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ABSTRACT

Six Indian Health Service (IHS) units, chosen in a non-random manner, were evaluated via a quality assessment methodology currently under development by the IHS Office of Research and Development. A set of seven health problems (tracers) was selected to represent major health problems, and clinical algorithms (process maps) were constructed for each health problem; criteria were then defined and translated into audit questions (population, provider, and health status indicators). The seven tracer conditions were analyzed in terms of care: provided by the system; received by the beneficiaries; and continuity. Results indicated four major methodological issues should be of concern in future quality assessment techniques re: ambulatory care: (1) examination of provider performance alone does not necessarily reflect the adequacy of care received; (2) diagnostic and treatment processes should not be examined alone but rather in conjunction with care continuity; (3) additional developmental work is needed to clarify a concept of health outcome applicable to quality assessment techniques for ambulatory care; and (4) methodology based on the tracer approach assumes that information derived from examination of a tracer disease is similar to that obtained from other similar conditions and that adaptive processes directed at improving deficiencies in health care for a tracer will result in improvements in other similar conditions. (JC)

STUDIES IN AMBULATORY CARE QUALITY ASSESSMENT IN THE INDIAN HEALTH SERVICE

VOLUME II: APPRAISAL OF SYSTEM PERFORMANCE

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ABSTRACT

A quality assessment methodology for ambulatory patient care is under development by the Office of Research and Development of the Indian Health Service (IHS). This report summarizes the conceptual basis of the methodology and describes a pilot test in six IHS Service units. The results for seven tracer conditions, designed to examine system performance in terms of care provided by the system, care received by the beneficiary populations, and the continuity of care are presented. Although the data from six service units, chosen in a non-random manner, do not necessarily reflect the quality of ambulatory care throughout the IHS, several trends are noted and briefly discussed.

INTRODUCTION:

Although there is a growing concern with the quality of health care, most of the developmental effort to date has concentrated on inpatient care. Currently there are two major organizations of national scope concerned with controlling the quality of inpatient care. The Joint Commission on Accreditation of Hospitals (JCAH) began certifying hospitals on the basis of structural criteria in 1952, and more recently has been examining hospital care through the use of process criteria. The PSRO legislation of 1972 (P.L. 92-603) directed that medical care evaluations were to be pre-requisites for reimbursement of costs payable under Medicare and Medicaid. In comparison, methods for examining the quality of ambulatory health care have remained in their infancy.

The Indian Health Service (IHS) of the Department of Health, Education, and Welfare has the primary responsibility for assuring comprehensive health services to American Indians and Alaskan Natives. This responsibility is discharged through a series of service units located in Indian communities and designed to provide preventive, health maintenance, and curative services to the beneficiary populations. The typical service unit includes a 25-50 bed community hospital and outpatient clinic, one or more field clinics, and referral capability to a major medical center. A field health service consists of public health nurses, sanitary engineers, and one or more tribally operated health programs dealing with issues of prevention and community health education.

The Indian Health Service is deeply concerned with the quality of hospital care as witnessed by the relatively large number of service unit hospitals which have earned JCAH accreditation. However, hospitals are a component of

the IHS system, as opposed to the IHS acting as a system of hospitals. For this reason, concern for the quality of care in the IHS extends to the care provided in the outpatient clinics and in a variety of field-based activities. Of particular interest is the continuity of care between these various components of the IHS system.

The Office of Research and Development of the Indian Health Service has been developing a methodology for assessing the quality of ambulatory care, which has been previously described [1,2,3]. This report is part of a series describing a pilot test of the assessment methodology in six service units of the Indian Health Service, three rural private practices, and two large health maintenance organizations. This report presents and discusses data on systems performance drawn from the six IHS service units. Subsequent reports will examine other aspects of the pilot studies.

METHODOLOGY:

The conceptual basis of the assessment methodology has been fully described elsewhere [2,3]. In summary, the assessment strategy is completed in stages. First, a set of health problems (tracers) is selected to represent the major health problems of the community. A process map (or clinical algorithm) is constructed for each health problem to describe the expected process of health care. Process maps specify necessary elements of prevention, screening, diagnosis, treatment, and follow-up, and they define acceptable health outcomes. In general, the set of tracers selected should, as a group, include all the clinical functions of health care for examination.

Criteria of clinical care are defined for each tracer condition and are translated into audit questions (called indicators) which are the actual measures of quality. The indicators are generally of three types. Population-based process indicators express a percent of the total community which has received a particular health service. This class of indicators characterizes the extent to which the health care system is meeting the needs of its total patient population. By tracking specific patient cohorts they describe the continuity, distribution, and appropriateness of health services received. This measure of system performance might be reflected by population-based indicators such as:

1. What percent of the community has been adequately screened for hypertension?
2. What percent of infants in the community have been adequately immunized against poliomyelitis?
3. What percent of patients diagnosed with otitis media, received adequate antibiotic therapy?

Provider-based indicators express a percent of contacts between patients and the health care system in which particular health services were provided. This class of indicator characterizes the adequacy of health services provided when patients utilize the health care system. Provider-based indicator data can be aggregated to characterize the performance of individual providers, provider disciplines, or all providers in the system. This performance measure might be reflected by indicators such as:

1. What percent of patient visits due for a screening blood pressure resulted in a blood pressure recording?
2. What percent of infant visits due for poliomyelitis immunization resulted in an immunization?
3. What percent of patient visits including a diagnosis of otitis media, was an appropriate antibiotic prescribed and a follow-up visit scheduled at an appropriate interval?

Finally, health status indicators express the percent of patients for whom a change in health status has been documented. One should be cautioned against equating health status indicators with measures of incidence or prevalence since the latter requires a random sampling of the population. Health status indicators on the other hand often reflect change in health status of selected patient group; e.g., only those who were followed-up.

Table 1 shows the tracer conditions used in the pilot study along with the assessment perspective (population-based or provider-based) and clinical functions of care covered by each. Figure 1, shows the process map for lacerations and the points in the process of care from which indicator data is extracted.

Some indicators are analogous to "flow meters" and can be constructed in a sequence in order to examine the continuity of care. From the process map for iron deficiency anemia, shown in figure 2, the population can be seen to percolate down through a variety of pathways. If flow meter indicators are placed along the major routes, they will measure the distribution and continuity of health services. For example, if an indicator is placed at the entrance of the diagnostic element, the results will show how well diagnostic services are distributed among the screened-positive population. These indicator sequences may focus on any of the clinical functions of the health care process and can express "continuity" as a series of conditional probabilities based on empirical data. By examining continuity of care in this way, the assessment methodology can identify discontinuities in health care and distinguish between those related to provider-behavior and those related to patient utilization of services.

