

CENTER FOR DISEASE CONTROL

RUBELLA

SURVEILLANCE

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PREFACE

Summarized in this report is information received from state and local health departments and other pertinent sources. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities.

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INTRODUCTION:

In June 1969, a live attenuated rubella virus vaccine was licensed for use in the United States. Subsequently, two other rubella vaccines have been licensed. Thus, rubella vaccine has become available 28 years after the recognition of the etiologic relationship between rubella and congenital rubella syndrome in 1941, 7 years after the isolation of rubella virus in 1962, and 4 years after the first reports of the attenuation of rubella virus. Because considerable experience with these vaccines has accumulated since licensure, it is appropriate to review the available surveillance data.

RECENT TRENDS

A. Source of Data

In January 1966, rubella and congenital rubella syndrome were officially added to the list of notifiable diseases by the Conference of State and Territorial Epidemiologists. Before this, some states maintained rubella surveillance and voluntarily reported cases to the Center for Disease Control. However, before 1966, congenital rubella syndrome was not reported.

In this report, the data prior to 1966 are those transmitted voluntarily by the states. Since 1966 the data have been submitted to the CDC in the Weekly Telegraphic Report of Notifiable Diseases and on Congenital Rubella Syndrome Case Report forms. Additional information characterizing rubella by age and sex was specifically solicited from state and municipal health departments where rubella has been consistently reported over the past decade.

There exists, at present, considerable variability in the completeness of rubella reporting, as well as in the type and accuracy of the information reported. The variability and the potential bias due to use of data collected from selected areas demand that the surveillance data presented in this report be interpreted with caution. Although not quantitatively accurate, these data do depict trends and patterns of rubella occurrence in the United States.

TABLE 1
REPORTED CASES OF RUBELLA BY STATE, 1960 - 1969

AREA	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	0	0	0	0
UNITED STATES	55,549	48,446	46,888	46,975	100,842	448,796	60,431†	37,265	43,810	50,958	58	58	58	58
No. States Reporting		(47)	(47)	(44)	(36)	(35)	(32)	(32)	(33)	(31)	)	)	)	)
NEW ENGLAND	4,130													
Maine	417	629	856	421	953	7,463	953	514	1,436	1,451	151	151	151	151
New Hampshire	109	92	214	133	163	1,331	453	57	217	163	33	33	33	33
Vermont	121	91	227	130	—	—	—	—	—	—	—	—	—	—
Massachusetts	1463	3,608	1,429	2,056	2,839	37,105	11,739	3,766	6,443	5,562	—	—	—	—
Rhode Island	289	1,397	384	283	234	11,399	1,324	129	313	138	—	—	—	—
Connecticut	1,731	3,039	1,910	2,245	1,719	40,737	3,945	1,338	2,748	3,750	—	—	—	—
MIDDLE ATLANTIC	3,505													
New York	1,996	4,389	2,258	2,631	2,505	61,624	8,158	4,246	4,465	8,816	—	—	—	—
New Jersey	627	1,680	NN	—	—	—	—	—	—	—	—	—	—	—
Pennsylvania	882	208	179	114	—	—	—	—	—	—	—	—	—	—
EAST NORTH CENTRAL	12,898													
Ohio	1,320	2,099	771	1,254	2,348	19,194	2,953	979	1,607	3,621	—	—	—	—
Indiana	2,385	912	669	2,345	1,911	13,037	1,972	1,406	1,371	1,937	—	—	—	—
Illinois	1,786	3,355	1,621	2,935	4,850	29,685	2,108	2,030	3,438	1,723	—	—	—	—
Michigan	4,127	1,908	2,338	3,040	9,937	18,922	1,637	1,091	1,224	2,028	—	—	—	—
Wisconsin	3,280	2,980	3,340	5,446	9,570	96,583	4,731	4,365	5,418	4,841	—	—	—	—
WEST NORTH CENTRAL	4,088													
Minnesota	245	69	97	124	1,910	3,232	—	—	1	—	—	—	—	—
Iowa	2,541	2,053	1,896	1,952	3,798	18,481	1,727	416	482	438	—	—	—	—
Missouri	580	142	350	61	39	573	155	158	—	—	—	—	—	—
North Dakota	256	238	181	205	—	—	—	—	—	—	—	—	—	—
South Dakota	—	—	3	2	—	—	—	—	—	—	—	—	—	—
Nebraska	352	32	153	—	13	—	—	—	—	—	—	—	—	—
Kansas	114	128	16	NN	—	—	—	—	—	—	—	—	—	—
SOUTH ATLANTIC	7,645													
Delaware	211	150	84	55	111	802	135	144	276	38	—	—	—	—
Maryland	865	366	615	404	248	3,583	299	258	391	211	—	—	—	—
District of Columbia	166	14	9	15	16	455	149	17	50	44	—	—	—	—
Virginia	1,598	644	675	961	—	—	—	—	—	—	—	—	—	—
West Virginia	2,417	904	639	1,037	2,091	6,774	1,438	960	748	314	—	—	—	—
North Carolina	19	—	NN	—	—	—	—	—	—	—	—	—	—	—
South Carolina	301	259	231	284	—	†††	—	—	—	—	—	—	—	—
Georgia	—	—	784	493	285	497	85	315	34	140	—	—	—	—
Florida	2,068	1,491	1,174	1,447	892	8,661	1,008	501	732	834	—	—	—	—
EAST SOUTH CENTRAL	3,156													
Kentucky	1,187	861	2,141	1,960	1,190	18,027	2,158	914	2,034	1,696	—	—	—	—
Tennessee	1,635	1,135	1,367	2,578	—	—	—	—	—	—	—	—	—	—
Alabama	136	464	191	122	169	3,574	88	57	60	45	—	—	—	—
Mississippi	198	9	—	—	1,167	6,784	—	—	2	—	—	—	—	—
WEST SOUTH CENTRAL	6,504													
Arkansas	199	4	114	14	428	1,025	370	59	168	218	—	—	—	—
Louisiana	39	62	NN	—	—	—	—	—	—	—	—	—	—	—
Oklahoma	1,852	93	558	NN	—	—	—	—	—	—	—	—	—	—
Texas	4,414	2,923	640	140	—	—	—	—	—	—	—	—	—	—
MOUNTAIN	3,064													
Montana	108	96	200	376	2,526	2,367	898	1,011	747	783	—	—	—	—
Idaho	94	130	72	119	1,088	462	82	116	87	52	—	—	—	—
Wyoming	103	14	5	239	—	25	—	—	—	—	—	—	—	—
Colorado	1,423	892	1,885	785	1,973	11,817	1,219	1,729	1,803	1,549	—	—	—	—
New Mexico	312	134	309	113	272	351	109	26	41	142	—	—	—	—
Arizona	861	700	1,168	2,619	2,076	6,653	1,608	1,732	1,751	1,493	—	—	—	—
Utah	158	110	71	80	1,489	588	85	111	110	143	—	—	—	—
Nevada	5	—	425	30	22	—	—	—	—	—	—	—	—	—
PACIFIC	10,559													
Washington	1,943	1,851	3,377	3,435	25,258	11,119	5,526	5,152	3,176	4,230	—	—	—	—
Oregon	743	625	986	1,174	12,956	4,190	2,114	3,318	2,298	4,167	—	—	—	—
California	6,174	4,890	9,539	2,847*	—	—	—	—	—	—	—	—	—	—
Alaska	543	289	381	112	451	747	1,127	152	89	331	—	—	—	—
Hawaii	1,156	287	356	159	3,345	929	78	198	50	60	—	—	—	—

NN — Report not required by State Health Dept.

