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SEPTEMBER/OCTOBER, 1986

LOUISIANA MORBIDITY REPORT
EPIDEMIOLOGY
PUBLIC HEALTH STATISTICS

DEPARTMENT OF HEALTH AND HUMAN RESOURCES
OFFICE OF PREVENTIVE AND PUBLIC HEALTH SERVICES
DIVISION OF RECORDS AND STATISTICS
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REPORT TO PHYSICIANS:
NEONATAL SCREENING IN LOUISIANA

The purpose of this article is to review certain issues relative to neonatal screening and to report on the achievements of the Louisiana Program.

RESPONSIBILITY FOR TESTING OF INFANTS

Louisiana law states:

"The physician attending a newborn child or the person attending a newborn child who was not attended by a physician shall cause the child to be subjected to tests . . . that have been approved by the Department of Health and Human Resources, provided, however no such test shall be given to any child whose parents object thereto."

The law also assigns responsibility to the state to provide a laboratory for screening. The tests offered currently include the Guthrie test for phenylketonuria (PKU), the radioimmune assay (RIA) for thyroxine (T_4) and thyroid stimulating hormone (TSH) for congenital hypothyroidism screening on filter paper specimens, and hemoglobin electrophoresis for sickle cell disease screening targeted to infants of black women who carry an abnormal hemoglobin trait. These are carried out at the Central Laboratory under the direction of the Director of Laboratories, Henry B. Bradford, Ph.D. Though there were four other tests added to the screening law in 1981, galactosemia, maple syrup urine disease, homocystinuria, and tyrosinemia, annual requests for funding for equipment and personnel to implement these have been turned down, and so screening for these conditions is not being carried out.

This laboratory maintains contact with similar state screening laboratories across the nation, and hence is mindful of the necessity for an adequate collection technique in order to have a meaningful quantitative assay. Quality control entails two processes. First, dated filter paper collection forms are provided by the Office of Preventive and Public Health Services (OPPHS) to assure proper absorptive quality currently at no charge to participating parties - hospitals, public health units (PHU), and physicians. Second, specimens are checked carefully and those judged inadequate are noted, and

repeat tests are requested. The answer to poor specimen collection is improved collection technique, and OPPHS can assist in this, as is discussed later.

It is the responsibility of the physician to perform the screen, including any necessary repeats and also to report cases identified to the Genetic Diseases Program. It is desirable also to report test results when a requested repeat of an unsatisfactory or suspect initial test is done elsewhere, whether or not a case is thus diagnosed. This permits the state to clear its record on suspects. The law calls for the state agency, in the case of positives, to make known to the physician and/or family the services offered by the state. For example, in the instance of PKU, this includes assistance in confirming the diagnosis and monitoring blood levels, and dietary management including use of special formula with the assistance of central and regional OPPHS public health nutritionists.

VALUE OF A CENTRAL LABORATORY

The National Academy of Sciences recommends a unified system of neonatal screening, since statistical treatment of specimens is required for congenital hypothyroidism. For instance, in the 1982 calendar year the OPPHS laboratory performed 88,895 screening tests for congenital hypothyroidism, using the RIA for T_4. Since there is no cut-off point below which all cases are abnormal and above normal, the laboratory repeats the lowest 10%, and performs additionally the RIA for TSH. From these approximately 8,900 repeats, 133 were found to be suspect for congenital hypothyroidism, and repeat testing was in order. The laboratory reported these to the genetics section and the sender, either doctor, hospital, or PHU, was notified that a follow-up specimen (usually serum) would be needed. Some sent the repeat specimen to OPPHS, in which case the Genetics Program could learn the outcome of repeat testing. Others elected to send the specimen to a local laboratory, and almost invariably failed to report the outcome to OPPHS who was mandated and obligated to see that these children receive follow-up. Telephone calls were made to the physician to verify that repeat testing had been done and to ascertain the infant's status - i.e. normal, congenital hypothyroidism requiring treatment, or the benign condition, thyroid binding globulin (TBG) deficiency not requiring treatment. From the 133 suspects of 1982, 12 cases were found to be hypothyroid and 6, TBG deficiency. Having so sizeable a number of tests made it more likely that a congenital hypothyroidism case would be identified, even though the T_4 might not be exceedingly low.