In general a required health task is completed only when three basic steps occur. First, there must be contact between the patient and an appropriate provider. Second, the need for that health care task must be recognized, and finally the task must be performed. Conventional wisdom would suggest that making contact with the health care system for services is generally the responsibility of the patient. The recognition function is the shared responsibility of the patient, who may reflect need in his chief complaint, and the provider who reviews the patient's record. The performance of the task, finally, is the responsibility of the provider. In this study urinary tract infections, iron-deficiency anemia, and hypertension are the tracers designed to examine the continuity of care in this way.

The service units employed as pilot sites in this study were chosen in a non-random manner. Four of the six were included because of a shared concern for the quality of ambulatory care, while the other two were included due to characteristics of their system or population that made the total group more representative of IHS service units in general. Table 2 compares the service units by major characteristics. Criteria of clinical care were established for each tracer by a consultant with recognized expertise in that condition. The criteria were reviewed and approved by the clinical staff of service units C and D, which were the original pilot sites. The criteria were presented to the clinical staff of each of the other service units before or during the study and there were no particular objections to the criteria established.

Within each tracer condition, indicators were selected to include criteria that were considered essential to good basic health care. Items that were controversial or would be applicable in only a small percentage of cases were not used in formulating the indicators. Also tasks which were felt to be reliably documented (or at least should be reliably documented) were more often incorporated into the indicators. Items which might be performed regularly, but infrequently documented, such as elements of the history or physical exam or counseling tasks, were incoporated into indicators only when they were considered to be essential for basic health care. The indicators are shown in tables 3 to 13.

Data collection instruments were designed for extracting the data required to compute each indicator and were subsequently field-tested. These were described and illustrated previously.(3)

Previous experience with this methodology has suggested that a number of individuals can perform well in data collection. In this pilot study data

collectors included undergraduate students in health administration, a medical student, a physician, and a laboratory technician with an MPH. A study of reliability, using the physician as a standard, was done on a sample of cases reviewed by each data collector. None of the data collectors varied by more than 10% compared to the physician.

Patient cohorts were selected for audit for each tracer by sampling from the entire catchment area as nearly as possible. This was done in an attempt to remove a bias toward patients who were more frequent utilizers of health care. To examine the quality of prenatal care for example a list was compiled of all women pregnant during the study year by examining birth certificates, the delivery room log, discharge diagnoses, operative reports, and lab requisitions for "prenatal lab work." From this list a sample was chosen using standard sampling techniques. Similar techniques were used to gather a sample of infants for examination of infant care, and of adults for audit of hypertension screening. Cohorts for urinary tract infection and anemia were selected from laboratory slips or the laboratory log as these tracers examined the continuity of care distal to the screening process. Any patient found on audit to have underlying renal disease or a non-nutritional cause of anemia were discarded from the sample. Patient cohorts for streptococcal pharyngitis were generated by randomly pulling medical records and searching for a visit involving a sore throat. Finally, the patient cohorts for lacerations were identified by review of the emergency room log.

Audit of the care for each patient involved examination of each health record extant for that patient. In many cases this required audit of a medical record at the hospital, one or more field clinic records and public health

nursing records, in order to extract a complete profile of care for each patient for that tracer condition.

RESULTS AND DISCUSSION:

At the outset it should be emphasized that the central purpose of the quality assessment methodology is not to make statements of "good" or "bad" care. Rather it is designed to identify the relative weaknesses in the system of health care that require attempts at improvement. A part of this pilot study examined the quality of ambulatory health care in rural private practice and health maintenance organizations. These results suggest that the IHS in general provides care of comparable quality and will be the subject of a subsequent report (4).

The results of the study in the six pilot sites are shown in tables 3 to 13. The results are shown for each service unit and the arithmetic total for all service units combined. Although statistical tests of significance have not been systematically applied to each service unit, spot checking reveals that for selected indicators there is significant variance between service units. Because of this variance and the non-random method of selecting these service units for the pilot study, the results should be generalized to other service units of the IHS with caution. However, some trends can be noted and tend to be consistent across the six pilot sites studied.

WELL-PATIENT CARE:

Examination of the results for prenatal and infant care (tables 3 and 6) reveal generally low rates for counseling and educational tasks (e.g. nutritional counseling, infant care counseling). Of this category, "family

planning counseling" (table 3) appears to be the most universally applied at 53% of the pregnant population. It is interesting to note that service unit A with a predominantly suburban population is substantially higher than the total for this class of indicators.

Similarly, care tasks related to health status monitoring are also somewhat low. From a population perspective the "pregnancy monitoring rate" (table 3) was only 16%. Yet from the provider perspective (table 4) this rate was 79%. This is to say that the providers perform the tasks on 79% of the opportunities, yet only 16% of the pregnant population receives the tasks at appropriate intervals. On the other hand the diet monitoring rate for infants from the population perspective (table 6) is 7%, while from the provider perspective (table 7) it is only 38%. This would suggest that the system is missing a substantial number of opportunities to monitor the diet of infants. Similar results are noted for the "infant care counseling," "growth monitoring," "development monitoring," and "nutritional counseling" rates for infants (tables 6 and 7) and for the prenatal "nutritional counseling" rate (table 3).

In this study, the data collection procedure was extremely lenient in interpreting the content of the record regarding educational and counseling tasks. For example, single statements such as "walking" or "rolling over" or "development WNL" were considered adequate for the "development monitoring rate" (table 6).

Nonetheless, it could be argued effectively that the performance of monitoring, educational, and counseling tasks is substantially better than the documentation of performance. While this may be very true, the importance of documentation of tasks critical to adequate care cannot be over-emphasized,

particularly in a setting in which multiple providers participate in the care of patients. Without adequate documentation, the assessment of service needs for any given patient visit rests on the provider's assumption rather than knowledge of which tasks have been done and which are due.

The "prenatal work-up" rates (tables 3 and 4) indicate that only 20% of the pregnant women in the community receive a prenatal work-up by the 20th gestational week, while the providers perform the work-up within two weeks of the initial visit on 34% of the patients. Apparently provider performance is the limiting factor since 64% of all pregnant women in the community make contact with the system by the 20th week of gestation. The prenatal work-up rate is a compound indicator requiring four separate tasks, of which the cervical culture was by far the most frequently omitted.

A contrasting pattern is seen in the pregnancy-induced hypertension (PIH) screening rates (tables 3 and 4). In this case only 25% of the pregnant population was adequately screened. However, the providers recorded diastolic blood pressures on 94% of all visits by prenatal patients. For this indicator it appears that patient behavior (prenatal visit patterns) is the limiting factor. However, in this regard it should be noted that the "abnormal BP recognition rates" (tables 3 and 4) were only 36% from both population and provider perspectives. This suggests that although the system was effectively capitalizing on the opportunity to document blood pressure, diastolic pressures greater than 90 mm. Hg. were recognized only 36% of the time.