— No cases reported.

† Includes data for Maine from State Report.

†† Hawaii not included in U.S. total.

* Vol. reports prior to 11/66.

... Data not available

††† Included in measles.

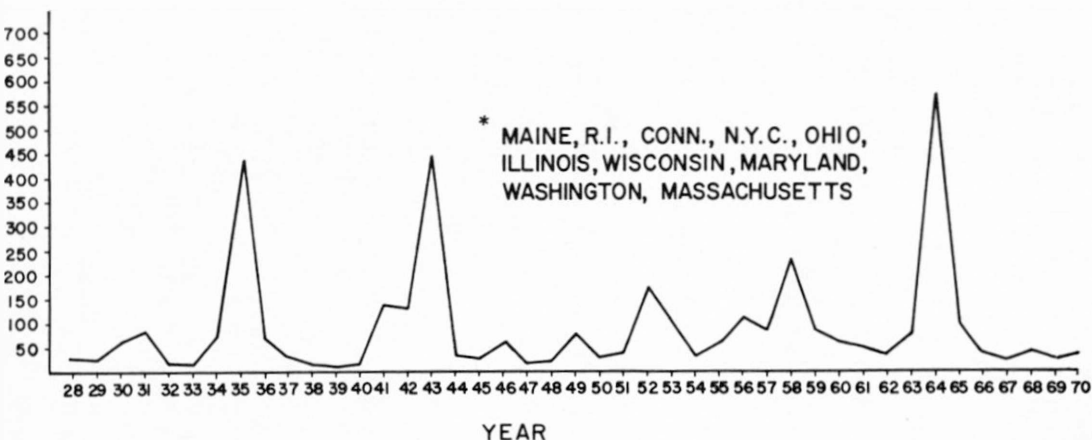
*Source: Reported Incidence of Notifiable Diseases in the United States;
Annual Supplement for respective year.*

B. Reported Rubella

Table 1 displays reported cases of rubella from states for the period 1960-69. Reporting for the 10 years has been inconsistent and sporadic. The table shows those states not reporting and the variability in reporting during specific years from states within the same geographic region with similar demographic characteristics.

FIGURE 1

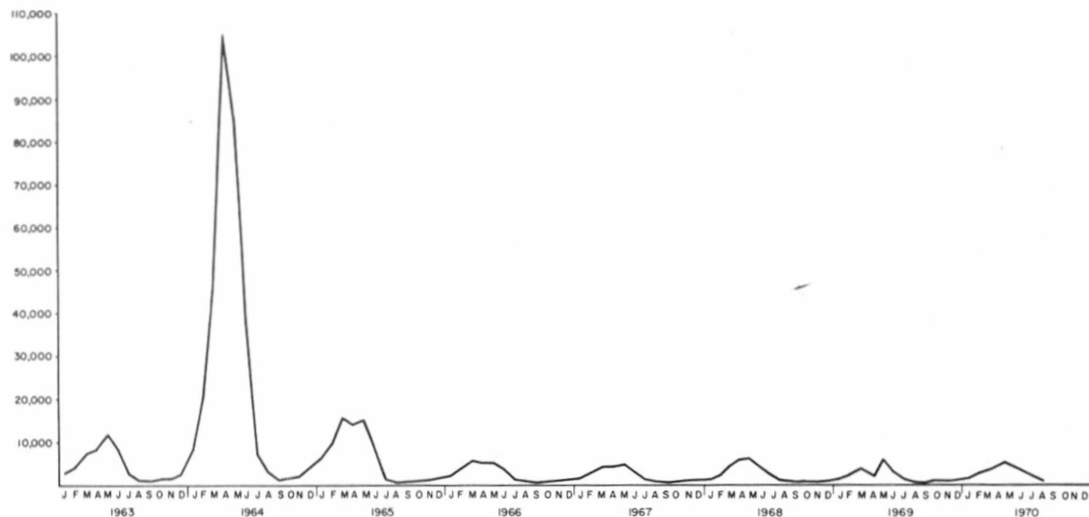
RUBELLA INCIDENCE - TEN SELECTED AREAS, U.S.A., 1928-1970



Rubella incidence in 10 selected areas has varied considerably (Figure 1). This figure suggests that major epidemics occurred throughout the country in 1935, 1943, and 1964. Further, high incidence was reported in 1952 and 1958. These periods of increased rubella activity have occurred at 6- to 9-year intervals. This moderately long and somewhat irregular cyclicity contrasts strikingly with the regular 2-year periodicity observed for rubeola in the United States before widespread use of measles vaccine.