AGE AT TESTING

There is no consensus on best age at testing. The American Academy of Pediatrics Committee on Genetics issued a statement recommending pre-discharge collection of neonatal screens, considering that there exists at the hospital of birth a "tighter net" for testing[1]. A trend toward earlier discharges, however, means that many are collected before the long-recommended age for collection of PKU screens (3-7 days in term infants and one week in prematures).

Some recommend later testing. A communique was received from Dr. Robert Guthrie, David Jinks, and Edwin Naylor, issued April 18, 1984, addressed to state laboratory directors as follows:

> "At the last annual Neonatal Screening Conference February 7-9 at Orlando, a question was raised concerning the recommendation of the American

Academy of Pediatrics' Committee on Genetics. This committee had stated that a blood specimen collected 24 hours after birth should be considered adequate for detection of PKU. We strongly disagree with this recommendation for several reasons:

"1. We agree that it would be very unlikely that "classical" PKU (eventual blood phenylalanine levels over 20 mg%) would be missed on grounds of documented evidence. Nevertheless, our estimates are that approximately 5% of cases have been missed in the past, due to many reasons in the real world of newborn screening in the United States. Further, in "hyperphenylalaninemia variants", with lower ultimate blood levels, the phenylalanine levels rise more slowly. These infants also need to be detected and evaluated individually for possible clinical treatment.

"2. The filter paper blood specimen is used for detection of several other important conditions by nearly all screening programs, and consideration of the "adequacy" of a 24-hour specimen for these other conditions does not appear to be seriously considered by this Committee. We have always believed that a follow-up blood specimen collected at 2-4 weeks after birth should be part of every newborn screening program. At Orlando, it was agreed that approximately 5% of hypothyroid cases are now being missed with the single nursery specimen. Evidence has pointed to a slow rise of blood methionine in homocystinuria, so that a later specimen should detect additional cases. In Texas, one of at least four states where follow-up specimens are routinely received, Dr. Brad Therrell states that this specimen is preferable for sickle cell detection, as better separation of the abnormal hemoglobin bands is obtained . . .

"3. Failing to obtain a routine follow-up specimen, such a specimen should be requested in all cases of discharge from the nursery before 72 hours after birth, in our opinion . . ."

On the other hand, Mamunes states that "when properly performed by the laboratory, the initial Guthrie test will detect almost all infants with PKU by 48 hours of age if there has been adequate milk intake, and repeat testing solely for PKU is not warranted"[2]. "When properly performed by the laboratory" must also be predicated upon a properly-collected specimen, to be discussed later.

HOW GOOD IS OUR NET?

Predischarge Screening

It is not possible to know with certainty the proportion of the population now covered by neonatal screening, but it was possible to estimate predischarge screening. In 1985 a mail survey of Louisiana hospitals delivering babies was made and 91 hospitals with delivery units returned the survey form. When linking the number of births reported in 1984 by hospital to the screening practice reported by the survey, it was possible to estimate the number of children screened before hospital discharge.

In Table 1A the hospitals were grouped according to the annual number of deliveries. In respondent hospitals, the larger the number of births, the more likely was pre-discharge screening to be performed: using births in the respondent hospitals as the denominator, in hospitals having ≥ 1000 deliveries annually, 79% of babies received routine pre-discharge

screening; 73% of babies born in hospitals with 500-999 deliveries were routinely tested; 66%, with 250-499 births; and 45% if less than 250 deliveries. Overall, the respondent hospitals indicated 76% of infants were born where routine pre-discharge screening is performed.

The great majority of respondent hospitals (56) referred to the state centralized laboratory, while 11 used other laboratories (See Table 1B). In 1984 a total of 93,280 specimens were processed by OPPHS for congenital hypothyroidism and 92,905 for PKU.

Two groups that clearly need special attention are the over eight hundred infants born out-of-state and approximately 500 born out-of-hospital. Physicians encountering patients in either of these categories would need to ascertain that neonatal screening has been or is carried out.

