimating and projecting populations are all tied to the inaccuracy of the 1970 U. S. Bureau of the Census population data for Indians and Alaska Natives.

- The U. S. Bureau of the Census estimated the inaccuracy of the Native American census to be at least 7% (Native leaders estimate the error to be as high as 20%). Geography, language and culture presented major barriers to an accurate census.
- Natives may not have been included in Indian, Aleut or Eskimo categories, but rather counted in White or Other categories.
- The U. S. Bureau of the Census net migration figures represent the total population of a county and are not available for any racial group. This makes the broad assumption that Native American migration patterns follow those of the total population and does not take into account the distinct cultural heritage and living patterns of Indian and Alaska Native people. Therefore, estimates could be either extremely high (i.e. in Barrow, Alaska where there is high in-migration due to the pipeline but of White not Indian/Alaska Natives) or low (i.e. in Oklahoma where Native Americans are very transient but this transience is not reflected in the overall pattern of the state).

Often net migration has a small absolute value at the county level and, therefore, this component is subject to a much greater estimate error rate, particularly in counties with small populations (i.e. Alaska boroughs).

- Any major change in normal events will tend to invalidate the projections since statistical methodology assumes the experience of the past will hold in the future and does not provide for changes due to wars, unusual epidemics, major economic depressions, major scientific or industrial developments or other major events which would impact births, deaths and migration.

Much effort has been expended by the U. S. Bureau of the Census, in cooperation with Tribal governments and Federal, State and local agencies, to expand the 1980 census data collection and reporting on American Indians, Eskimos and Aleuts. To help ensure a complete count of American Indians and Alaska Natives the Bureau has:

- Attempted to hire enumerators from within each community and trained personnel to assist Native peoples in completing questionnaires
- Developed a 1980 Census Supplementary Questionnaire for American Indians to collect information on the unique population and housing conditions, as well as information on payments for health care and accessibility and use of health services for use by Tribal governments and the Indian Health Service to plan health programs

- Included the categories "American Indian", "Eskimo," and "Aleut" on both the short and long census forms (Bureau studies have shown that self-identification results in more accurate identification of American Indians)
- Planned expansion of the 1980 census publication program for American Indians, Eskimos and Aleuts (Eskimo and Aleut counts will be available separate from the Indian population count; population, housing and selected social and economic summary data will be available by state, county, reservation and for the state of Alaska by Native villages).

The following recommendations are offered to improve the validity of the IHS population data.

RECOMMENDATION NO. 1:

IHS SHOULD TAKE AN ACTIVE ROLE IN THE CENSUS OF AMERICAN NATIVES, TO ENSURE ITS ACCURACY AND USEFULNESS.

It is unfortunate that this report follows on the heels of the 1980 census, which will play such a major part in the allocation of resources over the next decade. However, the 1980 census has included a number of innovations, as previously mentioned, which were specifically designed to assure as complete a count as possible of the Native American population. The Indian Health Service can implement, within the ensuing years, procedures for most effective use of the 1980 census and to improve the count in 1990. The most important of these

would be publicity oriented to inform Native Americans of the importance of complete and accurate census data to optimum delivery of services that are needed in their area. While the Bureau of the Census has designed attractive brochures and posters to explain the importance of the census to the Native American community, IHS could work, perhaps in cooperation with the BIA, to develop a liaison relationship with the Bureau of the Census, and become actively involved in:

- Widespread distribution of the census information brochures and posters
- Recruitment of indigenous enumerators, including recommendation of Native American persons for employment by the Bureau of the Census
- Organizing meetings with American Indians and Alaska Native organizations to discuss ways and means of utilizing 1980 census data, and improving the 1990 census.

RECOMMENDATION NO. 2

IN THOSE YEARS WHEN THE ACCURACY OF THE U. S. BUREAU OF THE CENSUS DATA IS SUSPECT, IHS SHOULD SEEK EXEMPTION FROM THE CONGRESSIONAL REQUEST THAT IHS UTILIZE SUCH DATA.

If, in the opinion of IHS, the census data available from the Bureau of the Census is not as accurate as other BIA or IHS population data, then IHS should seek a waiver in so doing, it is incumbent on IHS to justify the waiver.

and to demonstrate how utilizing the other population data is statistically more accurate. Seeking the waiver should be accomplished on an Area by Area basis to allow for the degree of discrepancies that may occur among tribes and IHS Area Offices. This approach will minimize erring in the other extreme by assuming all Bureau of the Census population data is substantially incorrect.

RECOMMENDATION NO. 3:

IHS SHOULD DEVELOP, AT THE AREA OFFICE LEVEL MORE ACCURATE MEANS FOR PROJECTING AMERICAN NATIVE MIGRATION.

The 1980 Supplementary Questionnaire for American Indians includes questions regarding migration characteristics. Questions on migration are intended to provide information showing the extent of movement by American Indians, Eskimos and Aleuts onto reservations. This information, when available (FY 1981-1982) should be examined by IHS Area Offices to determine accuracy and applicability to the demand forecasting process. Migration patterns are important because of their potential influence on health care utilization.

B. INPATIENT AND OUTPATIENT DATA - DIRECT

The inpatient input category affects 15 RAC data elements which in turn affect 30 of the RAC components (see Volume II, Attachment I). Inpatient services determine approximately 30%

of the Indian Health Service annual direct service dollar allowance. The outpatient input category affects 13 RAC data elements which in turn affect 10 of the RAC components. Outpatient elements determine approximately 18% of the Indian Health Service annual direct service dollar allowance.

1. Inpatient

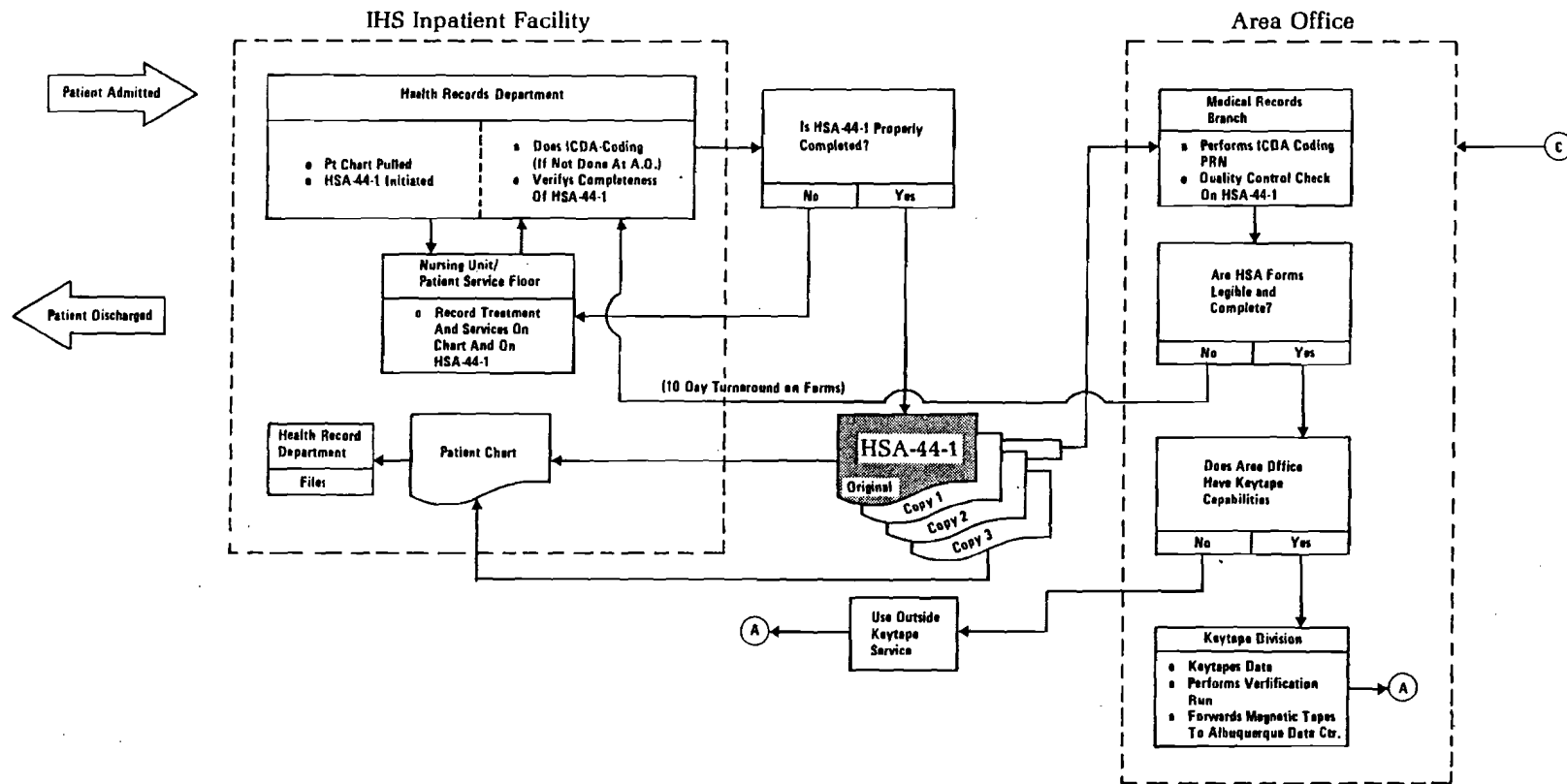
Inpatient identifiers are generated at the time the patient enters a hospital/medical center. Inpatient utilization statistics are generated when the patient is discharged. The typical inpatient process begins when the patient enters the hospital/medical center. A medical record file is pulled or created and a plastic card is used to imprint patient identifiers on the HSA-44-1 (IHS Clinical and Record Brief). The patient is screened/diagnosed/treated and the information entered in the medical record and on the HSA-44-1. When the patient is discharged, the HSA-44-1 is completed and copies pulled for eventual forwarding (usually on a weekly basis) to the Area Office. One copy is sent to the processing center for keytaping. Once keytaped, the information is fed to the center in Albuquerque which generates the inpatient data used in applying the RAC. (See Exhibit A on the following page.)