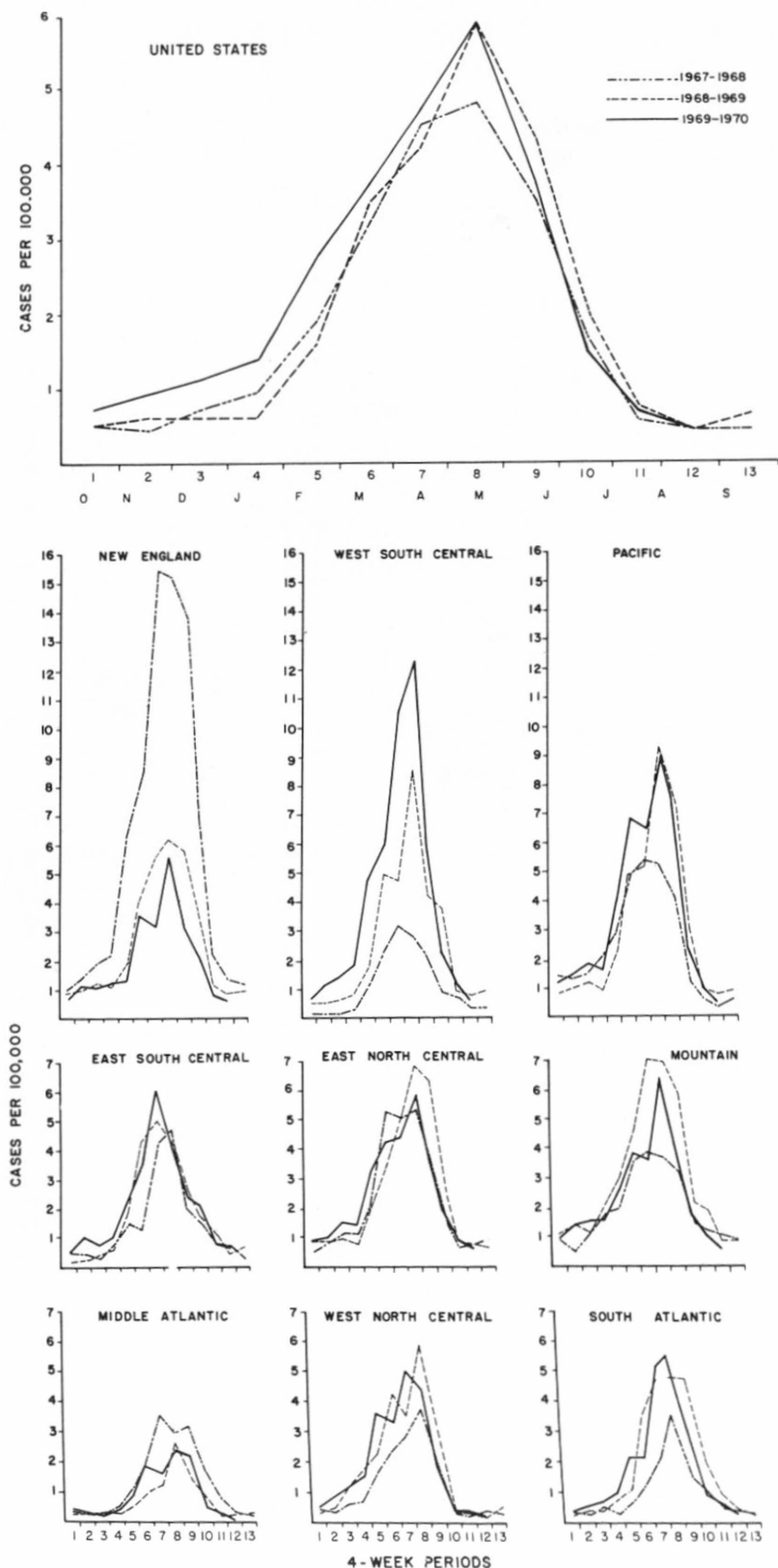
The reported cases by month of onset for 24 selected states (Figure 2) show the seasonal variation in disease incidence. The number of reported cases, in epidemic and non-epidemic years, increases in early winter, peaks in the spring, and falls to a low point in late summer and autumn. These data suggest that rubella activity has been at about the same level since the disease was made notifiable.

FIGURE 2
REPORTED RUBELLA CASES BY MONTH OF ONSET, 24 SELECTED STATES, JANUARY 1963- AUGUST 1970



The uniformity of the seasonal pattern of rubella in the different regions of the United States is shown in Figure 3 and Table 2. The pattern seen in the individual regions is similar to that noted nationally. Except in the West South Central region, no major increase in rubella activity has occurred during the current epidemiologic year compared with the past two epidemiologic years (Figure 3). Increased reported cases from Texas account in large measure for the high case rates calculated for the West South Central region.

FIGURE 3
RUBELLA CASE RATES, BY 4-WEEK PERIODS,
EPIDEMIOLOGIC YEARS*, 1967-68; 1968-69; 1969-70



*THE RUBELLA EPIDEMIOLOGIC YEAR IS THE 52 WEEKS BEGINNING WITH THE FIRST REPORTING WEEK IN OCTOBER.