Post-discharge Screening

What of infants born in hospitals not practicing routine pre-discharge screening? Parish Health Units (PHUs) continue to offer neonatal screening, and appointments are routinely given for infants discharged from state-supported hospitals to attend the area PHU by two weeks of age. Since length of hospital stay is usually quite short, perhaps 36 hours, retesting is encouraged on all babies discharged from state-supported hospitals, even from those doing pre-discharge screening. Many of the smaller hospitals not screening routinely, indicated that they refer to PHUs for screening. Several indicated check of infants at the hospital post-discharge (at appropriate ages) because of early discharge. Physicians also submit specimens collected at their offices. Data on completeness of pre- and post-discharge testing are not available, however. The total number of tests performed by the state laboratory in a year far exceeds the number of births. The proportion of tests representing repeats is unclear, however, so there is no way to assure that all infants are being tested. There are also other laboratories performing screening tests, and the number of such tests is not uniformly reported or presently known to the authors. Only one report of a positive PKU identified at a private laboratory has come to the agency's attention.

INADEQUATE SPECIMENS

The submission of inadequate filter paper specimens continues to compound the problem. Approximately 10% of those received at the Central Laboratory are judged unsatisfactory for a number of reasons - insufficient saturation, with white areas appearing on the back which would produce a laboratory value lower than actual; over-layering due to repeat application rather than a single one, which would lead to values higher than actual; errors in handling allowing decomposition (not mailed immediately; mishandling-specimens must be air dried before packaging and protected from moisture). Some clinics/offices submit a high percent of unsatisfactory specimens, and there have been times when as high as 19% of all incoming specimens were rejected. To run a test on a poorly collected specimen would give a false sense of security, if it is taken to be accurate. It is a recurring task to see that proper inservice training is given in collection methodology to all new, as well as "old" personnel.

PHUs can be contacted for two levels of assistance: attendance for demonstration at the PHU during collection times, and loan of a slide-cassette show, available from each regional office of the state. The central laboratory personnel are available for similar consultation as well.

Notification that specimens were unsatisfactory and require repeating is written on the laboratory report, which is returned to the sender. It is the sender's responsibility to submit a repeat. Should a physician lose track of a patient requiring a repeat, assistance of the PHU in tracking may be requested.

RESULTS OF SCREENING

Phenylketonuria (PKU)

PKU screening began in Louisiana in the nineteen-sixties using the Guthrie blood test. This test entails placing a filter paper "punched circle" from each specimen on an agar plate containing an inhibitor seeded with bacillus subtilis spores whose growth is dependant on exogenous phenylalanine, along with a row of control discs containing varying concentrations of phenylalanine. After overnight incubation, growth in the area around the disc correlates well with the amount of phenylalanine present.

Table 2 summarizes the experience over a six year period. There were 31 cases of classical PKU discovered through the state screening program. The incidence is much commoner in Caucasians (1:10,031 births) than in other races. One black case was diagnosed in the six-year period 1980-1985, with a total of four black cases on the registry. In that same period there were 10 cases of benign hyperphenylalaninemia (26% in non-whites) and 19 with transient hyperphenylalaninemia (26% in non-whites).

Assistance with metabolic monitoring and dietary management is available from OPPHS through a state contract with the Hayward Genetics Center, Human Genetics Program, Tulane Medical Center. At present 46 children are on special formula available through OPPHS, and periodic blood specimens in blue microfuge heparinized tubes are submitted mainly through local parish health units for phenylalanine level monitoring. Assistance in carrying out dietary prescription by Dr. Shapira's group is accomplished through central and regional nutritionists who work with the families. With good control of phenylalanine levels almost always there is avoidance of mental retardation, save for occasional cases of the "malignant" variety of phenylketonuria.

The success of dietary management in early childhood has been such that there are now 38 females with PKU in Louisiana who are in reproductive ages. There is concern that these women experience planned pregnancy only while under dietary management, lest the child be born mentally retarded from high PKU levels in utero. Dietary management beyond 6 or 7 years was not maintained in some of these women, and resumption of dietary control has been resisted. These women can be enrolled in the nation-wide collaborative study of pregnancy in PKU women and receive assistance in the metabolic management aspect of the pregnancy through the Haywood Genetics Center.

Congenital Hypothyroidism

Table 2 reports the cases of congenital hypothyroidism and TBG deficiency, the latter not requiring medication. The incidence of true congenital hypothyroidism was about twice as high in whites (1:5374) as in non-whites (1:11,343) with 7 to 17 cases diagnosed annually. On the other hand, TBG is almost equally prevalent in non-whites (1:12,855) as in whites (1:13,083) and occurred at 3 to 12 total cases annually.