The immunization rates of tables 6 and 7 deserve comment. Of the total infant group, 69% had received 3 DPT and 2 OPV immunizations by age 13 months, with a high of 90% in service unit E. The "total immunization rate" of 40%

added measles and rubella to the criteria. It should be noted that the audit period of this study preceeded the current immunization recommendations by the American Academy of Pediatrics, US Public Health Service that measles be deferred until 15 months of age. Although it is difficult to compare rates across differing criteria, these results appear to compare favorably with immunization rates previously described among the patients of pediatricians (5,6).

The health status indicators for prenatal care (table 5) and infant care (table 8) are not particularly enlightening due to the relatively low frequency of poor outcomes in these two groups. However, the "adequate growth" rate for infants (table 8) reflects an expected result despite the previously noted low rate of growth monitoring, diet monitoring, and nutritional counseling. Finally, the "repeat pregnancy rate" is encouraging as only 15% of pregnant patients in the study period failed to space their subsequent delivery by at least 18 months.

ACUTE CARE:

Examination of results for streptococcal pharyngitis (table 9) and lacerations (table 10) provides information on the manner in which the health care system is dealing with an acute infectious process and a minor surgical problem. In reality these indicators should be termed patient-based rather than truly population-based since the cohorts were by necessity selected from the subset of the population who initiated contact with the health care system. The relatively high "selective screening" rate for streptococcal pharyngitis reflects the concern of the IHS for streptococcal disease and ensuing rheumatic fever which still exceeds national norms in some Indian and Alaskan Native communities. The "treatment rate" is also extremely high, although the "treat-

ment of choice" rate is somewhat lower due to use of a second line antibiotic (presumably ampicillin) in service units B and E. The "unsupported treatment" rate is acceptably low although peaks at 37% in service unit D.

The documentation of "wound description" and "extent of injury" for lacerations (table 10) is somewhat low. However, it should be realized that both are compound indicators, i.e. requiring documentation of several items each. In general, 64% of patients with a sutured laceration returned in an interval of time appropriate for follow-up and 56% satisfied follow-up criteria. However, in service unit F, 42% returned for follow-up, whereas follow-up criteria were met in only 26%

CONTINUITY OF CARE:

The indicators for iron-deficiency anemia (table 11), urinary tract infections (table 12), and hypertension (table 13) were constructed to assess the continuity of health care. Each expresses the probability (based on empirical data) that patients successful in the preceeding element of care will pass successfully through the next process element. Likewise the transition rates through multiple successive elements of the process of care can be expressed as the product of the intervening rates. Perhaps the most publicized sequence of transition rates is the "½ x ½" series used to describe the care of hypertensive patients. According to a public health advertizing campaign, only one-half of the hypertensive patients have been diagnosed, and of these, only one-half are under treatment. The product of these (0.5 x 0.5 = 0.25) expresses the probability that a given hypertensive individual has been diagnosed and placed on medical management.

This approach has been applied to the aggregate service unit data for

urinary tract infections (UTI) and iron-deficiency anemia as shown in table 14. The "overall process success rate" is derived from the product of the successive indicators, and is 11% for UTI and 6.5% for anemia. The same approach also can be used to examine selected sequences of care. For example the probability that a screened positive individual will progress through the process as far as treatment is (0.88 x 0.89 x 0.50 x 0.95 = 0.37) for UTI and (0.87 x 0.69 x 0.49 x 0.82 = 0.24) for anemia.

Similarly it is possible to estimate the impact of improving selected aspects of care by substituting in the cross product equation. For example the benefit derived from increasing the recognition functions to an ideal level can be estimated by substituting 1.0 for the observed rates of recognition steps. Since an improvement of this magnitude may be somewhat unrealistic, an estimate can be made of the impact of increasing the recognition rates to a level midway between the observed and ideal rates. This can be done by substituting

$$\text{Observed rate} + \frac{(1.0 - \text{observed rate})}{2}$$

for the "recognition" indicators.

As an example, table 14 compares the observed "overall process success" rates for UTI and anemia with those derived from estimates of raising selected functions to the 90% level. Improving "recognition" and patient "contact" rates to 90% has roughly the same impact, although in most health care settings, improving recognition rates (provider behavior) would be more easily accomplished than improving patient contact rate (patient behavior). Improving assessment and treatment tasks to 90% achieves yet more impact for UTI, and improving combined recognition-action tasks results in substantial improvement in "overall

process success" for both conditions. As an extension of this approach, the estimated increase in clinic workload (physician visits, laboratory services, pharmacy services, etc.) accruing from such improvements can also be estimated.

However, each Service Unit presents a unique configuration of health services and service strategies, and some service units do not necessarily follow the patterns that emerge from the aggregated data. Table 16 presents the observed rates for anemia along with the estimates derived from projecting improvements in contact, recognition, and task performance, for service units A, B, and F. Service unit A derives its greatest protential improvement in the continuity of care from increasing the recognition rates, which results in an overall process success change from 11% (observed) to 20%. Service unit B, on the other hand, derives substantial improvement through improvements in patient contacts rates, thus increasing the overall process success rate from 3.3% to 13%. Finally, service unit F realizes a projected nine-fold improvement in continuity through improving the rates of task performance, thus increasing its observed rate of 0.8% to 7.7%.

Further variation in the continuity of care among the service units is summarized in table 16. The "case finding rate" is computed as the product of all rates from "contact for screening" through "diagnostic work-up". The "follow-up rate" is similarly computed as the product of the "contact for follow up rate," the "follow-up recognition rates," and the "follow-up rate." Also shown in table 16, are aggregate rates for patient contact, recognition, and task performance. The "aggregate contact rate" expresses the probability that patients will make all required contacts with the system for anemia, and is

computed from the product of the three contact indicators. Similarly the "aggregate recognition rate" and "aggregate task performance rate" express the probability that all required recognition steps and all tasks are performed, respectively, and are computed from the sum of the component indicators.

From table 16, it can be seen that service unit A clearly is superior in case finding while service unit D excells in follow-up. From the aggregate contact, recognition, and task performance rates of table 16, it is apparent that service unit A has no relative weaknesses while service unit B is relatively weak in patient contact and the relative impediment to continuity in service unit C is recognition. Both service unit E and F perform relatively well in patient contact and recognition, but fail to complete the required health service tasks.

CONCLUSIONS:

Results from a pilot test of a quality assessment methodology in six IHS service units have been described. The limited data suggest that although each service unit presents a different profile of health care, some general trends can be detected. Relatively low rates for counseling and educational tasks in maternal and child health have been noted. However, whether these rates reflect system performance or documentation practices are unknown. In several cases the limiting factor in the provision of a health service was noted to be a lack of recognition of service need by the provider rather than the conventional assumption that patients do not utilize services (make visits) effectively. Finally, examination of the continuity of care suggests that substantial improvement can be achieved by pinpointing and addressing areas of relative weakness. A subsequent report [4] will show that similar problems exist in the rural private practices and health maintenance organizations cooperating in this pilot study.