TABLE 2
REPORTED RUBELLA CASES BY 4-WEEK PERIODS, 1969

AREA	4-WEEK PERIODS													Total 1969
	1/25	2/22	3/22	4/19	5/17	6/14	7/12	8/9	9/6	10/4	11/1	11/29	1/3/70	
UNITED STATES	1,582	3,334	7,014	8,591	11,802	9,234	4,428	1,721	1,085	1,222	1,333	1,668	2,535	55,549
NEW ENGLAND	139	243	474	666	764	698	438	152	97	109	82	114	154	4,130
Maine	13	18	31	30	104	77	46	37	17	13	7	11	13	417
New Hampshire	6	10	15	16	11	16	7	—	1	3	4	10	10	109
Vermont	6	4	12	20	32	22	4	3	6	4	2	4	2	121
Massachusetts	56	109	193	316	246	209	135	38	19	30	22	49	41	1,463
Rhode Island	2	12	35	44	31	45	28	16	19	21	5	19	12	289
Connecticut	56	90	188	240	340	329	218	58	35	38	42	21	76	1,731
MIDDLE ATLANTIC	87	204	338	442	976	492	262	124	107	87	132	117	137	3,505
New York City	40	66	116	195	235	165	123	71	48	30	33	30	41	1,193
Upstate New York	22	55	73	105	161	110	86	31	33	33	42	32	20	803
New Jersey	18	57	141	115	103	60	33	5	10	10	27	26	22	627
Pennsylvania	7	26	8	27	477	157	20	17	16	14	30	29	54	882
EAST NORTH CENTRAL	293	821	1,373	1,962	2,686	2,474	1,024	345	267	244	324	400	685	12,896
Ohio	38	48	138	158	426	150	140	39	19	23	28	35	78	1,320
Indiana	51	147	245	600	565	365	82	42	42	38	58	67	83	2,385
Illinois	19	61	147	137	324	670	198	62	9	17	35	26	81	1,786
Michigan	128	288	360	601	814	769	381	98	131	75	122	145	215	4,127
Wisconsin	57	277	483	466	557	520	223	104	66	91	81	127	228	3,280
WEST NORTH CENTRAL	251	344	666	526	908	503	204	84	34	109	87	122	250	4,088
Minnesota	4	14	17	25	104	37	5	—	2	9	2	19	7	245
Iowa	135	307	363	390	624	353	21	15	17	48	49	62	157	2,541
Missouri	91	1	108	11	72	50	149	47	3	29	4	8	7	580
North Dakota	9	13	66	37	23	13	21	10	6	8	24	15	11	256
South Dakota	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nebraska	3	9	100	52	82	47	4	10	6	14	1	6	18	352
Kansas	9	—	12	11	3	3	4	2	—	1	7	12	50	114
SOUTH ATLANTIC	212	350	1,040	1,559	1,402	1,433	599	323	140	106	113	157	211	7,645
Delaware	61	30	25	35	22	12	7	5	—	5	1	4	4	211
Maryland	8	70	139	279	153	105	30	27	20	9	8	10	7	865
District of Columbia	—	1	—	45	62	20	9	1	10	4	3	1	10	166
Virginia	8	31	142	247	298	458	200	73	18	13	18	37	55	1,598
West Virginia	69	101	281	483	401	509	186	142	59	41	45	54	46	2,417
North Carolina	—	—	—	—	—	—	—	—	—	2	5	8	4	19
South Carolina	16	33	23	110	41	31	19	5	4	9	4	3	3	301
Georgia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Florida	50	84	430	360	425	298	148	70	29	23	29	40	82	2,068
EAST SOUTH CENTRAL	73	242	553	647	541	354	197	143	72	81	73	82	98	3,156
Kentucky	24	99	247	299	216	114	75	34	20	23	11	5	20	1,187
Tennessee	46	96	166	292	300	233	104	104	46	53	53	71	71	1,635
Alabama	2	33	15	37	10	4	5	4	3	2	9	5	7	136
Mississippi	1	14	125	19	15	3	13	1	3	3	—	1	—	198
WEST SOUTH CENTRAL	146	308	947	900	1,605	791	718	161	130	169	121	193	315	6,504
Arkansas	—	—	—	2	1	—	196	—	—	—	—	—	—	199
Louisiana	2	5	2	15	6	5	—	1	—	1	2	—	—	39
Oklahoma	34	28	327	262	854	220	3	—	—	16	26	33	49	1,852
Texas	110	275	618	621	744	566	519	160	130	152	93	160	266	4,414
MOUNTAIN	170	226	365	541	530	442	160	151	73	73	91	102	140	3,064
Montana	6	11	10	6	2	3	5	5	—	7	18	14	21	108
Idaho	7	12	4	14	31	9	2	2	—	—	1	6	6	94
Wyoming	—	3	49	6	9	3	3	1	2	5	1	6	15	103
Colorado	42	76	217	319	302	240	72	37	27	21	12	10	48	1,423
New Mexico	15	15	22	74	54	47	21	20	9	12	7	12	4	312
Arizona	84	99	52	110	117	128	52	69	30	19	30	40	31	861
Utah	15	6	11	12	15	12	5	17	5	9	22	14	15	158
Nevada	1	4	—	—	—	—	—	—	—	—	—	—	—	5
PACIFIC	211	596	1,258	1,348	2,390	2,047	826	238	165	244	310	381	545	10,559
Washington	66	134	236	305	346	316	38	9	17	75	110	126	165	1,943
Oregon	31	59	79	56	132	133	57	36	10	26	39	33	52	743
California	93	342	852	836	1,643	1,193	509	97	80	86	115	161	167	6,174
Alaska	3	27	34	34	32	144	30	26	7	12	24	44	126	543
Hawaii	18	34	57	117	237	261	192	70	51	45	22	17	35	1,156
Puerto Rico	2	3	12	7	20	48	244	22	21	5	12	—	5	401

— No cases reported.

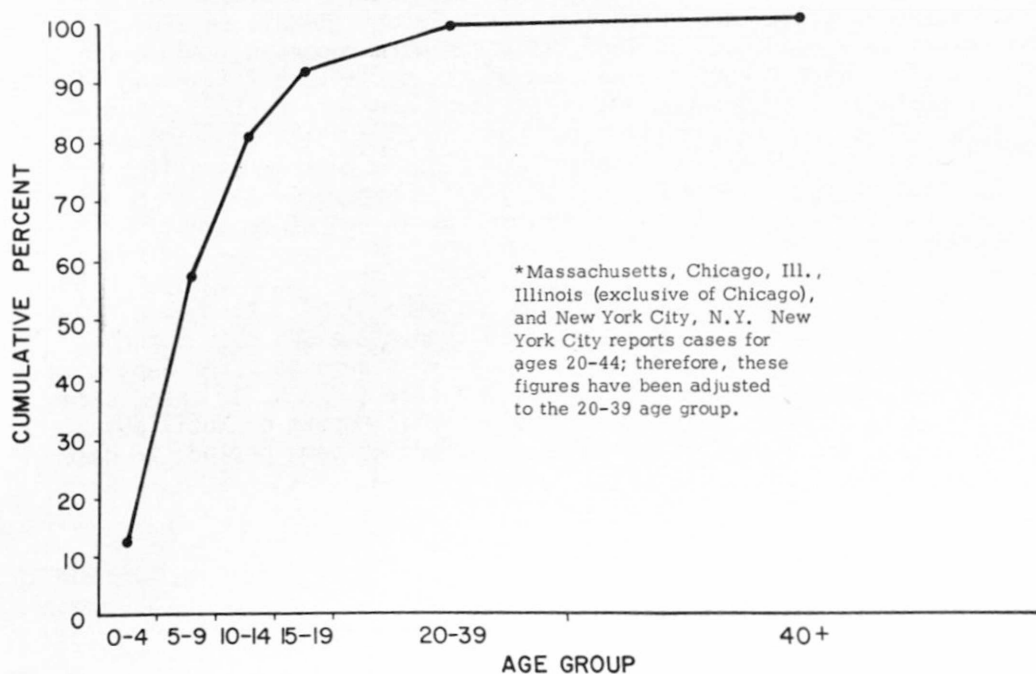
Source: Morbidity and Mortality Weekly Reports.

TABLE 3

REPORTED CASES OF RUBELLA BY AGE AND SEX
FOR SELECTED AREAS* -- 1963-1967

AGE	TOTAL			MALE			FEMALE		
	Number	%	Cum. %	Number	%	Cum. %	Number	%	Cum. %
0-4	16,373	13.5	13.5	8,218	14.3	14.3	8,155	12.9	12.9
5-9	52,078	43.1	56.6	25,660	44.5	58.8	26,418	41.8	54.7
10-14	28,403	23.5	80.1	13,483	23.4	82.2	14,920	23.6	78.3
15-19	14,527	12.0	92.2	7,446	12.9	95.1	7,081	11.2	89.5
20-39	8,100	6.7	98.9	2,541	4.4	99.5	5,559	8.8	98.3
40+	1,363	1.1	100.0	286	0.5	100.0	1,077	1.7	100.0
TOTAL	120,844			57,634			63,210		

FIGURE 4
CUMULATIVE PERCENT OF RUBELLA CASES BY AGE
GROUPS FROM SELECTED AREAS*- 1963-1967



The age distribution for reported cases of rubella is shown in Table 3. Most reported cases of rubella are from the 5-9 and 10-14 year age groups; in fact, approximately 66 percent of all reported cases occurred in these two age groups. The cumulative percent of reported cases by age indicates that 80 percent of reported cases had occurred by age 14, and 92 percent by age 20 (Figure 4). Nevertheless, significant numbers of cases were reported among young adults, particularly women.