Though reporting is mandatory, no cases have come to the attention of the agency

other than those identified through the screening program. The geographic distribution of the 73 cases has not been unusual.

Sickle Cell Disease

Sickle cell anemia is the commonest of the conditions for which Louisiana screens, with about 70 cases expected annually. The screening law was amended in 1984 to permit targeting of neonatal sickle cell screening from the population at large to groups at highest risk. Section 1299.1 reads:

..."B.1. In the cases of testing for sickle cell diseases, the physician attending the newborn child or the person attending the newborn child who was not attended by a physician shall determine the need for testing based on the child's genetic background.

"2. When the mother has indicated her racial group as black, the following applies:

a. If the mother has been tested for sickle cell diseases and the test results indicate the presence of sickle hemoglobin or other abnormal hemoglobin, then the child shall be tested.

b. If the mother has not been tested or will not be tested, the child shall be tested.

c. The physician or the person attending the child shall cause the child to be tested; however, no such test shall be given to any child whose parents object hereto."

Since 1972 electrophoresis screening has been offered in OPPHS clinics, to both women attending prenatal and family planning clinics, and to infants in well child clinics. In many instances a person's test results are retrievable from these sources. While the sickledex and other tests can identify the sickle trait, it fails to detect other abnormal hemoglobins such as C, and therefore, a negative sickledex does not totally eliminate the possibility of disease. Therefore, hemoglobin electrophoresis is the preferred screen.

The goal is to detect sickle cell disease as early as possible in order to first, counsel the family to seek early treatment for infections and life threatening crises such as splenic sequestration and possible prophylactic therapy, with resultant lowering of infant mortality, and second, to permit genetic counseling before another pregnancy ensues. It is not the goal of the law to identify all newborns with trait. Targeting the newborn screening according to maternal risk is a much more efficient way to detect disease than testing all black newborns. Testing the mother furnishes evidence of risk for all her pregnancies, and in the 89% of negative women there will be no need to test any of her children. Only 10%-11% of black infants need testing, so trait identification of females in relation to the childbearing function is of the highest priority. Black males will need to be tested when the mate of a woman at risk (a ninety percent reduction in testing). Many black males, of course, have been routinely tested since 1972, while attending PHUs for child health services. Reports of such testing can be sought from child health records there.

This program has sought to study whether the filter paper specimen can be used for targeted neonatal sickle cell disease screening. Table 3 gives the results of sickle cell disease testing of 50,624 blacks for a 12 month period 1984-85 by grouped ages. The under four months age group combines filter paper and capillary screens

and represents a partially targeted population. They consequently had a higher rate of disease - 1.14% with sickle cell disease (including Hemoglobin SC) and 0.53% Hemoglobin C disease. Rates thereafter ranged from .08% to 0.24% and 0.0% to 0.05%, respectively. Yet the Hemoglobin C and Hemoglobin S trait rates at under four months are roughly half the rates found at all other ages. The problem of high proportions of fetal (F) hemoglobin is well-known and in 4.95% of tests in this age group, only F hemoglobin was identified, requiring additional testing, but none at older ages. These are thought to be from filter paper specimens. Among the 17,533 total tests of black infants under one year of age, there were 143 reports suggestive of disease (86 Hemoglobin S disease, 40 Hemoglobin C disease, 17 Hemoglobin SC disease). Trait prevalence was found to be 7.5% with Hemoglobin S trait, and 2.4% with Hemoglobin C trait. The black population under one with no abnormal hemoglobin was 87.4%. Analysis on filter paper specimens has therefore not proved to be totally satisfactory. While it has served to identify 116 specimens under 4 months of age interpreted as posible disease, the difference in trait identification at under four months and later ages is of concern. Other screening methodologies are therefore being considered. This number of cases is more than would be expected, and could be accounted for by repeat testing of some children. Among the specimens run in all ages, 39% of the 140 cases reported as sickle cell disease were Hemoglobin SC disease.

Two state-funded programs are available for definitive diagnosis of children with abnormal screening tests, the Sickle Cell Center of Northern Louisiana at Shreveport and the Sickle Cell Center of Southern Louisiana in New Orleans.