2. Outpatient

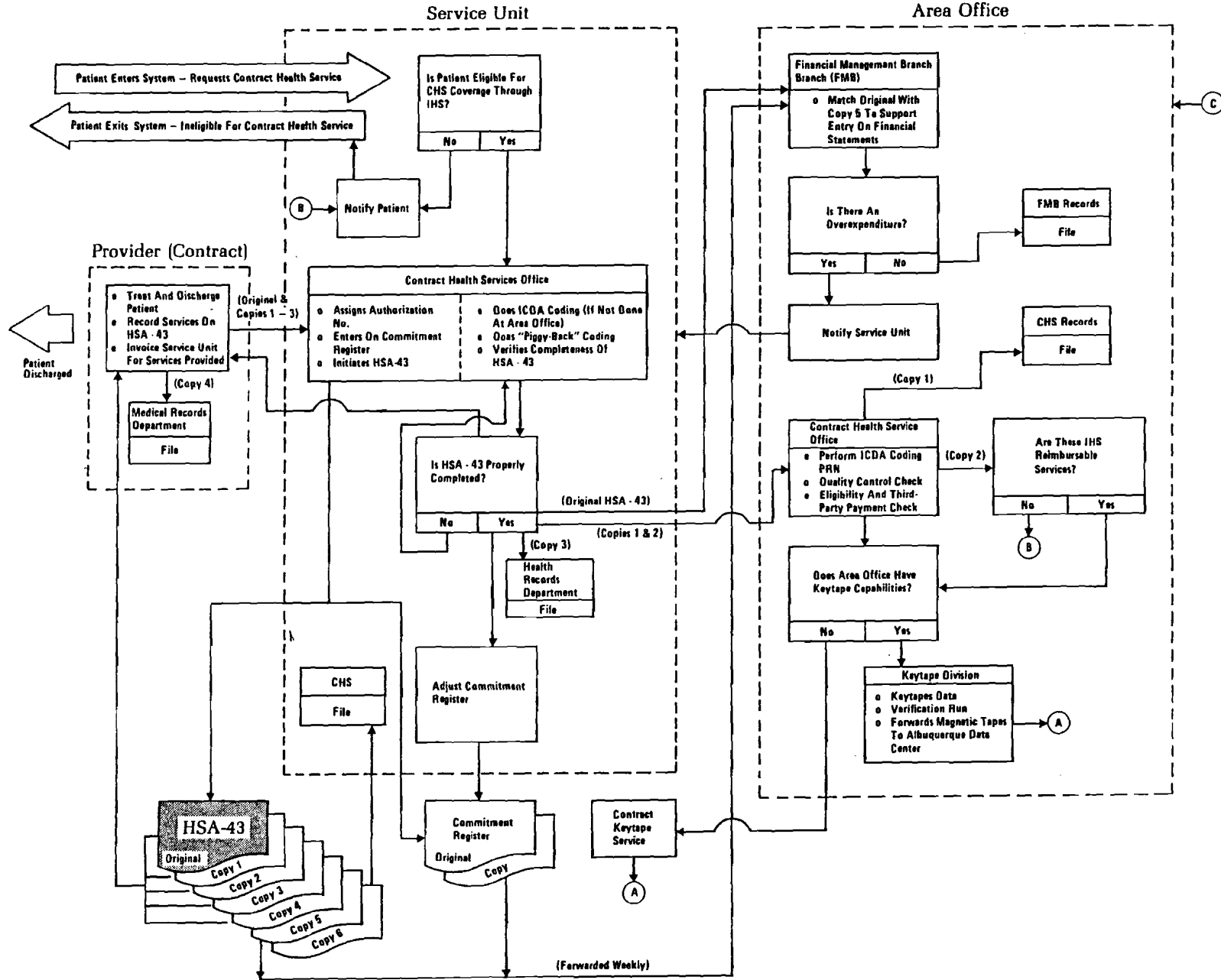
Outpatient identifiers and utilization statistics are generated during the outpatient visits. While procedures for the walk-in or patient with an appointment vary somewhat by Area, there is a basic continuity among them. Typically, a

Flow Chart Of IHS Direct And Contract Inpatient Data

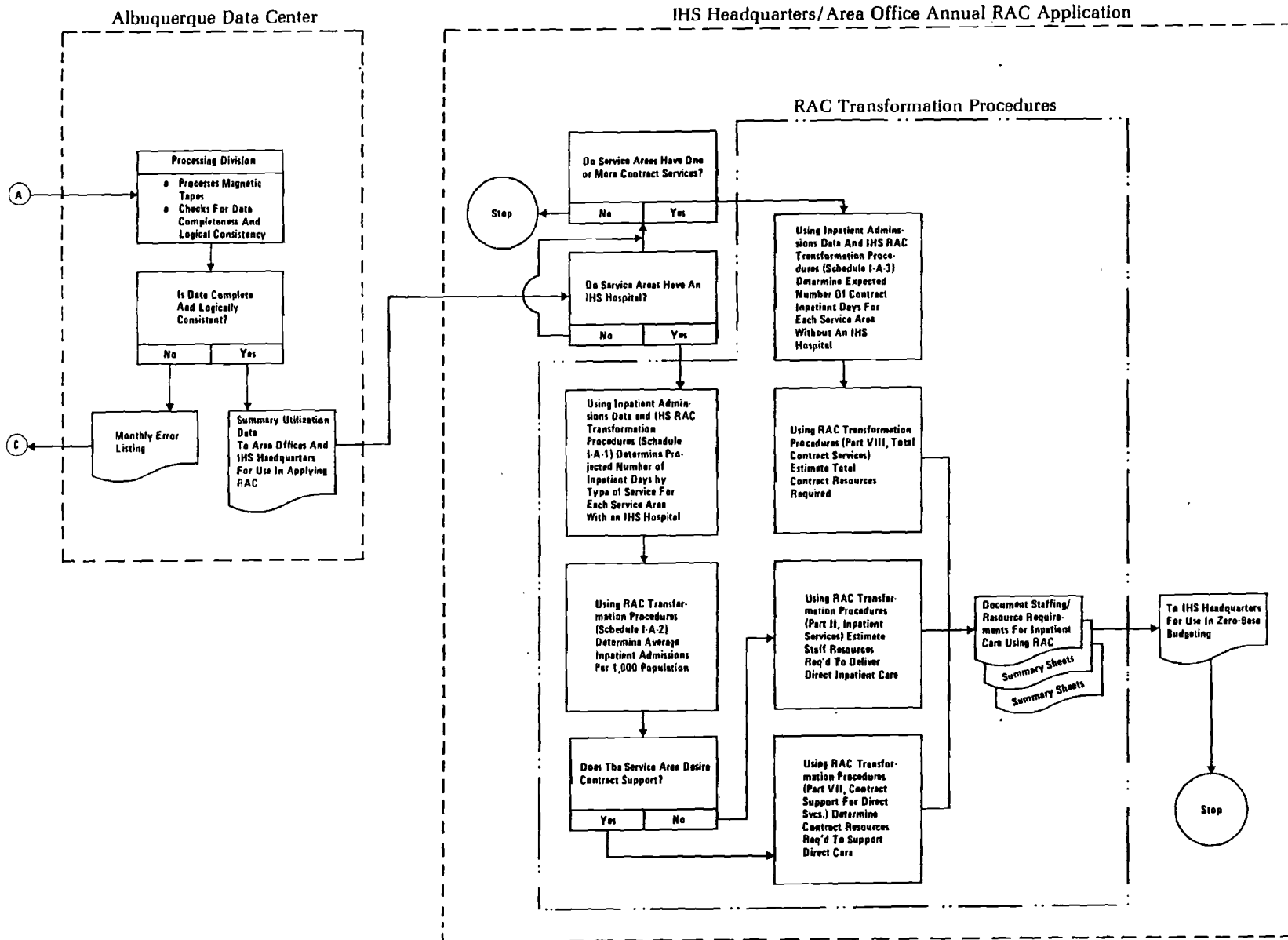
1. IHS Direct Inpatient



2. IHS Contract Inpatient



3. IHS Direct And Contract Inpatient Data Processing And RAC Application



walk-in will present himself to a clerk at the outpatient station. The clerk pulls the patient's file and using the plastic patient identification card, imprints the required data on the IHS Ambulatory Patient Care Report Form (HSA-406). The HSA-406 is then clipped to the patient's medical record and forwarded to the attending physician. After completion of patient diagnosis, the physician enters a limited amount of information on the HSA-406 and returns the patient record to the original clerk, who removes the HSA-406 for processing.

The HSA-406 forms are grouped by day and retained for weekly transmittal, via the Area Office, to the processing center for keytaping. Once keytaped, the information is fed to the Data Processing Service Center in Albuquerque which generates the outpatient data used in applying RAC. Patients keeping scheduled appointments are handled in a similar fashion with the variation that the medical record is generally pulled prior to patient arrival and HSA-406 forms imprinted in preparation for the scheduled appointment. (See Exhibit B on the following page.)

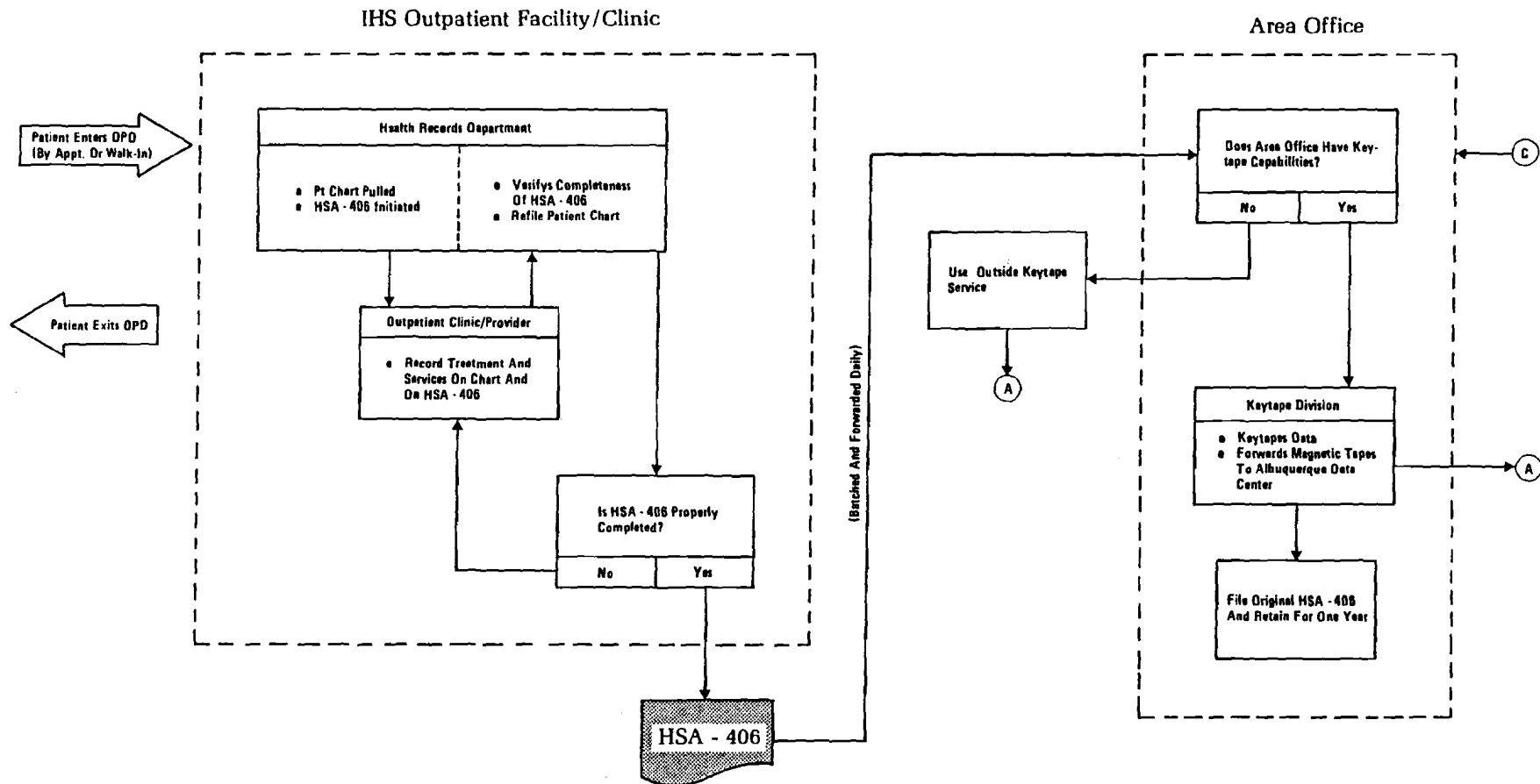
3. Findings, Conclusions and Recommendations