Although much rubella is reported among preschool children and adults, cases are most frequent among young schoolage children. Furthermore, estimates of age-specific rubella virus infection rates are highest in the 5-9 and 10-14 year age groups. Thus, both morbidity reporting and serologic data suggest that children in the 5-14 year group play a major role in the propagation of disease in the community. Although not specifically demonstrated by epidemiologic studies, it is thought that rubella spreads primarily among the large group of susceptible children congregated in the elementary schools and that these children, in turn, transmit disease to preschool children and older individuals, particularly adults. Thus, although the age-specific infection rates and susceptibility patterns for rubella are somewhat different from those of rubeola, the hypothesized role of children in the spread of rubella is similar to that accepted for rubeola.

CONGENITAL RUBELLA SYNDROME SURVEILLANCE

The 1965 Conference of State and Territorial Epidemiologists made congenital rubella syndrome a notifiable disease. However, since then reporting has been incomplete. In 1966, 11 cases were reported in the Morbidity and Mortality Weekly Report (MMWR); in 1967, 10 cases were reported; in 1968, 14 cases were reported; and in 1969, 18 cases were reported. Because of the persistent failure of adequate reporting, the 1969 Conference of State and Territorial Epidemiologists re-emphasized the importance of congenital rubella syndrome surveillance. Accordingly, the Center for Disease Control established a National Registry for Congenital Rubella Syndrome (CRS) to provide epidemiological data and to measure the effect of vaccination programs.

The Registry began to function in September 1969. At that time, state epidemiologists were asked to complete a CRS case report form (see appendix) on every case of CRS diagnosed after September 1969. Between September 1, 1969, and June 1, 1970, 42 cases were reported to CDC on the Weekly Telegraphic Report of Notifiable Diseases and listed in the MMWR. During the same period, 26 case report forms, from 14 states, were returned.

The small number of returned forms does not adequately reflect the emphasis that is being placed on reporting CRS. Considerable time and effort have been expended in establishing effective surveillance systems in most states over the last several months. Though the results of these efforts are not reflected in the number of reports received to date, they should be in the next few years.

Of the 26 cases for which case report forms have been received, 10 were confirmed as CRS with serologic tests or by rubella virus isolation. Additionally, 11 cases had multiple defects compatible with the clinical diagnosis of CRS. Because in the other 5 cases only one defect was noted and laboratory testing was not confirmatory, definitive diagnosis of these cases cannot yet be established. Approximately 70 percent of the reported cases were diagnosed in the first month of life, and by 11 months of age, all had been diagnosed. Nine of the children died, all at less than 2½ months of age. In 13 of the 21 confirmed cases, a history compatible with first trimester maternal rubella was noted.

Because the only true measure of the impact of rubella vaccination programs is a fall in the incidence of congenital rubella syndrome, an attempt has been made to establish a crude baseline of the yearly incidence of this condition. State epidemiologists were asked to conduct a retrospective search for all cases of CRS born in their states between January 1, 1966, and September 1, 1969. So far, reports have been received from 45 of 53 reporting areas (Table 4). In 1966, 203 cases were reported; in 1967, 134 were reported; and in 1968, 138 were reported. This is approximately 10 times the incidence reported in the MMWR for these years.

Cases have been consistently found at the following sources: pediatric referral hospitals, schools for the deaf and blind, maternal and child welfare services, and state bureaus of vital statistics. Over 80 percent of the cases have been reported from the above sources. Consequently, it is recommended that these sources be included in any congenital rubella syndrome surveillance system.

Although some states have completed detailed searches for CRS cases, other states have submitted incomplete and preliminary data. Because of the tentative nature of these data and the considerable variability in diagnostic criteria, we caution against interpreting these figures as accurately representing the incidence of CRS during interepidemic years.

BIOLOGIC SURVEILLANCE

Through June 30, 1970, 19,657,699 doses of rubella vaccine had been distributed in the United States. Of this amount, 12,419,363 doses were administered in public programs. The remaining 7,238,336 doses of vaccine were distributed for both private and public use.

TABLE 4
REPORTED CASES OF CONGENITAL RUBELLA SYNDROME
RETROSPECTIVE SURVEY 1966-1969

AREA	1966	1967	1968	1969*
UNITED STATES	203	134	138	87
NEW ENGLAND	1	2	3	2
Maine	0	0	1	0
New Hampshire				
Vermont	0	0	0	1
Massachusetts				
Rhode Island	1	1	1	1
Connecticut	0	1	1	0
MIDDLE ATLANTIC	13	18	50	22
New York City	3	5	24	8
Upstate New York	3	6	6	0
New Jersey	3	3	12	12
Pennsylvania	4	4	8	2
EAST NORTH CENTRAL	23	15	12	1
Ohio				
Indiana	13	9	6	1
Illinois	0	0	0	0
Michigan	10	6	6	0
Wisconsin				
WEST NORTH CENTRAL	6	2	2	0
Minnesota	4	2	0	0
Iowa				
Missouri	1	0	2	0
North Dakota	1	0	0	0
South Dakota				
Nebraska	0	0	0	0
Kansas				
SOUTH ATLANTIC	49	46	24	22
Delaware	0	0	0	1
Maryland	1	1	0	0
District of Columbia	9	5	1	0
Virginia	7	4	2	3
West Virginia	2	0	1	0
North Carolina	1	4	1	5
South Carolina	5	2	0	
Georgia	3	2	7	0
Florida	21	28	12	13
EAST SOUTH CENTRAL	7	3	5	0
Kentucky	5	3	3	
Tennessee	0	0	1	0
Alabama	2	0	1	
Mississippi	0	0	0	
WEST SOUTH CENTRAL	25	18	16	4
Arkansas	4	0	0	
Louisiana	8	7	7	3
Oklahoma	4	4	5	1
Texas	9	7	4	0
MOUNTAIN	12	13	11	3
Montana	1	0	0	0
Idaho	0	0	0	0
Wyoming	0	0	0	0
Colorado	0	6	4	3
New Mexico	3	3	2	0
Arizona	4	3	2	
Utah	2	0	3	0
Nevada	2	1	0	0
PACIFIC	67	17	15	33
Washington	28	8	5	0
Oregon	33	8	3	
California	0	1	6	33
Alaska				
Hawaii	6	0	1	

*First 9 Months Only

V. REPORTED REACTIONS ASSOCIATED WITH ADMINISTRATION OF RUBELLA VACCINE

A. Joint Reactions

Following use of live rubella virus vaccine in public programs in the United States in early 1970, the CDC received numerous reports of arthralgia and arthritis occurring in children after receiving vaccine. It had been well established that joint reactions occurred rather commonly after vaccination of adult females and less frequently in children. Results from prelicensure trials suggested that the incidence of joint symptomatology in children was less than 5 percent, and that, in general, these reactions were mild. However, with extensive usage following licensure, many areas were alarmed by a greater frequency and severity of reactions than were expected.