The study suggests four major methodological issues that should be of concern in future application of quality assessment techniques to ambulatory care. First, examination of provider performance alone does not necessarily reflect the adequacy of care received by the patient population. In this study population-based and provider-based indicators were employed to examine the effectiveness of care received.

Second, the study employed indicators specifically designed to examine the continuity of care. These results suggest significant impediments to the continuity of health care that would not have emerged from a study that emphasized only the adequacy of the diagnostic and treatment processes alone. This

study would suggest that improving the adequacy of only the diagnostic and treatment aspects of care to an ideal level would not necessarily result in continuous care for the majority of patients.

Third, examination of health status indicators do not add significantly to the information derived from this methodology. However important outcome measures may be to assessing the quality of health care, additional developmental work is needed to clarify a concept of health outcome and apply it to quality assessment techniques for ambulatory care.

Finally, this study methodology is based on the tracer approach to appraising health care. As such it makes two assumptions which have never been adequately tested. First it assumes that the information derived from examination of a "tracer" disease is similar to that which would have been obtained from examination of other "similar" conditions. More importantly, the implicit assumption within a tracer approach is that adaptive processes directed at improving identified deficiencies in health care for a tracer, will result also in improvements in other "similar" conditions. The latter assumption is particularly tenuous as attention directed toward a tracer condition may, in reality, detract from the care provided for other similar conditions. Several studies are currently underway at the Office of Research and Development, IHS to test these assumptions, but until objective evidence is available such assumptions must be viewed as tentative.

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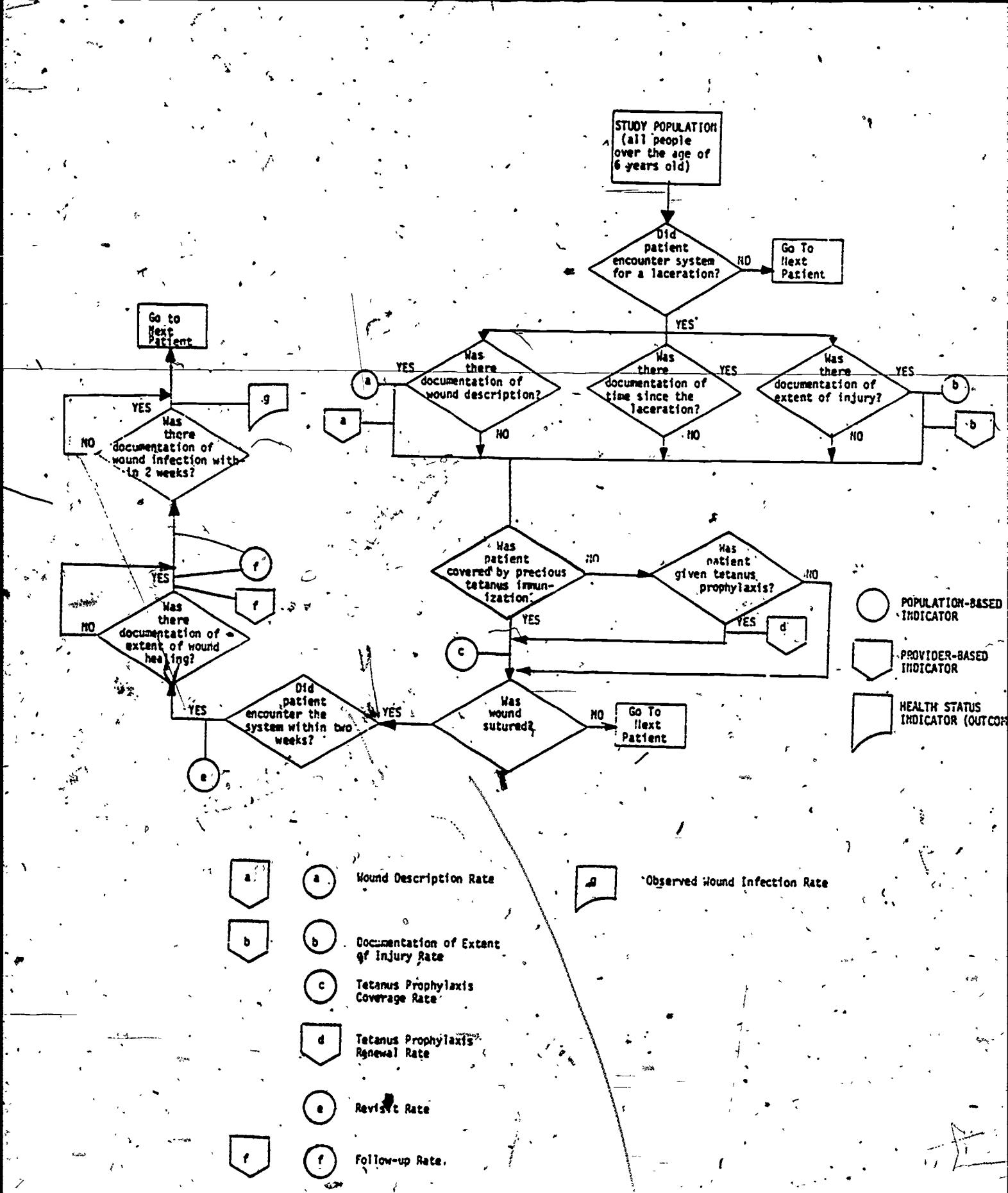

FIGURE 1: Process Map For Laurations, Showing The Points In The Process Of Care From Which Indicator Data Is Extracted.