FINDING: A patient may be assigned more than one identification number

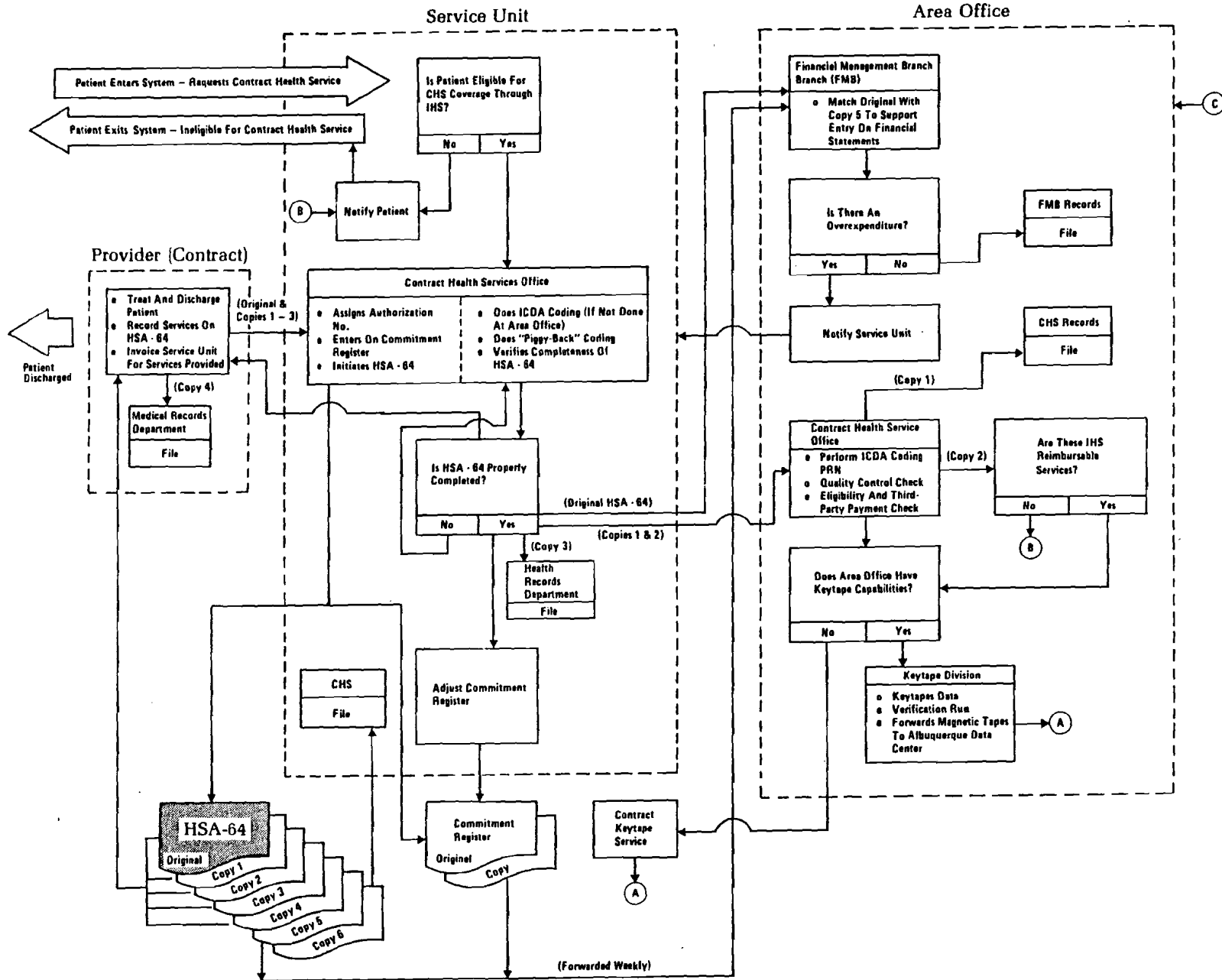
Currently, a patient's identification number is unique only to the facility at which the patient is being served. Should the patient travel to another facility, even

Flow Chart Of IHS Direct And Contract Outpatient Data

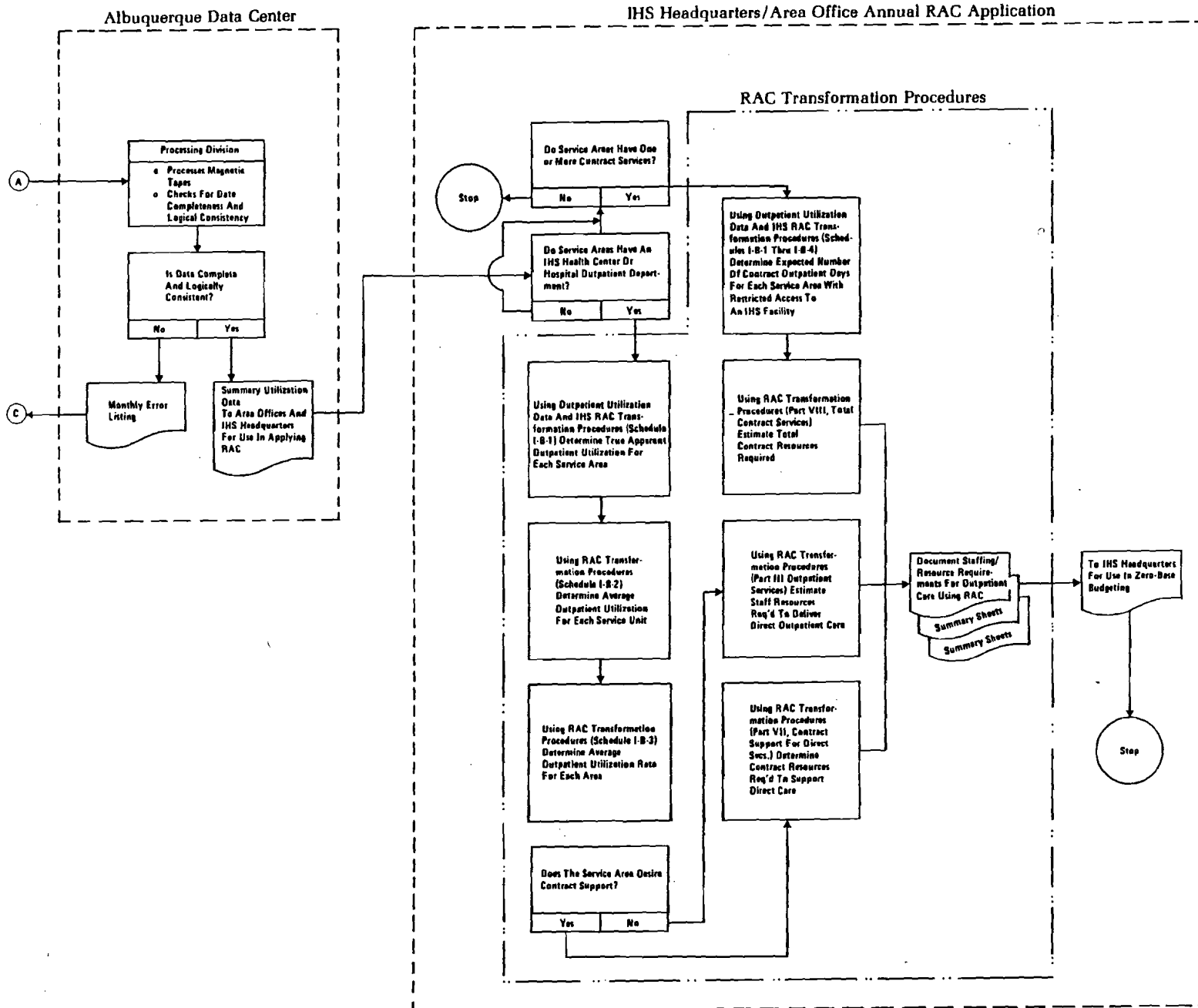
1. IHS Direct Outpatient



2. IHS Contract Outpatient



3. IHS Direct And Contract Outpatient Data Processing And RAC Application



within the same Service Unit, he/she will receive another identification number. Large segments of the Indian and Alaska Native population are highly transient. Therefore, it is likely they will be served by multiple facilities. It is not unusual that from birth to five years of age a patient may receive as many as six identification numbers within the same IHS Area, in addition to those which may have been received had they traveled outside the Area.

CONCLUSION: It is difficult to compile the entire medical record of a single individual seen at multiple facilities as the system now operates.

If an IHS beneficiary is seen at more than one IHS facility, he will have multiple patient identification numbers, one for each facility at which he was served. Clinical personnel, health planners, or the patient himself attempting to compile an entire medical record of the individual must be able to specify each facility, by Service Unit and Area Office, at which the patient was served. They must also be able to specify the patient identification number assigned to the patient at that facility in order to access all the information. As a result, it is unlikely that the complete medical record of a transient patient could be compiled.

FINDING: More than one patient may
be assigned the same identification
number.

On the basis of a random selection of patients by their identifier numbers from printouts from the Albuquerque Data Processing Service Center, discrepancies were found when the information contained in the printouts was compared to the information in the patient records available in the health records at the specified facility. Sex, age, tribe, community of residence and similar demographic information did not match. In some instances, a patient identified by the printout as being served during FY 1979 would be recorded at the facility as having died years before.

CONCLUSION: Due to the duplicity of patient
identification numbers the compila-
tion of information may not relate
to the patient whose record has been
requested.

The WCMA data sample indicated an inconsistency (as opposed to error) rate of 5% to 10% when comparing computer data to the patients' medical records. In our opinion, this is a direct result of duplication of patient identification numbers within an Area.

RECOMMENDATION NO. 4:

A UNIQUE PATIENT IDENTIFICATION NUMBERING
SYSTEM SHOULD BE DEVELOPED FOR EACH AREA
OFFICE.

The development and application of a unique patient numbering system nationwide should alleviate the difficulties encountered as a result of multiple numbers per patient and multiple patients per number.

The Tucson Program Office, as part of their efforts to convert to the Patient Care Information System (PCIS), is experimenting with the use of unique patient identification numbers (utilizing Social Security numbers) at the Area level. Appropriate individuals should be interviewed and the Tucson Program Office experience examined to identify the difficulties and benefits of implementing a unique patient numbering system at the Area level and nationwide.

FINDINGS: Expeditious compilation and processing of patient information is hindered by illegible information.

Illegible information results in an inaccurate or incorrect record of patient data.

Depending on the Service Unit, anywhere from 5% to 17% of the medical record forms (inpatient Form HSA-44-1 and Outpatient Form HSA-406) examined contained illegible information.

The illegible information was consistently found to be in fields 1-8 of the medical record forms. Additionally, three-fourths of the errors identified by the Albuquerque Data Processing Service Center are in fields 1-8. Fields 1-8 consist of the

patient identification information (name, patient number, date of birth, sex, tribal code, and community of residence) used to aggregate medical information both statistically and by individual patient. Therefore, statistical reports or patient medical files may be incomplete due to illegible information on the medical record forms.

Lacking legible information, processing the medical record forms and sending them to the Albuquerque Data Processing Service Center is slowed or altogether eliminated. As a result, an inaccurate accounting of number of admissions or outpatient visits will occur in the output computer data to be utilized in the application of RAC. Additionally, there is the risk that incorrect patient identifiers will be entered.

CONCLUSION: Imprinters transfer poor images.

All of the inpatient and outpatient facilities visited utilized a plastic card for imprinting the patient identifiers found in Fields 1-8 on the HSA-44-1 and HSA-406 medical forms. It was concluded that the imprinters transferred poor images to the medical forms causing part or all of the information to be illegible.

RECOMMENDATION NO. 5:

THE IHS SERVICE UNITS SHOULD ASSURE THAT PATIENT IDENTIFICATION CARD IMPRINTING EQUIPMENT IS PROPERLY MAINTAINED, AND REPLACED WHEN NECESSARY.

Although the distribution and application system of the plastic card for patient identification is adequate, much of the machinery and accessories are antiquated or worn and render the entire process ineffective. Failure to repair/replace the imprinting equipment renders ineffective an otherwise efficient patient processing system.

FINDINGS: There is high turnover in keytape personnel at Area Offices.