DISCUSSION

The agency has several concerns. First, we are concerned whether all Louisiana newborns receive screening, and call for concerted effort on everybody's part to assure this. Those born out-of-hospital and out-of-state are at particular risk of oversight. Second, use of private laboratory testing weakens the program: it may not provide a sufficient data base for a valid statistical analysis; the T_4 kits being used by private laboratories may not be calibrated for neonates; and we are not convinced they are effective, since there should have been several cases identified by them but the agency has been notified of only one PKU and no cases of hypothyroidism for six years effort. Sending screening specimens to the State Central Laboratory provides the best possibility of diagnosing a case promptly. Third, continued vigilance has to be maintained over the collection process to lower the rejection rate due to poor collection techniques. A plea is also made for physicians notified of unsatisfactory specimens to report on testing elsewhere as a result of screening by the central lab, and of positives identified by other labs. The indication of repeat testing on the lab slip would also be useful. Fourth, though the agency does not recommend routine repeat screens, it does urge a repeat specimen for children discharged prior to 72 hours of age. Fifth, with the difficulties encountered with hemoglobin electrophoresis in early life, it is also urged that requests for filter paper analysis at the time of PKU/-hypothyroidism screening be limited to children whose mothers are known to have an abnormal hemolobin. If a black mother's hemoglobin electrophoresis status is not known, it would be better to have the mother tested first (or obtain the results of tests done at family planning or elsewhere)

before deciding to request it on the child. At the two month well child visit a capillary specimen can be submitted for the 10% of infants of these unknown mothers who are found to be positive.

The tables attest to the discovery of close to expected numbers of cases of the three diseases for which screening is carried out in Louisiana, and the prospect of altering favorably the outcomes of affected children makes neonatal screening a gratifying effort. The three-way partnership of the providers of primary child care who are doing the collection, the state screening laboratory, and the central monitoring of test results by the OPPHS Genetic Diseases Section, is working very well. This agency will continue to work for early detection and treatment of these affected children. Physicians are invited to call the Genetic Diseases Program at (504) 568-5075 to learn more about the operation of the program or to voice their concerns.

REFERENCES

1. American Academy of Pediatrics, Committee on Genetics: New issues in newborn screening for phenylketonuria and congenital hypothyroidism. Pediatrics 1982; 69: 104-106.

2. Mamunes P. Neonatal Screening Tests. In The Laboratory in Pediatric Practice. Ped Cl NA 1980; 27: 733-751.

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Table 2
CASES OF HYPOTHYROIDISM, THYROID-BINDING GLOBULIN (TBG)
DEFICIENCY AND HYPERPHENYLALANINEMIA BY RACE
COMPARED WITH ANNUAL BIRTHS IN LOUISIANA, 1980-1985

YEAR	TOTAL BIRTHS	TRUE HYPOTHYROIDISM	TBG	HYPERPHENYLALANINEMIA		
				CLASSICAL	BENIGN	TRANSIENT
1980						
WHITE	50,168	4	2	8	0	0
NONWHITE	31,946	3	1	0	1	0
TOTAL	82,114	7	3	8	1	0
1981						
WHITE	50,393	8	4	1	2	3
NONWHITE	31,774	2	2	0	0	0
TOTAL	82,167	10	6	1	2	3
1982						
WHITE	51,867	8	6	6	1	5
NONWHITE	32,203	4	0	0	0	4
TOTAL	84,070	12	6	6	1	9
1983						
WHITE	50,177	15	3	5	2	3
NONWHITE	32,349	2	2	1	0	1
TOTAL	82,466	17	5	6	2	4
1984						
WHITE	49,171	8	1	5	2	2
NONWHITE	32,257	3	5	0	0	0
TOTAL	81,428	11	6	5	2	2
1985						
WHITE	49,200	13	7	5	1	1
NONWHITE	32,300	3	5	0	1	0
TOTAL	81,500	16	12	5	2	1
1980 - 1985						
WHITE	300,916	56 (1:5,374)	23 (1:13,083)	30 (1:10,031)	8 (1:37,614)	14 (1:21,494)
NONWHITE	192,829	17 (1:11,343)	15 (1:12,855)	1 (1:192,829)	2 (1:96,414)	5 (1:38,566)
TOTAL	493,745	73 (1:6,764)	38 (1:12,993)	31 (1:15,927)	10 (1:49,374)	19 (1:25,987)