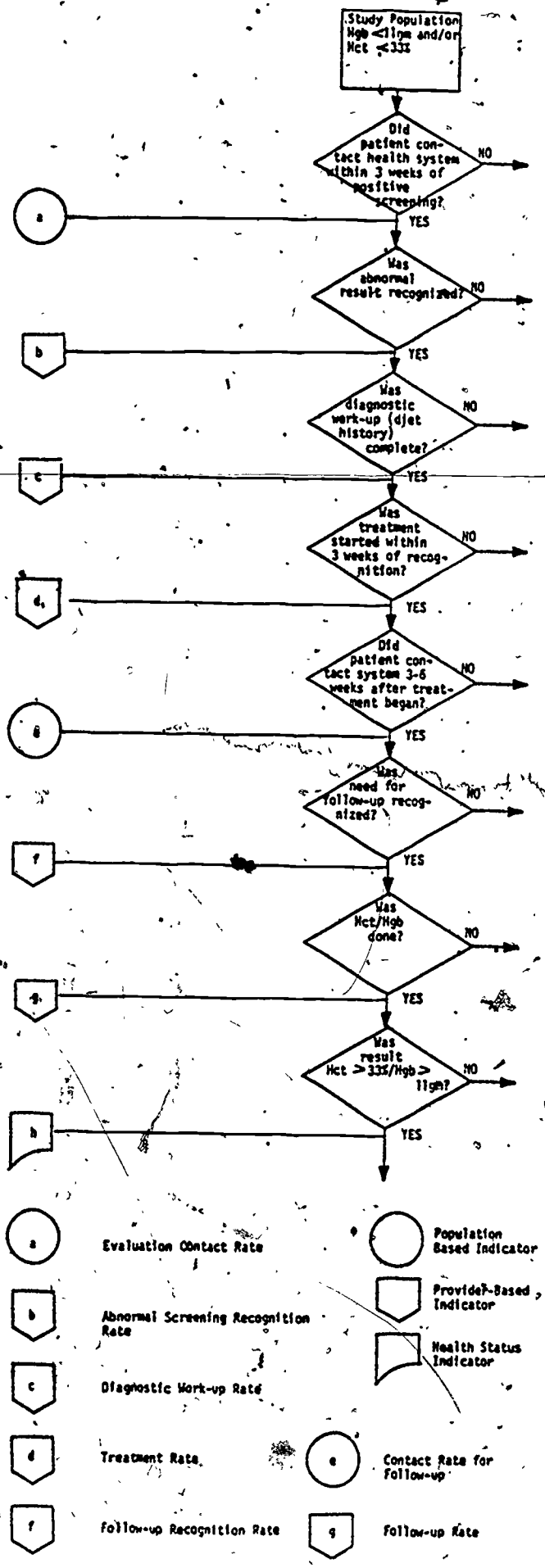

FIGURE 2: Process Map For Iron-Deficiency Anemia. Indicators Placed Sequentially Along The Process Can Express "Continuity" As A Series Of Conditional Probabilities based On Empirical Data. In This Way, The Relative Impediments to Continuity Can Be Pinpointed.

TRACER CONDITION	ASSESSMENT PERSPECTIVE		CLINICAL FUNCTIONS OF HEALTH CARE					
	Population-Based Indicators	Provider-Based Indicators	Prevention	Well-Patient Surveillance	Screening	Diagnostic Evaluation	Treatment	Follow-up
PRENATAL CARE	X	X	X	X	X			
INFANT CARE	X	X	X	X	X			
STREPTOCOCCAL	X				X	X	X	
LACERATIONS OF SCALP AND EXTREMITIES	X					X	X	X
HYPERTENSION	X	X			X	X		
URINARY TRACT INFECTION	X	X				X	X	X
IRON-DEFICIENCY ANEMIA	X	X			X	X	X	X

TABLE 1: Tracer Conditions Used In Pilot Study In Relation To The Assessment Perspective And The Clinical Functions of Health Care.

SERVICE UNIT	Population In Catchment Area	Size Of Catchment Area	Fixed Facilities	No. Of MD's	No. Of PHN's	No. Of CHM's PA's	No. Of Tribal Health Workers
A	900	111 sq. mi	1) 1 clinic	1	1	1	4
B	6,155	2,854 sq, mi	1) 50 bed hospital and OPD 2) 1 Field Clinic	5	5	3	10
C	14,480	100,000 sq. mi	1) 170 bed Medical Center 2) Multi disciplinary ORD 3) 2 field clinics	40	5	1	35
D	3,800	38,000 sq. mi	1) 29 bed hospital and OPD	2	3	0	30
E	4,926	6,375 sq. mi	1) 41 bed hospital and OPD	5	1	1	25
F	4,554	5,200 sq, mi	1) 39 bed hospital and OPD 2) 1 clinic	4	2	2	16

TABLE 2: Comparison Of Services Units By Major Characteristics

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Prenatal Entry Rate	Percent of pregnant women who encountered the health care system by the 20th week of gestation.	88	50	54	50	75	83	62	58	41	29	40	30	64	300
Prenatal Work-up Rate	Percent of pregnant women who had documentation of VDRL, cervical culture, pap smear, and clinical pelvietry by the 20th week of gestation.	30	50	8	50	36	83	10	58	24	29	0	30	20	300
Risk Assessment Rate	Percent of pregnant women who had a statement of risk or prognosis of pregnancy by the 20th week of gestation.	30	50	8	50	1	83	0	58	0	29	0	30	9	300
Desire For Pregnancy Documentation Rate	Percent of pregnant women who had documentation of whether pregnancy was wanted, unwanted, or undecided by the 13th week of gestation.	24	50	8	50	40	83	0	58	0	29	0	30	16	300
Unwanted Pregnancy TAB Rate	Percent of women with documentation of unwanted pregnancy by the 13th week who received a TAB.	—	0	—	0	81	16	—	0	—	0	—	0	81	16
Family Planning Counseling Rate	Percent of pregnant women who had documentation of family planning counseling during the pregnancy prior to delivery.	54	50	42	50	84	67	53	58	10	29	43	30	53	284
TAB Family Planning Rate	Percent of women with TAB who began family planning within 8 weeks after the TAB.	—	0	—	0	100	16	—	0	—	0	—	0	100	16
Postpartum Family Planning Rate	Percent of women who began family planning or for whom their intention not to begin family planning was documented within 8 weeks of delivery.	76	50	44	50	75	67	59	58	24	29	73	30	61	284
Nutritional Counseling Rate	Percent of pregnant women who received nutritional counseling by the 20th week of gestation.	50	50	14	50	10	67	3	58	0	29	3	30	15	284

TABLE 3 : System Performance For Prenatal Care (Population-based process indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
PIH Screening Rate	Percent of pregnant women who had their blood pressure recorded at least 3 times in the second and 5 times in the third trimester.	36	50	42	50	37	67	7	58	3	29	6	30	25	284
Abnormal Blood Pressure Recognition Rate	Percent of patients with a diastolic BP 90, who had a diagnosis or narrative documenting recognition of the abnormal result.	46	13	50	12	0	7	0	3	100	1	—	0	36	36
Anemia Screening Rate	Percent of pregnant women who had a hemoglobin or hematocrit recorded in the first 20 weeks of gestation.	72	50	4	60	81	67	59	58	41	29	37	30	55	284
Pregnancy Monitoring Rate	Percent of pregnant women who had the fundal height recorded at least 3 times in the second and 5 times in the third trimester, and had the fetal heart rate recorded at least once in the second and 5 times in the third trimester.	44	50	16	50	21	67	2	58	0	29	3	30	16	284
Postpartum Contact Rate	Percent of delivered patient who made a visit within 8 weeks after delivery.	48	60	34	50	75	67	66	58	52	29	57	30	57	284
Portpartum Follow-up Rate	Percent of delivered patients making a post-partum visit with any statement regarding exam of uterus, BP, and weight.	54	24	47	17	52	50	45	38	40	15	24	17	46	161
Portpartum Follow-up Rate	Percent of delivered patients with any statement documenting examination of the uterus, BP, and weight by 8 weeks after delivery.	26	50	16	50	39	67	29	58	21	29	13	30	26	284