Area Offices lack well-established protocols to govern tracking, storage and security of medical forms.

Keytaping personnel within IHS appears to be an area of high turnover. Two of the three Area Offices visited were 50% understaffed in the keytaping section. Three of the keytape personnel questioned had only been in their present position a brief period, those who had left had been at the keytape position less than one year, and two currently filling keytape positions were leaving within one month.

The new keytape personnel were unfamiliar with the tracking and filing protocols of the Area Office, and were unaware of the existence of any written protocols to govern tracking, filing and security procedures for patient records. Additionally, storage areas were not clearly marked as to their contents.

CONCLUSION: Patient records could easily be misplaced, lost or subject to security violations.

Two of the three sites visited reported misplacing one week's batch of inpatient records and one month's batch of outpatient records as a result of new personnel being unfamiliar with filing procedures. Patient records which had not yet been keytaped were inadvertently filed in a storage area containing keytaped records. The errors were not discovered until months later while comparing Area Office known utilization data with that fed back from the Albuquerque Computer Center.

RECOMMENDATION NO. 6:

IHS SHOULD DEVELOP AND IMPLEMENT COMPREHENSIVE FILING AND DOCKETING PROTOCOLS FOR THE PROCESSING CENTER.

Storage areas should be clearly marked as to their contents. Protocols should be formalized and well established as part of keytape personnel orientation material to serve as guidelines for new personnel and to provide continuity in the processing center routines. Bi-weekly comparisons should be made by Program Planners, or other key personnel, of records kept at the Area Office with data output from Albuquerque and any major discrepancies investigated to determine cause.

FINDING: There is a significantly lower error rate in inpatient data.

All Area Offices visited had verification runs performed on all inpatient data keytaped. The verification runs entail keytaping the inpatient data a second time by someone other than the original keytaper and noting discrepancies. In no instances were verification runs performed on all outpatient data keytaped.

It is not possible to perform a verification run on all HSA-406 forms which enter the processing center. The volume of ambulatory care data far exceeds the keytaping capability thus limiting the ability to verify the original keytape. Some spot checking was done on outpatient data and, where this occurred, there was a slight decrease in error rate.

CONCLUSION: The verification process significantly reduces the amount of errors in keytaped data.

A significantly lower error rate was found in inpatient data than in the outpatient data. While some of this may be attributed to the smaller volume of inpatient data it is also influenced by the verification process.

A much higher basic error rate occurs in the ambulatory care data because the volume of ambulatory care data far exceeds keytaping capability and significantly limits the ability to verify the original tapes.

RECOMMENDATION NO. 7

IHS AREA OFFICES SHOULD CONTINUE INPATIENT DATA VERIFICATION RUNS, AND IMPLEMENT PROCEDURES FOR PARTIAL VALIDATION OF OUTPATIENT DATA.

The inpatient verification practice should be continued where now in operation, and implemented where not currently used. A procedure for partial validation, through random sampling, of the outpatient data should be developed and implemented at all IHS data processing centers.

FINDING: A number of inpatient and outpatient forms never enter the IHS data system.

A number of inpatient forms never enter the IHS data system. HSA-44-1 forms returned to providers for corrections or additions may be discarded by clinical and administrative personnel who fail to see any clinical use for the form.

A number of outpatient forms never enter the IHS data system. After diagnosis, it is sometimes necessary to admit a patient. When this occurs, the Outpatient or HSA-406 form is not always removed from the medical record and is not noticed until the patient is discharged. Weeks may have passed from admission to discharge of the patient and the HSA-406 form will be discarded in the belief that it is no longer of use.

An even greater number of outpatient forms are eliminated from the IHS data system because outpatient services are often provided in an environment removed from the routines of a hospital/medical center. Clinics are periodically set up, for a period of one day to one week in schools, trailers or on

an itinerate basis to provide services to those in remote or isolated areas. The providers who service these clinics often neglect to carry HSA-406 and other ambulatory patient care data forms with them, and may report information inaccurately or not at all upon return to their office. Orienting such providers as to the importance of completeness and accuracy in reporting ambulatory patient care data to proper resource allocation may inspire these providers to collect the data more carefully.

Additionally, the Indian Health Service, through tribal contracting programs, employs CHAs (in Alaska only) who work at the village level and are responsible for completing ambulatory patient care data forms. CHAs generally receive one to three weeks training at the service area and can maintain contact with the service area by telephone communication. Itinerate visits are made to the areas on an average interval of once a month. In the interim, the CHA is expected to maintain records of patient visits (number of visits, diagnosis, treatment, etc.). Such records serve as the source documents utilized in determining demand as well as providing itinerant clinicians with patient information. It is unreasonable to expect that a CHA, with limited exposure to the intent of such records will fully comprehend the need to maintain accurate records.

Cultural factors such as language and subsistence living present additional barriers to maintaining comprehensive records at the source level. Given the level of sophistication of the health records, relating other than the most common diagnosis can prove an obstacle to the CHA. When the CHA is away from the structure of the health station, there is even less motivation to CHAs to record health information.

CONCLUSION: There is a lack of basic orientation and training programs as well as systems checks directed toward the importance of accurate inpatient and outpatient reporting.

There is no actual accounting of how many inpatient or outpatient forms were discarded, lost or simply never initiated. The overriding reason for this is that there are no systems in place to:

- Monitor the flow of inpatient forms returned to providers for additional information
- Ensure removal of APCs from medical records when a patient is admitted
- Assess the number of patients seen by itinerant physicians for which no APC forms were submitted
- Assess the reporting accuracy of CHAs.

Such systems need to be put in place, along with orientation and training programs regarding the value of accurate reporting of patient care.

RECOMMENDATION NO. 8:

IHS SHOULD ASSESS THE FEASIBILITY OF
DEVELOPING THE HSA-44-1 AND THE HSA-406
AS CLINICAL MANAGEMENT TOOLS

There is no record of the number of forms returned to clinicians and subsequently discarded. An assessment of the extent of the problem should be made, and actions taken commensurate with the severity of the problem. Options include reworking of the inpatient reporting form to make it more usable as a clinical tool, as well as development of procedures to enhance the clinical aspects of the clinician's work and to minimize the administrative burden to them.

RECOMMENDATION NO. 9:

IHS SHOULD ASSESS THE NEED FOR AN INVENTORY
REPORTING PROCEDURE WITHIN THE INPATIENT
AND OUTPATIENT REPORTING SYSTEMS

It is difficult to assess the extent of the problem of discarded forms if there is no means in place to track for discarded medical forms. Installation of an inventory procedure into the reporting system would provide means to monitor the flow of inpatient and outpatient forms returned to providers for additions or corrections.

RECOMMENDATION NO. 10:

AREA OFFICES SHOULD REVIEW SYSTEMS CHECKS
AND IMPLEMENTATION OF NECESSARY CHANGES.

Medical records should be reviewed to determine how often outpatient forms inadvertently remain with a medical record when a patient is admitted to a facility. If it is found to be a significant problem, a check should be placed in the system to eliminate the problem. Such a check could be as simple as designating a clerk as the individual responsible for checking for and removing all APCs from the medical records of outpatients prior to the patient's admission into a medical facility.

RECOMMENDATION NO. 11:

IHS SHOULD DEVELOP AND IMPLEMENT A PROGRAM TO INCREASE CLINICAL AND ADMINISTRATIVE PERSONNEL AWARENESS OF THE IMPORTANCE AND UTILITY OF ACCURATE AND COMPLETE INPATIENT DATA.

Orientation of providers who service outpatient clinics as to the importance of completeness and accuracy in reporting ambulatory patient care data to proper resource allocation may inspire these providers to collect the data more carefully. Those providers who receive inpatient forms for corrections may be more inclined to supply the missing information and to take more care to complete the forms accurately the first time.

RECOMMENDATION NO. 12:

IHS SERVICE UNITS SHOULD ORIENT PROVIDERS TO THE NECESSITY OF CARRYING AND USING HSA-406 FORMS DURING ITINERANT VISITS.

An orientation program should be developed to inform medical and administrative staff of the need for and value of accurate and complete data to the proper allocation of resources. The program should provide an overview of how the system works and the use of the data that is generated by these IHS personnel.

RECOMMENDATION NO. 13:

IHS SERVICE UNITS SHOULD DEVELOP AND CONTINUALLY IMPLEMENT A TRAINING PROGRAM FOR COMMUNITY HEALTH AIDES (CHAs) COMPLETING AMBULATORY PATIENT CARE DATA FORMS.

Training should be provided to the CHAs similar to that recommended for hospital/medical center staff, but on a more basic level. A review of the methods used to train or prepare CHAs to collect input data would be useful to determine if attempts are being made to assist CHAs in overcoming the barriers to complete and accurate maintenance of health records and to bring closure to the CHAs' efforts. It is imperative that training for CHAs be ongoing. CHAs have only limited contact with the Service Unit and Area Office, necessitating continual training to reinforce the concepts being taught. Periodic validation of data collection through random sampling of the CHAs health records and feedback as to areas requiring improvement would provide an additional learning process for the CHAs.

FINDING: Alcoholism is not always reported.

Currently, alcoholism is not being consistently reported. If reported, it is generally recorded as a secondary diagnosis. For example, a patient with a fracture enters the IHS health service system. The fracture is due to a fall suffered by the patient as a direct result of being inebriated. The patient will be treated for the fracture, but not always the alcoholism.

CONCLUSION: There is a reluctance by health providers to diagnose alcoholism.

There appears to be a reluctance by health providers to diagnose alcoholism. There is a stigma attached to alcoholism both culturally and socially. Additionally, the IHS health delivery systems often lack the support services necessary to respond adequately to the problems of such patients and their families.

RECOMMENDATION NO. 14:

IHS SHOULD REQUIRE ALCOHOLISM TO BE REPORTED AND RECORDED AS A PRIMARY DIAGNOSIS WHEN APPROPRIATE.

Provision should be made for reporting and recording alcoholism as a primary diagnosis when appropriate to ensure proper clinical management of the patient and reporting of clinical data. Resource allocation is based upon utilization. Without complete reporting of alcoholism data, IHS will always be lacking the resources necessary to provide the full range of treatment and support services such patients and their families require.

c. CONTRACT DATA

This input category affects 27 data elements which in turn affect 22 of the RAC components (see Volume II, Attachment 1). Contract services determine approximately 19% of the Indian Health Service annual allowance.

There are two varieties of contract service utilized by the Indian Health Service. Direct health care services provided by IHS are often supplemented through contract support to direct services. In this instance, IHS contracts with the private sector in areas of specialty care and emergency care, as well as ancillary, dental, optometry and audiology services. When IHS services are not available in a specific area, total contract services are provided to assure adequate resources are available to IHS beneficiaries.

FINDING: In projecting demand for contract health services, the RAC relies heavily on historic utilization.

The demand for contract health services is projected using historic utilization for contract and direct. The difference between the projected sum of the two, and those needs which will be met through direct services, is the demand for contract services. The historic contract utilization figure typically reflects full use of the previous fiscal year's authorized contract expenditures. However, full use of contract dollars does not ensure that the entire demand for these services has been met.

CONCLUSION: There is no reconciliation of unsatisfied demand during those times contract funds are unavailable.

When using the RAC projected contract utilization value, there is no reconciliation of unsatisfied demand during those times contract funds are unavailable. It is not uncommon for contract physicians and dentists to provide services for Natives only during that portion of the year during which the provider is receiving funding. For example, a physician may have a contract to provide \$75,000 per year worth of services. These services may be utilized and contract funds depleted during the first quarter of the fiscal year. Demand for these services may then go unmet for the remainder of the fiscal year, seriously skewing the year's end utilization rate.