Table 3.
RESULTS OF HEMOGLOBIN ELECTROPHORESIS
IN DHHR LABORATORY AMONG BLACKS OF VARIOUS AGES

RESULTS	AGE													
	≤4 MONTHS		4-6 MONTHS		7-11 MONTHS		1-5 YEARS		6-18 YEARS		>18 YEARS		TOTAL	
	NO.	PER-CENT	NO.	PER-CENT	NO.	PER-CENT	NO.	PER-CENT	NO.	PER-CENT	NO.	PER-CENT	NO.	PER-CENT
F ONLY	344	4.95											344	0.68
NOT ABNORMAL	6,040	86.88	3,312	88.20	5,966	87.40	8,087	86.59	12,512	90.34	8,435	85.18	44,352	87.61
C TRAIT	123	1.77	95	2.53	195	2.86	286	3.06	281	2.03	360	3.64	1,340	2.65
S TRAIT	329	4.73	337	8.97	649	9.51	955	10.23	1,035	7.47	1,097	11.08	4,402	8.70
C DISEASE	37	.53	2	0.05	1	0.01	0	- -	4	0.03	2	0.02	46	0.09
S DISEASE	79	1.14	9	0.24	15	0.22	11	0.12	18	0.13	8	0.08	140	0.28
TOTAL	6,952	100.00	3,755	100.00	6,826	100.00	9,339	100.00	13,850	100.00	9,902	100.00	50,624	100.00

SELECTED REPORTABLE DISEASES

(By Place of Residence)

STATE AND PARISH TOTALS REPORTED MORBIDITY SEPTEMBER, 1986	VACCINE PREVENTABLE DISEASES					ASEPTIC MENINGITIS	HEPATITIS A AND UNSPECIFIED	HEPATITIS B	LEGIONELLOSIS	MALARIA	MENINGOCOCCAL INFECTIONS	SHIGELLOSIS	TUBERCULOSIS, PULMONARY	TYPHOID FEVER	OTHER SALMONELLOSIS	UNDERNUTRITION SEVERE	GONORRHEA	SYPHILIS, PRIMARY AND SECONDARY	RABIES IN ANIMALS (PARISH TOTALS CUMULATIVE 1986)
	MEASLES	RUBELLA	MUMPS	PERTUSSIS	TETANUS														
TOTAL TO DATE 1985	42	0	2	12	0	56	150	158	3	1	25	30	270	0	148	3	16508	821	16
TOTAL TO DATE 1986	4	0	3	13	5	75	110	196	3	15	20	83	310	1	253	3	14208	677	18
TOTAL THIS MONTH	0	0	1	2	3	17	18	22	1	1	1	15	23	0	37	0	1589	80	3
ACADIA												1			2		11		
ALLEN																	4		
ASCENSION						2											2		
ASSUMPTION																	1	1	
AVOYELLES				1													5		4
BEAUREGARD																	2		
BIENVILLE																	2		2
BOSSIER						2											18		5
CADDO												3	4		2		193	10	
CALCASIEU												1					92		
CALDWELL																	7		
CAMERON																	2		
CATAHOULA																	4		
CLAIBORNE																			
CONCORDIA																	8	2	
DESOTO							1					1	1				7		
EAST BATON ROUGE						1		2					2		1		92	5	
EAST CARROLL																	9		
EAST FELICIANA																	1	2	
EVANGELINE																	1		
FRANKLIN																	3		
GRANT																	2		
IBERIA						1	2								1		28		
IBERVILLE																	4	1	
JACKSON																			
JEFFERSON							7	1	1			1	1		3		75	6	
JEFFERSON DAVIS								1					2				7		
LAFAYETTE							1								1		74	7	
LAFOURCHE												1			3		6	1	
LASALLE																			
LINCOLN																	1		
LIVINGSTON						1	1	3							1		3	1	
MADISON																	16		
MOREHOUSE								1									14		
NATCHITOCHES						4											2	1	1
ORLEANS			1		1	1	3	9		1		3	4		2		493	27	
OUACHITA								1					2				95		1
PLAQUEMINES																			
POINTE COUPEE																	6		
RAPIDES															7		58	3	5
RED RIVER																	1		
RICHLAND																	22		
SABINE																	1		
ST. BERNARD													1		4		5		
ST. CHARLES																	1	1	
ST. HELENA																			
ST. JAMES					1										2		2		
ST. JOHN							1	1									4		
ST. LANDRY								1					1				27	5	
ST. MARTIN																	16	1	
ST. MARY																	4		
ST. TAMMANY						1	1					1			1		20		
TANGIPAHOA																	7	2	
TENSAS													1						
TERREBONNE				1		2					1	3					21	2	
UNION																	13		
VERMILION								1					1		4		4		
VERNON								1					2				56	1	
WASHINGTON						2									2		17	1	
WEBSTER													1				9		
WEST BATON ROUGE					1		1										2		
WEST CARROLL																	3		
WEST FELICIANA															1		3		
WINN																			
OUT OF STATE																	3		