TABLE 3: (Cont.)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Prenatal Work-up Rate	Percent of first prenatal visits which resulted in a VDRL, cervical culture, pap smear, and clinical pelvimetry within 2 weeks of the first visit.	44	50	35	48	39	83	12	58	62	29	13	30	34	298
Risk Assessment Rate	Percent of first prenatal visits which resulted in a statement of risk or prognosis of pregnancy within 2 weeks of the first visit.	28	50	10	48	2	83	0	58	3	29	20	30	9	298
Prenatal Work-up Rate (by 20th week)	Percent of first prenatal visits occurring prior to the 20th week, which resulted in a documentation of a VDRL, cervical culture, pap smear, and clinical pelvimetry by the 20th week.	34	44	15	27	45	62	14	36	58	12	0	12	30	193
Risk Assessment Rate (by 20th week)	Percent of first prenatal visits occurring prior to the 20th week, which resulted in a statement of risk or prognosis of pregnancy prior to the 20th week.	34	44	15	27	2	62	0	36	0	12	0	12	10	193
Desire for Pregnancy Documentation Rate	Percent of first prenatal visits which resulted in a statement of whether the pregnancy was wanted, unwanted, or undecided.	30	50	17	48	33	83	0	58	0	29	3	30	17	298
Unwanted Pregnancy Counseling Rate	Percent of prenatal visits for women with unwanted or undecided about pregnancy within two weeks of documentation, resulted in counseling regarding desire for pregnancy.	50	2	100	1	100	16	—	0	—	0	—	0	95	19
Anemia Screening Rate	Percent of first prenatal visits which resulted in documentation of a hematocrit or hemoglobin within two weeks of first visit.	86	50	98	48	83	83	83	58	90	29	67	30	85	298
Pregnancy Monitoring Rate	Percent of prenatal visits made after first visit which resulted in documentation of the fundal height.	83	402	86	306	82	495	71	310	85	131	54	109	79	1753
PIH Screening Rate	Percent of prenatal visits made in the second and third trimester which resulted in documentation of the diastolic blood pressure.	91	358	98	360	92	490	94	308	97	121	94	102	94	1739
Abnormal Blood Pressure Recognition Rate	Percent of prenatal visits with a recorded diastolic blood pressure greater than 90 mm Hg, resulted in a diagnosis or narrative indication recognition of the abnormal result.	59	22	60	10	0	17	0	5	100	1	—	0	36	55

TABLE 4 : Provider Performance For Prenatal Care (Provider-based Process Indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Normal Birth Weight Rate	Percent of pregnancies resulting in a birth weight between 5 lbs. 8 ozs and 9 lbs.	96	50	94	50	85	65	91	57	62	29	70	30	86	281
Acceptable One Minute Apgar Rate	Percent of pregnancies resulting in an infant with a one minute Apgar of 7 or greater.	94	50	90	50	91	64	96	53	69	29	93	30	90	276
Observed PIH Rate	Percent of pregnancies with documentation of PIH or documentation of a diastolic BP>90 mm Hg.	26	50	24	50	13	67	5	58	3	29	0	30	13	284
Observed Gestational Diabetes Rate	Percent of pregnancies with documentation of gestational diabetes.	12	50	2	50	1	67	0	58	—	—	—	—	6	225
Observed Anemia Rate	Percent of pregnancies screened for anemia with documentation of a HCT < 37% or a Hgb < 12.	16	45	71	17	15	67	31	58	31	29	50	30	29	246
Operative Delivery Rate	Percent of pregnancies resulting in delivery by C-section	6	50	2	50	2	67	0	58	0	29	0	30	2	284
Repeat Pregnancy Rate	Percent of women who became pregnant again within 12 months of previous delivery.	28	50	15	39	7	67	14	36	—	—	—	—	15	192

TABLE 5 : Prenatal Care Outcomes
(Health Status Indicators)

INDICATOR	DESCRIPTION	Unit A		Unit B		Unit C		Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Initial Feeding Instruction Rate	Percent of infants' mothers who received diet or feeding instructions documented prior to discharge after delivery	72	50	67	46	40	78	27	41	90	29	13	30	51	274
Initial Infant Care Counseling Rate	Percent of infants' mothers who had documentation of counseling on general topics of infant care prior to discharge after delivery	70	50	65	46	54	78	39	41	24	29	10	30	48	274
Infant Care Counseling Rate	Percent of infants' mothers who had documentation of infant care counseling at least once in the first 3 months and at least once in the second 7 months of life.	78	50	56	46	3	78	5	41	76	29	0	30	32	274
Growth Monitoring Rate	Percent of infants who had weight and length recorded at least 3 times in the first 6 and at least 2 times in the second 7 months of life.	42	50	18	49	41	78	20	41	3	29	3	30	26	277
Development Monitoring Rate	Percent of infants who had documentation of developmental milestones at least 4 times in the first 6 months and at least 3 times in the second 7 months of life.	40	50	2	49	0	78	0	41	0	29	0	30	8	277
Diet Monitoring Rate	Percent of infants who had documentation of dietary intake at least 4 times in the first 6 months and at least 3 times in the second 7 months of life.	22	50	12	49	1	78	2	41	0	29	0	30	7	277
Anemia Screening Rate	Percent of infants who had a hemoglobin or hematocrit recorded between age 6-13 months.	72	50	55	49	50	78	34	41	7	29	7	30	43	277
TB Screening Rate	Percent of infants who had a PPD or Tine test recorded between ages 6-13 months.	66	50	51	49	55	78	24	41	83	29	23	30	51	277
Hip Dysplasia Screening Rate	Percent of infants who had documentation of a hip exam in the first 6 months of life.	64	50	51	49	37	78	61	41	90	29	0	30	49	277
DPT-OPV Immunization Rate	Percent of infants who received 3 DPT and 2 OPV immunizations by age 13 months.	64	50	53	49	78	78	68	41	90	29	57	30	69	277
Total Immunization Rate	Percent of infants who received 3 DPT, 2 OPV, a measles, and a rubella immunization by age 13 months.	52	50	16	49	46	78	44	41	48	29	30	30	40	277
Nutrition Counseling Rate	Percent of infants who received nutrition counseling 3 times in the first 13 months of life	68	50	44	50	51	78	46	41	0	29	0	30	41	278