RECOMMENDATION NO. 15:

THE AREA OFFICES SHOULD ANNUALLY EXAMINE WHETHER OR NOT THE PROJECTED UTILIZATION OF CONTRACT SERVICES REFLECT ACCURATELY ACTUAL NEED FOR CONTRACT SERVICES

The projection for contract services is based upon historic utilization of those services. However, because some services were not rendered due to budgetary constraints the utilization projections will be incorrect. The Area Office should identify the amount of utilization that was not experienced and include it as part of the historic utilization for purposes of the

projection. The effect of overstating historic utilization will not be to overstate the projected need because the need always existed but could not be met because of financing limitations.

FINDING: RAC does not provide a mechanism for projecting the additional administrative costs and technical assistance requirements incurred with "638" contracting.

The intent of P. L. 638 is for IHS to allow American Native organizations to become involved in their own health care. There are a substantial number of "638" contracts in effect in the IHS Area and Program Offices. However, the RAC methodology does not provide any means for determining the personnel and dollar resources required to monitor and provide technical assistance on "638" contracts.

CONCLUSION: The internal costs to IHS of "638" contracting cannot be determined.

As "638" contracts increase in both number and dollar size, the amount of administrative time required to monitor and provide technical assistance on these contracts also increases at both the Service Unit and Area Office level. RAC allocates administrative positions for each Area Office. However, the RAC methodology as currently devised does not account for the administrative activities of "638" contracting.

RECOMMENDATION NO. 16:

IHS HEADQUARTERS SHOULD DEVELOP A METHODOLOGY FOR IDENTIFYING AND PROJECTING THE ADMINISTRATIVE AND TECHNICAL ASSISTANCE COSTS INCURRED WITH "638" CONTRACTING

The internal costs associated with "638" contracting primarily consist of personnel and travel expenditures. A system to record the amount of time and travel expenses IHS personnel spend in administrative matters and providing technical assistance for "638" contracts should be implemented. This can be done by establishing a time and expense sheet to be completed every two weeks. The sheets can then be tabulated on a monthly basis and costs allocated to the various "638" activities.

FINDING: Pertinent data is frequently missing from the HSA-43 and HSA-64 contract reporting forms.

Contract inpatient (HSA-43) and outpatient (HSA-64) health service records are initially completed by the contract care provider. Afterwards, they are forwarded to the Service Unit, the information is entered on a commitment register (committing funds) and the records are then batched and forwarded on a weekly basis to the Area/Program Office Contract Health Service Branch with a copy of the commitment register. The Area/Program Office checks that all documents on the commitment register are accounted for and that patient identifiers, provider codes, diagnoses, etc., are included on the forms. Corrections are made

where possible, however, if a diagnosis is missing the form must be returned to the Service Unit, which must then obtain the missing data from the contractor. From discussions with IHS contract personnel the problem of missing data is a common one. (See Exhibit A, following page II-9, for contract inpatient data flow and Exhibit B, following page II-10, for contract outpatient data flow.)

When contract services have been performed and the provider bills for those services, the provider may only have the patient's home address, may not know that the patient is covered by IHS, and bill the patient directly.

CONCLUSION: Contractors either do not know how to properly fill-in the HSA-43 and HSA-64, or lack incentive and interest to do so.

Payments to contractors and the accumulation of contract data is delayed because of incomplete forms.

The frequency with which contract forms are missing data and IHS beneficiaries are incorrectly billed would indicate either a lack of incentive and interest in or understanding about properly filling out the IHS contract forms on the part of the contractor. Whatever the cause, the direct result is a delay in payments to the contractor and a lag in the accumulation of contract data for IHS.

RECOMMENDATION NO. 17:

A PROCEDURE SHOULD BE DEVELOPED AND IMPLEMENTED BY AREA OFFICES' CONTRACT HEALTH SERVICE BRANCH WHICH PROVIDES INFORMATION TO CONTRACTORS CONCERNING THE IMPORTANCE OF SUBMITTING ACCURATE AND COMPLETE DATA ON HSA-43 AND HSA-64 FORMS.

This can be accomplished by developing and distributing instructions to contractors on how to correctly complete the forms. Periodically, this can be reinforced by IHS personnel at the time contracts are negotiated and during on-site management reviews.

FINDING: Contract health service providers are not always audited.

The health services provided by contract to IHS beneficiaries are not always audited to determine if the services are actually being provided. The problem has risen primarily with individual contractors providing itinerant health services.

CONCLUSION: There is no means for knowing if the contract services are actually being provided.

Contractors providing itinerant health services seldom receive a scope of work identifying the number of procedures, visits, etc., for which they are being paid. Recognizably, this is difficult when the range of needed services is not known at the time of contract award.

Without a scope of work or guidelines, it is difficult to determine if the provider is actually delivering the services for which he is being paid.

RECOMMENDATION NO. 18:

AREA OFFICES SHOULD DEVELOP AND IMPLEMENT PROCEDURES TO ENSURE CONTRACTED SERVICES ARE ACTUALLY BEING PROVIDED TO IHS BENEFICIARIES.

A selective audit procedure of contractor records coupled with a validation survey of service recipients might accomodate the situation. In addition, periodic on-site visits can be made to determine, by sample, if the services are being received by IHS beneficiaries.

FINDINGS: Numerous bills for contract services are submitted after the close of a fiscal year.

Numerous bills are submitted, for which funds were not obligated, after the close of a fiscal year. For example, a patient may have had private insurance. Funds would not have been obligated to pay for the difference between covered and non-covered items. Bills may also be received which are for services provided two to three years ago for which there are no funds available during the current fiscal year.

CONCLUSIONS: Bills for contract services, submitted after the close of the fiscal year during which the services were provided, distorts the contract resource requirement.

System-wide bills for contract services submitted after the close of a fiscal year can significantly distort the contract resource requirement and subsequently over or understate the projected contract resource required in the next year.

RECOMMENDATION NO. 19:

AN INCREASED EFFORT SHOULD BE MADE TO OBTAIN ALL POSSIBLE CONTRACTOR INVOICES BEFORE CLOSING THE FISCAL YEAR END BOOKS.

Contractors should be required to submit timely invoices with the understanding that those invoices presented in excess of 30 days after the fiscal year closes should be disallowed for payment. Given the disincentive of potentially reduced revenues, it is possible the invoices will improve.

Another, and perhaps, more realistic solution is to place all contract providers on a letter of credit. This is optional for contracts valued at \$60,000 to \$120,000 and mandatory for those valued above \$120,000. (It cannot be used for contracts valued at less than \$60,000.) A monthly draw down is arranged and then verified by the invoices monthly, quarterly or at year's end.

D. SENSITIVITY ANALYSIS OF THE RAC INPUT DATA

The sensitivity analysis examined the degree of error caused in the output for a given error (plus or minus 15%) in the input to RAC. The RAC staffing tables were used to perform the sensitivity analysis.

FINDING: The RAC staffing tables are relatively insensitive from a statistical perspective.

In the sensitivity analysis, it was found that permutations of plus or minus 15% to the input data provided the full range of changes in the output from the staffing tables. Anything less than 15% often showed no change in the output because it was too small to be noticed. For example, the sensitivity results calculated on Table II-A-7-b, Part 5 (Exhibit C on the following page) using an assumption of a 15% error rate in the input data, are listed below:

<u>Point</u>	<u>Input to Table</u>	<u>Output from Table</u>	<u>Change in Manpower Level (+ or -)</u>	
			<u>M</u>	<u>M%</u>
1	1,625	14.9	1.24	8.3
2	4,125	27.9	3.28	11.8
3	13,125	71.4	14.34	20.1
4	25,625	135.5	19.68	14.5

These results are quite representative of the sensitivity analysis. The staffing tables are relatively insensitive from a statistical perspective. Less than one quarter of 15% or more in the output (manpower). This was especially true for the

EXHIBIT C

TABLE II-A-7-b
Page 2 of 2

PART II: INPATIENT SERVICES
SECTION A: BASIC FACILITY
FUNCTION 7: NURSING SERVICES

SUBFUNCTION: PEDIATRICS

INSTRUCTIONS 7.1: TYPE 1 NURSING SERVICE*

PEDIATRIC NURSING STATIONS	EXPECTED INPATIENT DAYS PER YEAR IN PEDIATRICS**	NUMBER OF EMPLOYEES								
		DIRECTOR OF NURSES	ASSISTANT DIRECTOR OF NURSES	NURSING EDUCATOR	HEAD NURSE	REGISTERED NURSE	LICENSED PRACTICAL NURSE	NURSING ASSISTANT	CLERK	TOTAL EMPLOYEES
PART 5 3	0 - 874	0.2	0.5	0.1	1.6	7.5	0.0	0.0	0.0	9.9
	875 - 1,374	0.2	0.5	0.1	1.7	10.0	0.0	0.0	0.0	12.5
	1,375 - 1,874	0.2	0.5	0.1	1.7	12.4	0.0	0.0	0.0	14.9
	1,875 - 2,374	0.2	0.5	0.1	1.8	14.0	0.0	0.0	1.0	17.6
	2,375 - 2,874	0.2	0.5	0.1	1.8	14.8	1.8	0.0	1.0	20.2
	2,875 - 3,374	0.2	0.5	0.1	1.8	15.4	3.4	0.0	1.4	22.8
	3,375 - 3,874	0.2	0.5	0.1	1.9	15.9	5.1	0.0	1.5	25.2
	3,875 - 4,374	0.2	0.5	0.1	1.9	16.5	3.5	3.5	1.7	27.9
	4,375 - 4,874	0.2	0.5	0.1	2.0	17.1	4.4	4.3	1.9	30.5
	4,875 - 6,874	0.2	0.5	0.1	2.0	17.7	5.2	5.2	2.0	32.9
	6,875 - 9,374	0.2	0.5	0.1	2.2	21.9	9.0	9.0	2.9	45.8
	9,375 - 11,874	0.2	0.5	0.1	2.4	28.5	11.6	11.6	3.8	58.7
	11,875 - 14,374	0.2	0.5	0.1	2.6	37.9	14.3	11.2	4.6	71.4
	11,375 - 16,874	0.2	0.5	0.1	2.8	47.3	16.9	10.9	5.5	84.2
	16,875 - 19,374	0.2	0.5	0.1	3.0	47.9	19.5	19.6	6.3	97.1
	19,375 - 21,874	0.2	0.5	0.1	3.0	54.4	22.3	22.2	7.2	109.9
	21,875 - 24,374	0.2	0.5	0.1	3.0	61.0	24.9	24.9	8.1	122.7
	24,375 - 26,874	0.2	0.5	0.1	3.0	67.5	27.7	27.6	8.9	135.5
	26,875 - 29,375	0.2	0.5	0.1	3.0	74.5	30.5	30.5	9.0	148.3
	29,375 - 30,000	0.2	0.5	0.1	3.0	81.6	33.5	33.3	9.0	161.2
PART 4 4	0 - 874	0.3	0.7	0.2	2.2	9.1	0.0	0.0	0.0	12.5
	875 - 1,374	0.3	0.7	0.2	2.2	11.7	0.0	0.0	0.0	15.1
	1,375 - 1,874	0.3	0.7	0.2	2.3	14.1	0.0	0.0	0.0	17.6
	1,875 - 2,374	0.3	0.7	0.2	2.3	16.7	0.0	0.0	0.0	20.2
	2,375 - 2,874	0.3	0.7	0.2	2.4	19.2	0.0	0.0	0.0	22.8
	2,875 - 3,374	0.3	0.7	0.2	2.4	20.0	0.8	0.0	1.0	25.4
	3,375 - 3,874	0.3	0.7	0.2	2.4	21.6	1.6	0.0	1.0	27.8
	3,875 - 4,374	0.3	0.7	0.2	2.5	22.1	2.0	1.0	1.8	30.6
	4,375 - 4,874	0.3	0.7	0.2	2.5	22.7	2.6	2.0	2.0	33.0
	4,875 - 6,874	0.3	0.7	0.2	2.6	25.3	2.2	2.1	2.2	35.6
	6,875 - 9,374	0.3	0.7	0.2	2.8	26.2	7.7	7.6	3.0	48.5
	9,375 - 11,874	0.3	0.7	0.2	3.0	29.3	12.0	11.9	3.9	61.3
	11,875 - 14,374	0.3	0.7	0.2	3.2	35.7	14.6	14.6	4.7	74.0
	14,375 - 16,874	0.3	0.7	0.2	3.4	42.2	17.3	17.2	5.6	86.9
	16,875 - 19,374	0.3	0.7	0.2	3.6	48.8	19.9	19.8	6.4	99.7
	19,375 - 21,874	0.3	0.7	0.2	3.8	55.1	22.6	22.5	7.3	112.5
	21,875 - 24,374	0.3	0.7	0.2	4.0	61.8	25.2	25.1	8.1	125.4
	24,375 - 26,874	0.3	0.7	0.2	4.0	68.5	27.7	27.7	9.0	138.1
	26,875 - 29,374	0.3	0.7	0.2	4.0	74.4	30.7	30.7	9.9	150.9
	29,375 - 30,000	0.3	0.7	0.2	4.0	81.3	33.3	33.3	10.7	163.8

* Type 1 nursing services contains distinct and separate nursing services with at least one nursing station for each type of nursing service.