In general, symptoms have been self-limited and most commonly have involved the small joints of the hands and knees. The pain, often more severe at night, has frequently been accompanied by tingling and numbness. In most cases, only joint pain has been noted; however in a small percentage, muscular tightness, limitation of motion, and joint swelling have been observed. Although usually only one or two joints are involved, occasionally pain in several joints has developed. These features have been observed to begin 1-8 weeks after vaccination and resemble those seen with natural rubella. In most cases, the duration has been 1-10 days; however, a few cases have persisted for several weeks or longer. Some children with these reactions have been hospitalized to be evaluated for rheumatic fever or rheumatoid arthritis.

In an attempt to define as accurately as possible the incidence of joint reactions following rubella immunization, many areas conducted surveys of vaccinated and unvaccinated populations on the incidence of such reactions. The following is a summary of provisional data from New Jersey, Erie County (Buffalo), New York, Utah and Oklahoma:

New Jersey: Results of surveys in 9 communities have been tabulated.

	<u>Vaccine Administered</u>	
	<u>Duck Embryo</u>	<u>Dog Kidney</u>
Number of Communities Surveyed	3	6
Number of Persons Surveyed	6,265	7,493
Forms Completed	5,022 (80.2%)	6,177 (82.4%)
Received Vaccine in School	3,705 (73.8%)	3,251 (52.6%)
Reported Joint Reactions	190 (5.1%)	389 (12.0%)
Consulted Physician	30 (0.8%)	98 (3.0%)
Median Duration	3-4 days	10 days
Reported Joint Reactions in Unvaccinated Children	<0.1%	<0.1%

Erie County (Buffalo), New York: Children attending two schools which conducted vaccination campaigns were surveyed by home visits two months after the campaign.

<u>Vaccine</u>	<u>No. Surveyed</u>	<u>No. with Joint Symptoms</u>	<u>Percent with Joint Symptoms</u>
Dog Kidney	749	154	20.5%
Duck Embryo	136	8	5.9%
None Administered	82	3	3.7%

Duration of Joint Symptoms
Vaccine Administered

<u>Duration (days)</u>	<u>Dog Kidney</u>	<u>Duck Embryo</u>
1-2	29 (18.8%)	7 (87.5%)
3-4	26 (16.9%)	1 (12.5%)
5-6	11 (7.2%)	--
7-13	27 (17.5%)	--
14-20	18 (11.7%)	--
21-27	11 (7.2%)	--
28-34	8 (5.2%)	--
Present at Survey	20* (13.0%)	--
Unknown	4 (2.5%)	--
Total	154 (100.0%)	8 (100.0%)

* Because 20 children had symptoms at the time of the survey, the average duration could not be calculated.

Utah: School surveys were conducted 43 days after a statewide vaccination campaign (a later date was precluded by the closing of schools for the summer). In other surveys extended to 60 days after vaccination, 10 percent or more of cases had onset of symptoms 43-60 days after vaccine administration.

Vaccine Group

	<u>Dog Kidney</u>		<u>Duck Embryo</u>	
	<u>Vaccinated</u>	<u>Unvaccinated "Controls"</u>	<u>Vaccinated</u>	<u>Unvaccinated "Controls"</u>
Number Surveyed	2,459	603	749	420
Joint Symptoms by Questionnaire	315 (12.8%)	16 (2.7%)	55 (7.3%)	10
Phone Interview after Questionnaire	283	14	45	6
Joint Symptoms Verified by Phone	220 (8.9%)	2 (0.3%)	28 (3.7%)	666

Oklahoma: Children attending 32 schools in Tulsa which conducted a rubella immunization program were surveyed. Questionnaires were sent out to 14,987 students; only 5,980 (39.9%) forms were returned.

<u>Vaccine</u>	<u>Forms Returned</u>	<u>Joint Symptoms Number</u>	<u>Percent</u>
Dog Kidney	2,004	144	7.2
Duck Embryo	1,825	105	5.8
None Administered	2,151	36	1.7
	<u>5,980</u>		

At the time of this publication Cendehill vaccine had limited distribution and an accurate assessment of reactions following its administration could not be determined. However, preliminary data from New Jersey suggests that joint reactions following administration of Cendehill vaccine do occur in children and that rates are similar to those observed after duck embryo (HPV-77 DE 5) vaccine.

In summary, these preliminary data indicate that:

- (1) Joint symptoms following administration of rubella vaccine occur more frequently than previously estimated.
- (2) Following dog kidney vaccine the incidence rates are higher and the duration of symptoms longer.
- (3) Preliminary data indicate that incidence rates following Cendehill vaccine are similar to those following duck embryo vaccine.

1. Neurological reactions temporally associated with administration of rubella vaccine

In the last 12 months, 9 reports of neurological reactions temporally associated with administration of rubella vaccine have been submitted to the CDC. These case reports are summarized in Table 5.

In addition to the serological data presented in Table 5, cerebrospinal fluid specimens submitted for virus isolation within 1 week after onset of illness from patients 2, 3, and 5 were negative for rubella vaccine virus or other etiologic agents. That seven of these patients had received duck embryo strain rubella vaccine can probably be explained by the greater distribution of this vaccine. Thus, no single clinical or epidemiologic characteristic appears to be consistently present except for the temporal relationship to vaccine administration.

RUBELLA VACCINE

CASE NO.	AGE	SEX	VACCINE STRAIN	ONSET OF ILLNESS (days after vac.)	CLINICAL DATA	RUBELLA SEROLOGY (HA1) DAYS TITER	
1.	3½	F	Duck Embryo	15	High Fever Ataxia Complete Recovery	+30 +45	1:32 1:32
2.	16	F	Duck Embryo	25	High Fever Arthralgias Aseptic Meningitis Complete Recovery	0 +30 +60	<1:10 1:64 1:128
3.	11	F	Duck Embryo	7	"Transverse myelitis": Quadriparesis Spasticity, Right Leg Left Hemianesthesia Improving	+10 +28	<1:8 1:64
4.	4	M	Duck Embryo	3	"Polyneuritis": Ataxia Paraparesis Hyporeflexia Improving		
5.	11	M	Duck Embryo	17	"Polyneuritis": Hypesthesia, Paresthesia, Paresis, Lower Extremities Sensory Loss Below T4 Hyporeflexia Complete Recovery	+19 +31	<1:10 <1:10
6.	14	M		10-14	Headache, Fever Aseptic Meningitis	+23 +37 +43	1:16 (IgM <1:4) 1:16 1:16
7.	2	M	Cendehill	8	Right Facial Paralysis Right Hand Weakness Complete Recovery	+14 +29	<1:10 1:80
8.	8	F	Duck Embryo	23	High Fever Convulsion Somnolence, Disorientation Died, 1 week later		
9.	9½	F	Duck Embryo	16	"Transverse myelitis": Paraplegia Sensory Loss Below T3 Neurogenic Bladder Stable	+40	1:256

APPENDIX

MEDICAL RECORD. This form contains medical information the disclosure or release of which is restricted by 5 U.S.C. 552, (b) (6); 45 CFR Part 5.