TABLE 6 : System Performance For Infant Care (Population-based process indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Growth Monitoring Rate	Percent of infant visits resulted in recording of length and weight during the first 13 months of life.	42	503	39	419	58	546	40	303	67	125	34	67	47	1963
DPT Immunization Rate	Percent of infant visits made when due for a DPT immunization, resulted in the immunization being given.	43	296	38	284	71	284	48	184	88	91	96	55	55	1194
Diet History Rate	Percent of infant visits during the first 13 months of life, which resulted in any statement of recent dietary intake.	36	503	36	419	42	546	30	303	69	125	12	67	38	1963

TABLE 7 : Provider Performance For Infant Care (provider-based process indicators)

(Health Status Indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Adequate Growth Rate	Percent of infants who were between the 10th and 90th percentiles for height and weight at approximately one year of age.	85	33	74	27	73	78	69	41	—	—	—	—	74	179
Birth Depression Rate	Percent of infants who had an Apgar of 6 or less at one minute or less than 8 at five minutes.	6	50	4	49	1	78	0	41	3	29	3	30	3	277

TABLE 8 : Infant Care Outcomes (Health Status Indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Selective Screening Rate	Percent of patient-episodes of pharyngitis who received a throat culture within two days of the initial visit.	84	49	66	50	72	137	57	196	85	52	80	50	69	534
Treatment Rate	Percent of patients with a positive strep culture who received an antibiotic within five days of the culture date.	100	5	75	12	97	33	83	44	100	16	100	2	90	112
Treatment-Of-Choice Rate	Percent of patients with a positive strep culture who received either 1.2 mu LA bicillin (600,000 units for children less than 60 lbs. or 9 years of age), oral penicillin for 10 days, or erythromycin for 10 days within 5 days of the culture date.	60	5	58	12	97	33	83	44	53	16	100	2	79	112
Unsupported Treatment Rate	Percent of patients with an episode of pharyngitis who received an antibiotic without receiving a throat culture.	6	49	4	50	18	137	37	196	15	52	16	50	22	534
Positive Strep Culture Rate	Percent of pharyngitis episodes cultured which resulted in a positive culture for strep.	12	41	36	33	33	99	35	113	36	44	5	42	29	372

TABLE 9 : System Performance For Streptococcal Disease (population - based process indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Wound Description Rate	Percent of scalp or extremity lacerations for which the following were documented: 1. time since the laceration 2. cause of the laceration 3. description of laceration	54	50	39	49	34	100	23	95	40	50	38	50	36	394
Documentation Of Extent of Injury Rate	Percent of scalp or extremity lacerations with documentation of assessment of bone, nerve, and/or vascular involvement.	16	50	22	49	39	100	18	95	36	50	28	50	27	394
Tetanus Prophylaxis Coverage Rate	Percent of scalp or extremity lacerations which had documentation of current tetanus coverage, or were provided additional coverage.	68	50	90	49	56	100	31	95	70	50	88	50	62	394
Revisit Rate	Percent of patients who had laceration sutured who had an encounter with any provider for any reason within 5 to 15 days after laceration was sutured.	86	21	80	30	66	72	87	23	41	34	42	43	64	223
Follow-up Rate	Percent of patients with sutured laceration for whom some statement of wound healing was made within 5 to 15 days of initial encounter for the laceration.	86	21	80	30	58	72	74	23	38	34	26	43	56	223
Observed Wound Infection Rate	Percent of scalp or extremity lacerations with documentation of a wound infection. (2 wks.)	6	50	12	49	5	100	5	95	6	50	8	50	6	394

TABLE 10 : System Performance For Lacerations (population-based process indicators)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		TOTAL	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Contact For Screening Rate	Percent of infants and prenatal patients who made contact with the health care system when they required screening for anemia. (Percent of infants contacting the system between age 6-13 months. Percent of prenatal patients contacting the system by 20th week of gestation.)	94	100	72	100	91	154	78	99	91	58	70	60	82	571
Screening Rate	Percent of infants and prenatals making contact for screening, who had a hematocrit and/or hemoglobin.	77	94	72	72	69	140	62	77	34	41	31	42	63	466
Evaluation Contact Rate	Percent of patients screened positive for anemia (Hct 33 and/or Hgb 11) who made contact with the system within 3 weeks after positive screening.	89	45	56	50	100	20	100	11	96	50	100	50	87	226
Abnormal Screening Recognition Rate	Percent of patients making contact for whom there is any statement or action indicating recognition of the abnormal result.	80	40	71	28	85	20	100	11	56	48	58	50	69	197
Diagnostic Work-up Rate	Percent of patients with recognition of abnormal result, for whom any statement of dietary intake was made.	78	32	80	20	35	17	18	11	38	48	40	50	49	178
Treatment Rate	Percent of patients with recognition of abnormal result, who were started on iron therapy. (1 wk)	88	32	55	20	88	17	100	11	85	27	83	29	82	136
Contact Rate For Follow-up	Percent of patients who made contact with the health care system within 3-6 weeks after iron therapy was instituted	57	28	45	11	33	15	73	11	48	23	50	24	51	112
Follow-up Recognition Rate	Percent of patients contacting the system 3-6 weeks after therapy started, for whom there was any statement or action indicating the need for follow-up.	56	16	80	5	20	5	75	8	91	11	58	12	65	57
Follow-up Rate	Percent of patients with recognition of the need for follow-up who received a hemoglobin and/or hematocrit within 3-6 weeks after institution of iron therapy.	100	9	100	4	100	1	100	6	50	10	71	7	81	37

TABLE II : Continuity of Care For Iron-Deficiency Anemia

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		TOTAL	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Screening Yield	Percent of infants and prenatal patients screened for anemia who had a Hgb 11 and/or Hct 33.	17	72	9.6	52	23	77	63	48	22	46	39	22	26	337
Resolution Of Anemia Documentation Rate	Percent of patients with a repeat Hct and/or Hgb 3-6 weeks after therapy started, which resulted in a Hct 33 and/or Hgb 11.	67	9	50	4	100	1	83	6	40	5	0	4	55	29

TABLE II : (Cont.)