** Assumes at least 5 beds per nursing station and no more than 40 beds per nursing station.

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Y5d = Expected * Inpatient Days, Pediatrics
Schedule I-A-1

inpatient manpower tables. When the change in output did exceed 15%, it was usually within 16-20%. The outpatient tables were slightly more sensitive, but again from a statistical perspective these were conservative.

While the RAC staffing tables can be considered to be insensitive from a statistical perspective, the fact remains that IHS is a multi-million dollar program. Currently, RAC is utilized in the annual Zero Base Budget (ZBB) process as well as for justification of manpower for new and/or replacement health facilities. However, should RAC ever be utilized to project budget requests, the 15% "conservative" "non-sensitive" staffing tables could have a significant effect on the funds requested if the input data is incorrect.

Exhibit D on the following page demonstrates the potential impact of the RAC staffing tables' sensitivity on IHS budgeting. The first column presents the specific table, the fourth column shows the degree of sensitivity of the table assuming a 15% error in the input data. At the end of each set of tables, an attempt is made to match the tables with the areas of the IHS budget they potentially affect using FY 1979 budgetary figures.

In performing the sensitivity analysis, WCMA stressed the result of input errors on outputs of selected RAC staffing tables. The analysis assumed that the algorithms

SENSITIVITY ANALYSIS OF RAC INPATIENT SERVICES TABLES THAT REQUIRE
"ADJUSTED EXPECTED DIRECT INPATIENT DAYS" AS THE INPUT VARIABLE

(SERVICE)	INPATIENT SERVICES BASIC FACILITY (TABLE)	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)	
1	Laboratory	II-A-1 (Part 1)	0-29,999	1.5 - 4.5	16.4
		II-A-1 (Part 2)	0-29,999	1.5 - 3.5	8.0
2	X-ray	II-A-2	0-29,999	1.2 - 1.9	4.1
3	Medical Records	II-A-3 (Part 1)	0-19,374	2.5 - 5.0	8.5
		II-A-3 (Part 2)	19,375-29,999	5.5 - 7.0	13.5
		II-A-3 (Part 3)	19,375-29,999	5.5 - 7.5	14.2
4	Pharmacy	II-A-4 (Part 1)	0-29,200	2.0 - 8.0	12.6
		II-A-4 (Part 2)	0-30,000	2.0 - 8.5	12.6
		II-A-4 (Part 3)	0-30,000	2.0 - 8.5	14.0
		II-A-4 (Part 4)	0-30,000	2.0 - 8.5	13.1
		II-A-4 (Part 3)	0-12,775	7.8 - 8.0	1.5
		II-A-4 (Part 4)	0-16,425	8.0 - 9.0	0.9
		II-A-4 (Part 5)	0-20,075	9.0 - 11.0	2.4
		II-A-4 (Part 6)	0-23,725	10.0 - 13.0	2.0
		II-A-4 (Part 7)	0-27,375	11.0 - 14.0	1.8
		5	House- keeping	II-A-5 (Part 8)	0-30,000
II-A-5 (Part 9)	0-30,000			13.0 - 17.0	1.5
II-A-5 (Part 10)	0-30,000			14.5 - 18.0	1.8
6	Laundry	II-A-6 (Part 1)	0-29,999	1.0 - 4.5	8.8
7	Nursing	II-A-7-a (Part 1)	0-14,600	4.9 - 49.4	6.6
		II-A-7-a (Part 1)	0-14,600	4.9 - 49.4	18.8
		II-A-7-a (Part 2)	0-29,200	7.4 - 90.4	4.8
		II-A-7-a (Part 2)	0-29,200	7.4 - 90.4	13.7
		II-A-7-a (Part 1)	0-14,600	4.9 - 49.4	6.6
		II-A-7-a (Part 1)	0-14,600	4.9 - 49.4	18.8
		II-A-7-a (Part 2)	0-29,200	7.4 - 90.4	4.8
		II-A-7-a (Part 2)	0-29,200	7.4 - 90.4	13.7
		II-A-7-a (Part 3)	0-30,000	9.9 - 100.5	5.9
		II-A-7-a (Part 3)	0-30,000	9.9 - 100.5	12.9
		II-A-7-a (Part 4)	0-30,000	12.4 - 103.1	4.9
		II-A-7-a (Part 4)	0-30,000	12.4 - 103.1	12.4
		II-A-7-b (Part 1)	0-14,600	5.0 - 79.3	9.5
		II-A-7-b (Part 1)	0-14,600	5.0 - 79.3	19.7
II-A-7-b (Part 2)	0-29,200	7.5 - 145.9	9.7		

SERVICE	INPATIENT SERVICES BASIC FACILITY (TABLE)	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)
7 Nursing	II-A-7-b (Part 2)	0-29,200	7.5 - 145.9	14.6
	II-A-7-b (Part 5)	0-30,000	9.9 - 161.2	8.3
	II-A-7-b (Part 5)	0-30,000	9.9 - 161.2	20.1
	II-A-7-b (Part 5)	0-30,000	12.5 - 163.8	7.0
	II-A-7-b (Part 4)	0-30,000	12.5 - 163.8	13.3
	II-A-7-c (Part 1)	0-14,600	4.5 - 59.7	8.4
	II-A-7-c (Part 1)	0-14,600	4.5 - 59.7	19.4
	II-A-7-c (Part 2)	0-29,200	6.9 - 109.9	6.1
	II-A-7-c (Part 2)	0-29,200	6.9 - 109.9	14.3
	II-A-7-c (Part 3)	0-30,000	9.3 - 121.8	6.9
	II-A-7-c (Part 3)	0-30,000	9.3 - 121.8	10.8
	II-A-7-c (Part 4)	0-30,000	11.9 - 124.5	5.7
	II-A-7-c (Part 4)	0-30,000	11.9 - 124.5	13.5
	II-A-7-c (Part 1)	0-14,600	4.8 - 44.8	7.3
	II-A-7-d (Part 1)	0-14,600	4.0 - 44.8	19.0
	II-A-7-d (Part 2)	0-29,000	6.4 - 82.6	1.7
	II-A-7-d (Part 2)	0-29,000	6.4 - 82.6	14.1
	II-A-7-d (Part 3)	0-30,000	8.8 - 92.1	6.2
	II-A-7-d (Part 3)	0-30,000	8.8 - 92.1	18.6
	II-A-7-d (Part 4)	0-30,000	11.5 - 94.6	4.8
II-A-7-d (Part 4)	0-30,000	11.5 - 94.6	12.7	
II-A-7-f (Part 1)	0-11,874	13.5 - 43.0	4.8	
8 Medicine	II-A-8-a (Part 1)	0-15,000	1.5 - 4.8	7.2
	II-A-8-a (Part 1)	0-15,000	0.1 - 0.5	10.0
	II-A-8-a (Part 2)	0-15,000	1.0 - 3.8	11.6
	II-A-8-a (Part 2)	0-15,000	0.1 - 0.5	10.0
	II-A-8-b	0-15,000	0.6 - 2.3	7.1
	II-A-8-b	0-15,000	0.1 - 0.7	12.5
	II-A-8-c	0-10,000	0.7 - 3.8	7.2
	II-A-8-c	0-10,000	0.1 - 0.6	10.0

(SERVICE)	INPATIENT SERVICES BASIC FACILITY (TABLE)	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)
9 Dietary	II-A-9-a (Part 1)	0-29,999	6.0 - 27.5	9.0
	II-A-9-a (Part 2)	0-29,999	6.0 - 28.0	11.5
	II-A-9-a (Part 3)	0-29,999	6.0 - 27.5	4.7
	II-A-9-a (Part 4)	0-29,999	6.0 - 28.0	15.3
	II-A-9-a (Part 5)	0-29,999	6.0 - 28.0	18.8
	II-A-9-b (Part 1)	0-29,999	6.0 - 42.5	9.1
	II-A-9-b (Part 2)	0-29,999	6.0 - 44.0	9.1
	II-A-9-b (Part 3)	0-29,999	6.0 - 44.5	5.9
	II-A-9-b (Part 4)	0-29,999	6.0 - 44.0	6.0
	II-A-9-b (Part 5)	0-29,999	6.0 - 44.0	5.9
INPATIENT SERVICES MEDICAL CENTER (TABLE)				
1 Laboratory	II-B-1 (Part 1)	30,000-100,000	13.0 - 21.5	9.9
	II-B-1 (Part 2)	30,000-33,749	13.0 - 20.5	8.5
2 X-ray	II-B-2 (Part 1)	30,000-100,000	8.0 - 10.0	4.2
3 M. Records	II-B-3 (Part 1)	30,000-100,000	7.5 - 17.0	16.6
4 P. Therapy	II-B-4 (Part 1)	30,000-100,000	2.2 - 3.7	13.4
5 O. Therapy	II-B-5 (Part 1)	20,000-100,000	4.0 - 6.5	12.0
7 Pharmacy	II-B-7 (Part 1)	33,000-73,000	11.0 - 21.5	11.2
	II-B-7 (Part 2)	30,000-87,600	11.5 - 26.0	9.5
	II-B-7 (Part 3)	30,000-100,000	11.5 - 29.5	13.9
	II-B-7 (Part 4)	30,000-100,000	11.5 - 29.5	12.0
	II-B-7 (Part 5)	30,000-100,000	11.5 - 29.5	11.9
	II-B-7 (Part 6)	30,000-100,000	11.5 - 29.5	12.0
8 Housekeeping	II-B-8 (Part 2)	30,000-50,005	23.0 - 25.0	2.9
	II-B-8 (Part 3)	30,000-59,130	26.0 - 28.0	2.2
	II-B-8 (Part 4)	34,000-64,605	29.0 - 32.5	4.0
	II-B-8 (Part 5)	30,000-77,380	31.0 - 36.0	2.0
	II-B-8 (Part 6)	30,000-86,505	34.0 - 39.0	4.0
	II-B-8 (Part 7)	30,000-95,630	36.0 - 43.0	3.8
9 Laundry	II-B-9 (Part 1)	30,000-93,749	5.0 - 14.0	11.0