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION
NATIONAL COMMUNICABLE DISEASE CENTER
IMMUNIZATION BRANCH
ATLANTA, GEORGIA 30333

CONGENITAL RUBELLA SYNDROME CASE REPORT

FORM APPROVED
BUDGET BUREAU NO. 68-R1150

1. CHILD'S NAME (last)		(first)	(middle)	NCDC CASE NUMBER
2. ADDRESS (number, street, city, county, state, and zip code)				
3. DATE OF BIRTH	4. SEX ☐ M ☐ F	5. BIRTH WEIGHT _____ Grams	6. RACE ☐ White ☐ Negro ☐ Other	
7. IS CHILD LIVING ☐ Yes ☐ No	8. IF NO, DATE OF DEATH		9. CAUSE OF DEATH	

CLINICAL

10. MALFORMATIONS	YES	NO	UNK	11. NEONATAL MANIFESTATIONS	YES	NO	UNK
CATARACTS				LOW PLATELET COUNT			
HEARING LOSS				PURPURA			
MENTAL RETARDATION				ENLARGED SPLEEN			
CONGENITAL HEART DISEASE				ENLARGED LIVER			
CARDIAC DIAGNOSIS				LONG BONE RADIOLOCENCIES			
☐ Unk	Patent Ductus Arteriosus			CONGENITAL GLAUCOMA			
	Peripheral Pulmonary Stenosis			OTHER (specify)			
	Other (specify)						
12. OTHER MALFORMATIONS ☐ Yes ☐ No ☐ Unk If yes, specify _____							
13. AGE CONGENITAL RUBELLA SYNDROME DIAGNOSED _____ Years _____ Months ☐ <1 Month							

MATERNAL HISTORY

14. MOTHER'S NAME (last)		(first)	(middle)
15. RUBELLA-LIKE ILLNESS DURING PREGNANCY ☐ Yes ☐ No ☐ Unk	16. IF YES, MONTH OF PREGNANCY _____ ☐ Unk	17. CLINICAL FEATURES	
18. MOTHER IMMUNIZED WITH RUBELLA VACCINE ☐ Yes ☐ No ☐ Unk	19. IF YES, DATE VACCINATED	20. MANUFACTURER	21. LOT NUMBER

LABORATORY

22. BLOOD SPECIMENS SUBMITTED TO (name of laboratory)	
CHILD ☐ None	MOTHER ☐ None
DATE COLLECTED	RUBELLA HI TITER

23. RECORD VIRAL ISOLATION STUDIES (date, specimen, source, and result) AND OTHER BLOOD STUDIES (date, test, and result) BELOW

APPRAISAL

24.		
☐ CONFIRMED	☐ PRESUMPTIVE	☐ NOT RUBELLA SYNDROME
INVESTIGATOR		DATE

SEROLOGIC ASSISTANCE IN RUBELLA DIAGNOSIS

The rubella hemagglutination inhibition test, the most widely used technique for quantitating rubella antibodies, is a valuable diagnostic tool and an excellent means of expanding the surveillance system for rubella. The following is a listing of commonly encountered clinical problems relating to rubella in which serological testing can be helpful in diagnosis:

1. Confirmation of Acute Rubella Infection

Specimens Required:

Paired sera--first collected within 3 days after onset of illness, and a convalescent serum collected 1-2 weeks later.

Interpretation:

Only a 4-fold or greater rise in antibody titer is diagnostic of recent rubella infection. Stable, or falling titers indicate only past rubella infection at some undetermined time. In instances where stable rubella HI antibody titers are found, additional laboratory techniques such as CF or FA should be employed since antibody measurable by these latter two procedures appears later following the onset of rash than does the HI antibody.

2. Determination of Immune Status of Pregnant Women Exposed to Rubella

Specimens Required:

Single serum collected within 7 days after exposure.

If the first specimen contains no detectable rubella antibody, then a second serum should be collected 3-4 weeks after the exposure.

Interpretation:

The presence of any level of rubella antibody within the 7-day period after exposure indicates prior infection with rubella virus, and immunity to primary infection.

Absence of detectable rubella antibody at the time of exposure indicates susceptibility to rubella. The testing of a second serum 3-4 weeks after exposure will confirm whether or not rubella infection, apparent or inapparent, has resulted from the exposure.

3. Confirmation of Suspected Congenital Rubella Infection

Specimens Required:

Serum specimens from both the infant and mother (if infant is less than 6 months old, an additional serum should be obtained at 6-12 months of age).

Specimens for viral isolation are of limited value for diagnosis and management of rubella syndrome infants.

Interpretation:

Congenital rubella infection can be confirmed serologically by demonstrating the persistence of antibody above and beyond that which is passively transferred from the mother. In general, the presence of rubella antibody in specimens submitted when the suspect case is 6-12 months old confirms the diagnosis. Above the age of 12 months the chance of antibody having resulted from natural post-natal rubella must be weighed against the likelihood of congenital origin. The degree of confidence in the serologic diagnosis therefore decreases with age above 1 year.

Defining Need for Rubella Vaccination

Specimens Required:

Single serum.

Interpretation:

The presence of any level of HI antibody ($>1:8$) indicates past rubella infection at some undetermined time, thus immunity to primary infection.

Absence of rubella HI antibody indicates susceptibility to rubella.

Evaluation of Possible Post-rubella Vaccine Complications

Specimens Required:

Paired sera--first serum obtained as soon as possible after onset of illness; a convalescent specimen collected 1-2 weeks later.

Specimens for viral isolation are essential for a complete laboratory evaluation of suspected rubella vaccine related illness. Specimens for viral isolation studies, if not tested within 24 hours, should be kept frozen at -60°C (or on dry ice) until virus isolation tests can be carried out.

Interpretation:

Minor qualitative and quantitative differences have been demonstrated between vaccine and wild virus induced rubella antibody. Using routine serologic techniques, however, such differentiation is generally not possible, and specimens should be referred to a reference laboratory for special tests (CF, differential FA, etc.).

Virus isolation with strain characterization of a rubella virus isolate is the most meaningful approach to evaluating rubella vaccine related illnesses. Strain characterization of rubella virus is available from a few specialty reference laboratories.