From January 1, 1986 - September 30, 1986, the following cases were also reported:
2-Amebiasis, 1-Brucellosis, 4-Cholera, 1-Psittacosis, 1-Reye Syndrome, 1-Tularemia, 1-Typhus Fever, Endemic.

* Includes Rubella, Congenital Syndrome.

** Includes 19 cases of Hepatitis Non A, Non B.

*** Acquired outside United States unless otherwise stated.

SELECTED REPORTABLE DISEASES

(By Place of Residence)

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	MEASLES	RUBELLA	MUMPS	PERTUSSIS	TETANUS														
TOTAL TO DATE 1985	42	0	2	15	0	68	173	179	3	1	27	40	299	1	205	4	18580	946	19
TOTAL TO DATE 1986	4	0	3	13	5	84	130	227	4	17	22	221	337	1	341	3	15806	785	19
TOTAL THIS MONTH	0	0	0	0	0	9	20	31	1	2	2	138	29	0	88	0	1598	108	1
ACADIA							1	1					1				8		
ALLEN																	7		
ASCENSION						1						1			2		5		
ASSUMPTION																	2		
AVOYELLES													1				8		4
BEAUREGARD																	1	1	
BIENVILLE													1				2		2
BOSSIER								1				1			6		13	3	5
CADDO						3		1				90			14		176	3	
CALCASIEU										1		2	1		2		81	1	
CALDWELL																	2		
CAMERON																	4		
CATAHOULA																	1		
CLAIBORNE																	3		
CONCORDIA								1									4	5	
DESOTO													1		1		2		
EAST BATON ROUGE						1	2					4			4		104	9	
EAST CARROLL																	7		
EAST FELICIANA																	4	1	
EVANGELINE								1				2			2		5	7	
FRANKLIN																	5		
GRANT																			
IBERIA							1	1							1		26		
IBERVILLE								1									8		
JACKSON																	2		
JEFFERSON							10	4	1			3	3		8		74	5	
JEFFERSON DAVIS								1					1				14		
LAFAYETTE								1					3		7		46	3	
LAFOURCHE							1					2			3		11	9	
LASALLE																			
LINCOLN																	9		
LIVINGSTON											1						1	3	
MADISON																	12	1	
MOREHOUSE													1				15		
NATCHITOCHES																			1
ORLEANS						1	2	7				8	12		14		559	31	
OUACHITA						2						12	1		1		83	6	1
PLAQUEMINES															1		1		
POINTE COUPEE																	2		
RAPIDES												2			5		60	2	6
RED RIVER																	1	1	
RICHLAND															1		3		
SABINE																			
ST. BERNARD											1				2		9		
ST. CHARLES																	3	3	
ST. HELENA																			
ST. JAMES								1									8		
ST. JOHN								1							1		10	1	
ST. LANDRY								2									20	1	
ST. MARTIN													1		5		8	1	
ST. MARY													1		1		29		
ST. TAMMANY						1	1					1			3		21		
TANGIPAHOA																	5	1	
TENSAS																			
TERREBONNE							2	1		1		7			2		26	7	
UNION																	8	1	
VERMILION								1					1		2		2		
VERNON								4									51	1	
WASHINGTON								1				1					7		
WEBSTER												2					14	1	
WEST BATON ROUGE																	3		
WEST CARROLL																			
WEST FELICIANA																	1		
WINN																	1		
OUT OF STATE																	1		

From January 1, 1986 - October 31, 1986, the following cases were also reported:
4-Amebiasis, 1-Brucellosis, 4-Cholera, 1-Psittacosis, 2-Reye Syndrome, 1-Tularemia, 1-Typhus Fever, Endemic.

* Includes Rubella, Congenital Syndrome.

** Includes 21 cases of Hepatitis Non A, Non B.

*** Acquired outside United States unless otherwise stated.

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