(SERVICE)	INPATIENT SERVICES MEDICAL CENTER (TABLE)	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)
10 Nursing	II-B-10-a (Part 1)	0 - 14,600	18.5 - 44.5	14.2
	II-B-10-a (Part 2)	0 - 29,200	21.7 - 86.7	13.3
	II-B-10-a (Part 3)	0 - 43,800	25.2 - 129.1	13.3
	II-B-10-a (Part 4)	0 - 58,400	28.3 - 158.4	11.7
	II-B-10-a (Part 5)	9,125 - 73,000	44.8 - 200.7	12.2
	II-B-10-b (Part 1)	0-14,600	22.6 - 61.9	16.0
	II-B-10-b (Part 2)	0-29,200	27.5 - 123.7	14.6
	II-B-10-b (Part 3)	0-43,800	29.7 - 185.6	13.8
	II-B-10-b (Part 4)	0-58,400	32.9 - 227.8	13.6
	II-B-10-b (Part 5)	9,125-73,000	55.7 - 289.6	13.5
	II-b-10-c (Part 1)	0-14,600	27.9 - 76.1	16.0
	II-B-10-c (Part 2)	0-29,200	31.1 - 152.4	14.9
	II-B-10-c (Part 3)	0-43,800	36.4 - 229.0	16.6
	II-B-10-c (Part 4)	0-58,400	37.6 - 280.7	13.7
	II-B-10-c (Part 5)	9,125-73,000	65.3 - 356.9	13.6
	II-B-10-c (Part 5)	9,125-73,000	65.3 - 356.9	15.1
	II-B-10-d (Part 1)	0-14,600	16.5 - 43.3	5.4
	II-B-10-d (Part 2)	0-29,200	19.9 - 86.7	14.2
	II-B-10-d (Part 3)	0-38,749	23.6 - 130.0	12.9
	II-B-10-d (Part 4)	0-58,400	26.8 - 160.0	12.2
II-B-10-d (Part 5)	9,125-73,000	43.4 - 203.2	11.7	
II-B-10-d (Part 5)	9,125-73,000	43.4 - 203.2	27.46	
11 Medicine	II-B-11-a (Part 1)	0-50,000	3.1 - 16.5	9.63
	II-B-11-a (Part 2)	0-50,000	2.0 - 13.4	7.94
	II-B-11-a (Part 2)	0-50,000	1.0 - 6.0	8.6
	II-B-11-a (Part 2)	0-25,000	0.8 - 5.5	8.7
	II-B-11-b	0-25,000	0.8 - 2.0	7.4
	II-B-11-c	0-16,124	1.8 - 10.2	9.7
	II-B-11-c	0-16,374	0.8 - 8.1	11.3
	II-B-11-c	16,125-30,000	10.6 - 18.0	12.0
12 Dietary	II-B-12-a	16,375-30,000	8.4 - 14.9	15.0
	II-B-12-a	30,000-99,999	30.0 - 83.5	12.5
	II-B-12-a	30,000-99,999	30.5 - 85.5	12.2

(SERVICE)	INPATIENT SERVICES MEDICAL CENTER (TABLE)	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)
12 Dietary	II-B-12-a (Part 1)	30,000-99,999	31.0 - 87.0	14.7
	II-B-12-a (Part 2)	30,000-99,999	31.5 - 89.0	14.0
	II-B-12-a (Part 5)	30,000-99,999	32.0 - 91.0	12.1
	II-B-12-b (Part 1)	30,000-99,999	33.0 - 90.5	13.6
	II-B-12-b (Part 2)	30,000-99,999	32.5 - 92.0	12.2
	II-B-12-b (Part 3)	30,000-99,999	33.0 - 94.0	14.2
	II-B-12-b (Part 4)	30,000-99,999	34.5 - 95.5	11.5
	II-B-12-b (Part 5)	30,000-99,999	34.0 - 97.5	12.3

Tables II-A through II-B reflect IHS direct inpatient care services. Approximately \$131 million or 28% of the IHS Annual Allowance for FY 1979 is appropriated for direct inpatient care.

SENSITIVITY ANALYSIS OF RAC COMMUNITY HEALTH SERVICES TABLES THAT REQUIRE
"IHS PROJECTED SERVICE AREA POPULATION" AS THE INPUT VARIABLE

COMMUNITY HEALTH SERVICES COMMUNITY HEALTH NURSING		INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +/- 15% ERROR RATE)	
(SERVICE)	SERVICES (TABLE)				
1	Community & Facility	IV-A-1-a (Part 1)	0-52,499	.49 - 58.70	14.9
		IV-A-1-a (Part 1)	0-52,499	.49 - 58.70	14.9
		IV-A-1-a (Part 2)	0-52,499	.49 - 57.06	14.9
		IV-A-1-a (Part 2)	0-52,499	.49 - 57.06	15.0
		IV-A-1-b (Part 1)	0-52,499	.49 - 70.88	15.2
		IV-A-1-b (Part 1)	0-52,499	.49 - 70.88	15.0
		IV-A-1-b (Part 2)	0-52,499	.49 - 65.67	15.2
		IV-A-1-b (Part 2)	0-52,499	.49 - 65.67	15.0
3	School	IV-A-3-a (Part 1)	0-52,499	.27 - 9.79	10.9
		IV-A-3-a (Part 1)	0-52,499	.27 - 9.79	14.4
		IV-A-3-a (Part 2)	0-52,499	.26 - 8.98	11.5
		IV-A-3-a (Part 2)	0-52,499	.26 - 8.98	14.4
		IV-A-3-b (Part 1)	0-52,499	.64 - 15.16	8.2
		IV-A-3-b (Part 1)	0-52,499	.64 - 15.16	14.5
		IV-A-3-b (Part 2)	0-52,499	.62 - 13.47	7.8
		IV-A-3-b (Part 2)	0-52,499	.62 - 13.47	14.5
		IV-A-3-b (Part 3)	0-52,499	1.38 - 15.91	4.9
		IV-A-3-b (Part 3)	0-52,499	1.38 - 15.91	13.8
		IV-A-3-b (Part 4)	0-52,499	1.36 - 14.22	4.5
		IV-A-3-b (Part 4)	0-52,499	1.36 - 14.22	13.6
		IV-A-3-b (Part 4)	0-52,499	1.36 - 14.22	13.6
		COMMUNITY HEALTH SERVICES PUBLIC HEALTH NUTRITION			
	IV-B	0-21,170	0 - 10.5	12.7	
COMMUNITY HEALTH SERVICES SOCIAL SERVICES					
	IV-D-2	MHC 1-27,636	1.5 - 16.5	14.8	
	IV-D-2-b	891-31,537	1.5 - 28.0	6.8	
	IV-D-2-b	891-31,537	1.5 - 28.0	14.3	
COMMUNITY HEALTH SERVICES HEALTH EDUCATION SERVICES					
	IV-E	0-20,378	0.0 - 7.5	13.8	
COMMUNITY HEALTH SERVICES COMMUNITY ALCOHOLISM PROGRAM					
	IV-F	less than 109-29,101	.5 - 72.5	57.0	
	IV-F	29,102-39,511	75.6 - 96.8	15.6	

Tables IV-A through IV-F are Community Health Service tables related to three preventive health activities: Public Health Nursing, Health Education, and Field Medical Services. These three activities constitute more than \$20 million or 24% of the IHS Annual Allowance for FY 1979.

SENSITIVITY ANALYSIS OF RAC AMBULATORY CARE TABLES THAT REQUIRE
"EXPECTED NUMBER OF OUTPATIENT VISITS PER YEAR" OR "ANNUAL DENTAL TEAM SERVICE MINUTES"
OR "IHS PROJECTED SERVICE AREA POPULATION" AS THE INPUT VARIABLE

(SERVICE)	AMBULATORY CARE SERVICES	INPUT RANGE (WORKLOAD)	OUTPUT RANGE (STAFFING)	SENSITIVITY (ASSUMING +- 15% ERROR RATE)	
A	Amb. Med. Care in Health Centers & Hospital OPDs	III-A (Point 1)	6,646-155,050	7.5 - 107.0	13.3
		III-A (Point 2)	6,646-155,050	7.5 - 107.0	15.1
		III-A (Part 1)	945-5,670	0.8 - 3.2	16.3
		III-A (Part 2)	810-4,860	0.8 - 3.2	16.2
		III-A (Part 3)	675-4,050	0.8 - 3.2	16.3
		III-A (Part 4)	540-3,240	0.8 - 3.2	16.3
B	Amb. Med. Care in Health Stas. & Mobile Health Clinics	III-B (Part 1)	1,248-6,656	1.0 - 4.2	16.1
		III-B (Part 2)	832-6,656	1.0 - 5.6	14.6
		III-B (Part 3)	832-3,343	2.8 - 5.6	12.4
C	Dental	III-C-2	41,501-939,000	2 - 33	20.0
D	Optometry	III-D	0-26,640	0 - 6.0	14.7
E	Audiology	III-E (Col. A)	5,350-88,546	.33 - 4.0	12.5
		III-E (Col. B)	5,350-88,704	1.0 - 8.0	15.0

Tables III-A through III-B require "number of outpatient visits per year as the input variable, Tables III-D (optometry) and III-E (audiology) require "IHS projected Service Area population" as the input variable, and dollars are appropriated under ambulatory care. Approximately \$87.5 million or 18.7% of the IHS Annual Allowance for FY 1979 is appropriated for ambulatory care.

Table C-2 requires "Annual Dental Team Service Minutes" as the input variable and funds are appropriated under the category dental services. Approximately \$14 million or \$3.2 of the IHS Annual Allowance for FY 1970 is appropriated for dental services.

which support the staffing tables were correct and accurate. However, the algorithms have never been validated to ensure the tasks and time requirements for each personnel category are accurate.

CONCLUSION: The validity of the sensitivity analysis is dependent upon the accuracy of the algorithms.

Obviously, the sensitivity analysis can demonstrate the relation of input to output. However, if the algorithms are incorrect, the analysis is meaningless.

RECOMMENDATION NO. 20:

IHS SHOULD VALIDATE THE ALGORITHMS WHICH SUPPORT THE STAFFING TABLES AND REVISE THEM AS NECESSARY AFTER WHICH ANOTHER SENSITIVITY ANALYSIS SHOULD BE PERFORMED.

It is WCMA's understanding that IHS has made plans to validate the standards and criteria in RAC, and the attendant algorithms. We strongly support this interest because once validated the credibility of RAC will be enhanced. After the algorithms have been validated, a new sensitivity analysis should be developed to assist in ZBB development and budget projections for manpower and facilities.