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Evaluation Contact Rate	Percent of patients with a positive urine culture (100,000 organisms) who made contact with the health care system within 2 weeks of positive culture.	84	50	72	50	98	45	79	19	96	50	96	50	88	264
Abnormal Screening Recognition Rate	Percent of patients making contact within 2 weeks, who had any statement or action indicating that positive culture was recognized.	98	42	83	36	98	44	100	15	96	48	69	48	89	233
Diagnostic Evaluation Rate	Percent of patients with recognition of positive culture, who had documentation of the history, description of symptoms, temperature, and palpation of the abdomen.	44	41	53	30	44	43	67	15	46	46	58	33	50	208
Treatment Rate	Percent of patients with recognition of positive culture, who were placed on an appropriate antibiotic therapy within 2 weeks of positive culture.	95	41	93	30	98	43	100	15	96	46	91	33	95	208
Follow-up Contact Rate	Percent of patients treated who made contact with the health care system within 1-4 weeks after the treatment started.	74	39	79	28	74	[illegible]	60	15	57	44	63	30	68	198
Follow-up Recognition Rate	Percent of patients making contact for whom there was any statement of action indicating recognition of the need for follow-up.	52	29	50	22	84	31	89	9	32	25	58	19	59	135
Follow-up Rate	Percent of patients with recognition of the need for follow-up who received a urine culture within 1-4 weeks after treatment started.	67	15	82	11	96	26	89	9	50	8	18	11	72	80
Negative Reculture Rate	Percent of patients treated and followed-up who had a repeat urine culture resulting in 100,000 organisms.	70	10	44	9	80	25	88	8	25	4	0	2	67	58

TABLE 12 : Continuity of Care
For Urinary Tract Infections

INDICATOR	DESCRIPTION	Service Unit A		Service Unit B		Service Unit C		Service Unit D		Service Unit E		Service Unit F		Total	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
Screening Contact Rate	Percent of population who made contact with the health care system at least once within the three year time frame (1/1/74-1/1/77).	96	50	92	50	84	97	90	106	64	100	60	100	78	503
Screening Rate	Percent of patients making contact who had their blood pressure recorded at least once (in the absence of trauma, pregnancy, intoxication, or under the influence of medication known to elevate blood pressure).	100	48	98	46	75	81	66	95	66	64	88	60	79	394
Abnormal Screening Recognition Rate	Percent of patients with a positive BP screen (diastolic BP 90) for whom there was any statement or action indicating recognition of the abnormal result on that visit.	60	10	56	9	66	15	80	15	62	8	20	10	60	67
Abnormal Screening Contact Rate	Percent of patients with abnormal screening BP who made contact with the system within 6 weeks of the abnormal BP.	33	6	60	5	80	15	60	15	50	8	100	2	63	51
Rescreening Rate	Percent of patients making contact who had a blood pressure recorded within 6 weeks of the original abnormal result.	50	2	67	3	75	12	100	9	100	4	100	2	84	32
Screening Yield	Percent of patients screened during the time frame, who had one or more diastolic blood pressure readings above 90mm Hg.	21	48	20	45	25	61	25	60	19	42	19	53	22	309

TABLE 13 : Continuity Of Care
For Hypertension Screening

	OBSERVED		IF IMPROVE RECOGNITION TO 90%		IF IMPROVE CONTACT DATES TO 90%		IF IMPROVE ACTION TASKS TO 90%		IF IMPROVE COMBINED RECOGNITION-ACTION TO 90%	
	UTI	Anemia	UTI	Anemia	UTI	Anemia	UTI	Anemia	UTI	Anemia
EVALUATION CONTACT RATE	88%	87%	88%	87%	90%	90%	88%	87%	88%	87%
ABNORMAL SCREENING - RECOGNITION RATE	89%	69%	90%	90%	89%	69%	89%	69%		
DIAGNOSTIC EVALUATION RATE	50%	49%	50%	49%	50%	49%	90%	90%	90%	90%
TREATMENT RATE	95%	82%	95%	82%	95%	82%	90%	90%		
FOLLOW-UP CONTACT RATE	68%	51%	68%	51%	90%	90%	68%	51%	68%	51%
FOLLOW-UP RECOGNITION RATE	59%	65%	90%	90%	59%	65%	59%	65%	90%	90%
FOLLOW-UP RATE	72%	81%	72%	81%	72%	81%	90%	90%		
OVERALL PROCESS SUCCESS RATE	11%	6.5%	17%	12%	14%	12%	23%	14%	48%	36%

TABLE 14: Projecting Overall Process Success Through Improvements In Selected Clinical Events.

	OBSERVED RATES			IF IMPROVE CONTACT TO 90%			IF IMPROVE RECOGNITION TO 90%			IF IMPROVE TASK PERFORMANCE TO 90%		
	S.U. A	S.U. B	S.U. F	S.U. A	S.U. B	S.U. F	S.U. A	S.U. B	S.U. F	S.U. A	S.U. B	S.U. F
Contact For Screening Rate	.94	.72	.70	.94	.90	.90	.94	.72	.70	.94	.72	.70
Screening Rate	.77	.72	.31	.77	.72	.31	.77	.72	.31	.90	.90	.90
Evaluation Contact Rate	.89	.56	1.0	.90	.90	1.0	.89	.56	1.0	.89	.56	1.0
Abnormal Screening Recognition Rate	.80	.71	.58	.80	.71	.58	.90	.90	.90	.80	.71	.58
Diagnostic Work-up Rate	.78	.80	.40	.78	.80	.40	.78	.80	.40	.90	.90	.90
Treatment Rate	.88	.55	.83	.88	.55	.83	.88	.55	.83	.90	.90	.90
Contact Rate For Follow-up	.57	.45	.50	.90	.90	.90	.57	.45	.50	.57	.45	.50
Follow-up Recognition Rate	.56	.80	.58	.56	.80	.58	.90	.90	.90	.56	.80	.58
Follow-up Rate	1.0	1.0	.71	1.0	1.0	.71	1.0	1.0	.71	1.0	1.0	.90
Overall Process Success. Rate	.11	.033	.008	.18	.13	.020	.20	.047	.021	.16	.075	.077

TABLE 15: Iron Deficiency Anemia - Projecting Overall Process Success Through Improvements In Selected Clinical Events.

	S.U. A	S.U. B	S.U. C	S.U. D	S.U. E	S.U. F
Case Finding Rate	.40	.16	.19	.087	.049	.050
Follow-up Rate	.32	.36	.066	.55	.22	.21
Aggregate Contact Rate	.48	.18	.30	.57	.33	.35
Aggregate Recognition Rate	.45	.57	.17	.75	.51	.34
Aggregate Task Performance Rate	.53	.32	.21	.11	.05	.07

TABLE 16: Iron-Deficiency Anemia - Probabilities Of Process Success For Selected Functions and Functional Sequences.

The "Case Finding Rate" is calculated from the product of the following rates:

Contact for Screening Rate
Screening Rate
Evaluation Contact Rate
Abnormal Screening Recognition Rate
Diagnostic Work-up Rate

The "Follow-up Rate" is calculated from the product of the following rates:

Contact for Follow-up Rate
Follow-up Recognition Rate
Follow-up Rate

The aggregate functional rates are calculated from the product of selected rates as follows:

Aggregate Contact Rate	Aggregate Recognition Rate	Aggregate Task Performance Rate
Contact for Screening Rate	Abnormal Screening Recognition Rate	Screening Rate
Evaluation Contact Rate	Follow-up Recognition Rate	Diagnostic Work-up Rate
Contact For Follow-up		Treatment Rate
		Follow-up Rate