E.. TREND ANALYSIS OF THE RAC INPUT DATA

WCMA examined the three years' utilization data for contract and direct that were comparable; FY 1976, FY 1977, and FY 1978. We performed a test for Pearson's Correlation

ACTUAL UTILIZATION AS A PERCENT OF EXPECTED UTILIZATION

	FISCAL YEAR 1976				FISCAL YEAR 1977				FISCAL YEAR 1978			
	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV
ALASKA												
Anchorage	93.48	78.77	95.60	63.52	72.65	79.49	80.96	84.71	64.76	57.09	55.78	13.30
Barrow	88.20	-0-	110.20	-0-	121.95	-0-	103.97	2.04	93.87	-0-	82.74	0.00*
Bethel	78.30	-0-	99.10	-0-	69.60	-0-	54.70	>1.00	77.64	-0-	55.71	0.00*
Kanakanak	69.69	-0-	232.60	-0-	68.76	-0-	116.27	0.00*	52.78	-0-	58.99	0.00*
Kotzebue	103.38	-0-	101.85	UND**	99.57	-0-	73.29	0.00*	74.03	-0-	56.90	0.00*
Mt. Edgecumbe	115.50	68.62	116.89	12.42	112.43	58.51	85.13	3.94	82.08	65.67	77.02	51.56
Norton Sound	-0-	0.00*	-0-	0.00*	0.00*	0.00*	UND**	0.00*	0.00*	0.00*	-0-	22.00
Interior Alaska	102.37	54.06	98.30	18.64	98.28	53.98	98.49	62.15	62.67	118.89	80.88	76.16
	92.32%	53.44%	106.08%	56.73	80.52	59.54	79.22	33.15	69.74	58.28	63.24	22.64
BEMIDJI												
Central Wisconsin	-0-	0.00*	0.00*	0.00*	-0-	0.00*	0.00*	0.00*	-0-	7.21	0.00*	46.60
Eastern Michigan	-0-	>1.00	0.00*	0.00*	-0-	1.06	0.00*	1.14	-0-	17.75	0.00*	44.78
Fond du Lac	-0-	12.98	-0-	25.22	-0-	33.68	-0-	13.28	-0-	44.91	-0-	23.53
Grand Portage	-0-	68.97	-0-	84.83	-0-	51.73	-0-	34.25	-0-	102.71	-0-	40.31
Greater Leach Lake	0.00*	31.38	148.08	23.28	129.25	112.50	144.11	10.30	0.00*	75.38	116.83	38.23
Lac Courte Orielles	-0-	12.08	0.00*	410.37	-0-	10.96	0.00*	176.04	-0-	30.42	0.00*	95.88
Lac du Flambeau	-0-	11.75	0.00*	779.05	-0-	16.63	0.00*	53.60	-0-	33.53	0.00*	69.42
Mille Lacs	-0-	25.37	-0-	32.30	-0-	21.97	-0-	17.04	-0-	50.19	-0-	29.75
Minnesota Sioux	-0-	17.70	-0-	56.76	-0-	36.44	-0-	33.05	-0-	67.18	-0-	48.37
Nett Lake	-0-	15.03	-0-	35.05	-0-	23.34	-0-	11.98	-0-	37.38	-0-	21.77
Red Lake	0.00*	39.67	141.27	28.98	91.20	46.42	127.73	17.44	101.84	90.98	123.45	28.07
Western Michigan	-0-	3.36	-0-	8.75	-0-	7.82	-0-	7.89	-0-	49.34	-0-	31.62
White Earth	-0-	26.00	150.66	386.67	-0-	62.36	169.08	96.57	-0-	52.56	0.00	76.65
	-0-	8.47	53.98	56.41	104.10	15.27	56.64	21.41	63.58	31.46	37.08	45.17
OKLAHOMA												
Ada	0.00	21.27	42.76	18.58	0.00*	131.32	35.50	21.69	0.00*	131.58	0.00*	33.50
Claremore	80.04	2.73	55.63	142.09	94.86	35.49	52.36	34.98	88.93	78.08	46.12	58.27
Clinton	92.83	9.17	77.36	28.95	69.01	60.10	59.71	21.57	109.37	74.52	59.68	13.80
Kansas	-0-	7.84	112.31	208.22	-0-	48.25	98.59	230.15	-0-	129.18	118.50	343.87
Lawton	119.63	>1.00	125.57	26.53	128.45	68.72	120.91	30.98	107.39	103.36	91.57	35.76
Pawnee	115.80	20.45	68.17	16.60	105.08	117.09	75.76	16.48	83.08	109.13	73.09	25.06
Shawnee	-0-	6.67	64.60	17.17	-0-	72.32	63.22	12.78	-0-	61.95	40.03	30.07
Tahlequah	86.28	12.31	74.59	827.46	98.67	119.85	74.82	613.52	91.17	104.17	72.27	UND**
Talihinah	109.81	11.66	124.01	38.43	108.10	49.79	122.66	63.59	102.29	51.66	103.55	54.55
	76.97	9.85	76.38	32.65	76.79	70.82	73.57	27.40	74.39	86.24	60.33	42.84

	FISCAL YEAR 1976				FISCAL YEAR 1977				FISCAL YEAR 1978			
	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV	DIRECT ADM.	CONTRACT ADM.	DIRECT OPV	CONTRACT OPV
PHOENIX												
Phoenix	84.26	> 1.00	116.77	4.64	102.89	124.03	121.07	103.94	81.97	105.89	99.19	39.79
Colorado River	188.89	185.04	345.99	199.00	91.61	105.39	115.10	171.89	82.64	181.72	99.97	54.45
Sacaton	72.73	0.00*	103.53	71.08	86.27	100.00	139.88	24.29	100.18	200.00	89.26	5.49
White River	92.67	0.00*	107.40	12.67	106.78	41.18	106.32	7.60	80.54	187.50	101.84	3.64
Schurz	98.96	33.59	57.70	141.47	68.11	106.13	52.50	92.38	80.34	86.62	96.18	327.38
San Carlos	72.84	19.36	112.39	309.83	84.04	50.00	96.56	307.60	102.93	76.47	106.40	40.45
Owyhee	104.70	49.67	113.72	122.51	140.00	115.60	108.14	65.83	85.68	102.12	93.56	33.65
Fort Yuma	178.23	47.13	107.42	136.64	94.84	75.50	105.79	76.20	86.96	91.46	97.48	227.83
Keams Canyon	92.76	10.00	79.05	61.23	97.55	54.17	105.23	57.01	83.90	85.19	86.35	29.32
Ouray-Uintah	-0-	22.89	99.79	134.61	-0-	86.28	99.97	30.63	-0-	96.68	0.00*	30.04
PORTLAND	89.47	31.82	108.13	111.27	98.20	103.93	108.26	87.63	85.25	103.89	94.51	51.97
Colville					-0-	223.78	69.43	UND**	-0-	64.50	88.12	14.57
Fort Hall					-0-	63.96	109.53	265.25	-0-	65.20	102.94	239.53
Neah Bay					-0-	191.97	113.31	34.92	-0-	44.96	102.97	5.38
North Idaho					-0-	80.20	44.99	55.31	-0-	117.56	130.72	1.48
Taholah					-0-	107.01	87.81	5.97	-0-	68.63	98.51	15.46
Umatilla					-0-	134.04	64.38	UND**	-0-	57.73	92.18	777.63
Warm Springs					-0-	147.12	115.80	1.39	-0-	64.20	94.73	58.82
Wellpinit					-0-	95.58	105.20	176.52	-0-	UND**	96.22	172.68
Lummi					-0-	67.76	96.53	22.66	-0-	55.79	118.92	20.20
Puget Sound					-0-	42.71	2.55	N/A	-0-	0.00*	7.62	0.00
Yakima					-0-	124.04	101.47	279.53	-0-	71.69	103.00	99.76
Chemawa					-0-	18.99	83.25	N/A	-0-	10.72	118.78	UND*
					-0-	102.04	77.42	49.04	-0-	57.85	95.25	16.08
TUCSON												
Sells	85.15	30.98	N/A	N/A	87.72	85.18	83.35	2.98	102.36	121.02	92.73	4.51
	85.15	30.98	N/A	N/A	87.72	85.18	83.35	2.98	102.36	121.02	92.73	4.51

	FISCAL YEAR 1976				FISCAL YEAR 1977				FISCAL YEAR 1978			
	DIRECT	CONTRACT	DIRECT	CONTRACT	DIRECT	CONTRACT	DIRECT	CONTRACT	DIRECT	CONTRACT	DIRECT	CONTRACT
	ADM.	ADM.	OPV	OPV	ADM.	ADM.	OPV	OPV	ADM.	ADM.	OPV	OPV
BILLINGS												
Blackfeet	125.48	36.19	116.13	UND**	111.07	116.60	100.46	UND**	101.29	221.61	97.99	34.69
Crow	149.88	55.21	91.01	UND**	105.97	99.51	65.93	UND**	87.37	196.35	80.64	17.17
Flathead	-0-	21.73	UND**	69.23	-0-	70.57	UND**	61.80	-0-	65.97	UND**	55.46
Ft. Belknap	110.80	36.15	129.46	UND**	71.19	91.23	99.31	36.45	121.07	154.23	100.99	53.37
Northern Cheyenne	0.00	64.00	110.91	UND**	-0-	133.55	98.95	470.98	-0-	49.51	92.96	UND**
Wind River	-0-	34.61	112.38	UND**	-0-	66.41	127.19	234.42	-0-	66.61	99.86	253.93
Rocky Boys	-0-	47.48	129.86	UND**	-0-	47.68	121.94	UND**	-0-	80.59	126.59	19.09
Intermountain	0.00*	11.54	104.51	UND**	-0-	52.49	148.38	UND**	-0-	63.25	105.99	UND**
Ft. Peck	-0-	29.71	109.16	UND**	-0-	97.93	99.78	UND**	-0-	102.13	122.72	72.66
	102.97	32.87	112.44	97.07	100.98	82.25	100.28	87.47	98.46	91.11	101.61	50.95

NOTES: 0.00* - An unexpected figure exists, but no actual figure.

UND** - Undefined. An actual figure exists, but no expected figure.

outpatient visits than for services provided under contract. This is not surprising because it should be expected that the Area Offices and Service Units would be able to ascertain future utilization of IHS facilities much easier than the frequency of referral to contract providers.

The projected utilization in most cases, at the Area Office level, did not prove a good prediction of the actual demand for the year. The projections were influenced by certain policy decisions which affected their potential accuracy including the following:

- Facilities utilization was projected where there was no existing facility (i.e. Ada in Oklahoma)
- A physician left a Portland Area facility and the facility was closed for six months, but the utilization projections were made as if the facility had remained in operation
- If current services are provided under direct care (or contract care) and this may change to contract care (or direct care), both projections for direct and contract care are adversely affected
- The "on or near" regulations went into effect during the summer of 1978 which altered the areas qualified for services resulting in increasing or decreasing the population base.

The projection problems persisted even considering that we were able to eliminate some instances where utilization was projected for a planned facility that did not yet exist, and where a demand was projected and for some reason, did not exist. This was possible by specifying that any zero in that data was to be considered missing data. We still found that in almost all cases the statistics showed that the variance for any set of data was larger than the mean. However, the data was only broken down as far as the Service Unit level where there are often multiple health facilities. Although one of the facilities might be in a planning mode and have an actual utilization of zero, the sum of all the facilities in the Service Unit would not produce a count of zero. Therefore, eliminating all instances of zero in the data does not eliminate all problem areas.

CONCLUSIONS: Projected utilization is based upon need, not demand.

The data were too diverse to draw any meaningful conclusions.

The RAC utilization projections are calculated based on expected need, not the expected demand for the services. This accounts for the diversity between the projected and actual utilization figures.

Although allowances were made where reasonably possible for the discrepancies between projected and actual data resulting from policy decisions, the data were still too diverse to be able to draw any meaningful conclusions from the correlation of projected and actual numbers.

RECOMMENDATION NO. 21:

IHS SHOULD STANDARDIZE THE COLLECTION, REPORTING AND RECORDING PARAMETERS OF PROJECTED AND ACTUAL DATA REPRESENTING HEALTH SYSTEM UTILIZATION AND ASSURE A CONSISTENT APPLICATION IN DEVELOPING RAC INPUT DATA.

The problems confronted as a result of the diversity of the data relate to difficulties of conducting a trend analysis or similar comparison between the utilization projected based upon need, and actual utilization figures. If IHS is to examine other options (e.g. time series) to their current method of projecting utilization data, the collection, recording and reporting of historic utilization will need to be standardized for consistency. It will need to include sufficient detail to enable those studying the data to pinpoint and make adjustments for all instances where data are influenced by policy decisions. It would entail keeping two sets of utilization projections: those based on need (as currently calculated), and those based on actual demand.