AVAILABILITY OF H.I. TESTING FOR RUBELLA BY STATE

STATE	LABORATORIES PERFORMING H.I. TEST FOR RUBELLA			WILL STATE LAB RUN H.I. TEST ON PREMARITAL BLOODS?
	State Health Dept. Lab	Other Public Health Labs	Other (univ., private, etc.)	
REGION I				
Connecticut	yes	no	yes	no
Maine	yes	no	no	yes
Massachusetts	yes	no	yes	yes
New Hampshire	no	no	no	no
Rhode Island	yes	no	yes	no
Vermont	yes	no	yes	yes
REGION II				
New Jersey	yes	no	yes	yes
New York	yes	yes	yes	yes
Puerto Rico	yes	no	no	yes
Virgin Islands	yes	no	no	yes
REGION III				
Delaware	no	no	yes	no
District of Col.	yes	no	yes	yes
Maryland	yes	yes	yes	yes
Pennsylvania	yes	yes	yes	no
Virginia	yes	yes	yes	no
West Virginia	yes	no	yes	no
REGION IV				
Alabama	yes	no	yes	yes
Florida	yes	no	yes	yes
Georgia	yes	no	yes	no
Kentucky	yes	no	yes	yes
Mississippi	yes	no	yes	no
North Carolina	yes	yes	yes	yes
South Carolina	yes	no	no	yes
Tennessee	yes	no	yes	yes
REGION V				
Illinois	yes	yes	yes	yes*
Indiana	yes	no	yes	no
Michigan	yes	no	yes	no
Minnesota	yes	no	yes	yes
Ohio	yes	no	yes	yes
Wisconsin	yes	yes	yes	no
REGION VI				
Arkansas	yes	no	no	yes
Louisiana	yes	no	yes	yes
New Mexico	yes	no	yes	no
Oklahoma	yes	no	yes	yes*
Texas	yes	yes	yes	yes

AVAILABILITY OF H.I. TESTING FOR RUBELLA BY STATE - Continued

STATE	LABORATORIES PERFORMING H.I. TEST FOR RUBELLA			WILL STATE LAB RUN H.I. TEST ON PREMARITAL BLOODS?
	State Health Dept. Lab	Other Public Health Labs	Other (univ., private, etc.)	
REGION VII				
Iowa	yes	no	no	yes
Kansas	yes	no	yes	yes
Missouri	yes	no	yes	yes
Nebraska	no	no	yes	no
REGION VIII				
Colorado	yes	no	no	yes
Montana	yes	no	yes	yes
North Dakota	yes	no	no	no
South Dakota	yes	no	yes	yes
Utah	yes	no	yes	no
Wyoming	yes	no	no	yes
REGION IX				
Arizona	yes	no	yes	yes
California	yes	yes	yes	no
Hawaii	yes	no	yes	no
Nevada	no	no	yes	no
REGION X				
Alaska	no	no	yes	no
Idaho	yes	no	no	yes*
Oregon	yes	no	yes	yes
Washington	yes	yes	yes	yes*
Guam	no	no	no	no
Trust Territory	no	no	no	no

* assumed to be yes since no restrictions were returned with questionnaire.

The Public Health Service Advisory Committee on Immunization Practices developed the following recommendation in close collaboration with the Committee on the Control of Infectious Diseases, American Academy of Pediatrics which endorses the recommendation. (Reprinted from the Morbidity and Mortality Weekly Report, Vol. 19, No. 34, Week Ending August 29, 1970.)

RUBELLA VIRUS VACCINE

INTRODUCTION

Live, attenuated rubella virus vaccine* appears to be a highly effective immunizing agent and the first suitable method of controlling rubella. Through June 1970, more than 19 million doses of vaccine have been distributed in the United States.

Rubella is generally a mild illness, but if the infection is acquired by a woman in the early months of pregnancy, it poses a direct hazard to the fetus. Preventing infection of the fetus is the principal objective of rubella control. This can best be achieved by eliminating the transmission of virus among children, who are the major source of infection for susceptible pregnant women. The live, attenuated rubella virus vaccine is safe and protective for children. Because of an undetermined risk of the vaccine virus for the fetus, the safety for pregnant women is not known.

RUBELLA

Rubella is one of the common childhood exanthems. Most cases occur in school-age children particularly during the winter and spring. By early adulthood, approximately 80 to 90 percent of individuals in the continental United States have serological evidence of immunity.

Rubella is clinically variable, and its common features, such as post-auricular and sub-occipital lymphadenopathy and transient erythematous rash, are often overlooked or misdiagnosed. A mild febrile illness may not be recognizable as rubella, and moreover, inapparent infection often occurs, which further decreases the reliability of clinical history.

Transient polyarthralgia and polyarthritis may accompany or follow the illness. Joint symptoms occur frequently in adult women but are also observed occasionally in adult men and in children.

By far the most important complication of rubella is the frequent occurrence of fetal infection when a woman acquires rubella early in pregnancy, especially in the first trimester. Other complications of rubella such as involvement of the central nervous system or thrombocytopenia are rare.

RUBELLA IMMUNITY

Immunity following rubella appears to be long lasting, even after mild illness or clinically inapparent infection. As with other viral diseases, re-exposure to natural rubella is sometimes accompanied by a booster-type antibody rise without clinical disease, indicative of asymptomatic reinfection. To date, these reinfections have not been shown to be of practical significance.

The only reliable evidence of immunity is a positive serological test. The hemagglutination-inhibition (HI) antibody determination is the test of choice for evaluating im-

munity. However, because of the variation among reagents and technical procedures, results of serological tests should be accepted only from laboratories of recognized competence that regularly perform these tests.

LIVE RUBELLA VIRUS VACCINE

Live rubella virus vaccine is prepared in duck embryo, dog kidney, or rabbit kidney cell cultures. It is administered as a single subcutaneous injection. Differences in the frequency of reactions as well as immunogenicity have been reported with the available rubella vaccine preparations. Approximately 95 percent of susceptible vaccinees develop antibodies. Although titers are lower than those observed following natural rubella infection, vaccination affords protection against clinical illness following natural exposure.

Antibody levels have declined very little during the 4-year period of observation of children who were among the first to be immunized with rubella vaccine. Long-term protection is likely, but its exact duration can be established only by continued observation.

Rubella-like symptoms of rash and lymphadenopathy occur occasionally after vaccination. Complaints related to the joints and distal portions of the extremities have been the most common. Arthralgia and arthritis have been reported in as many as 15 percent of vaccinated children. The small joints are most commonly involved and discomfort is most prominent at night. Less frequently, children may develop pain and paresthesias in the arms and hands or pain in the popliteal fossa with or without joint involvement. These reactions occur more frequently following use of the more immunogenic canine renal cell vaccine. These symptoms begin between 2 and 8 weeks following vaccine administration and may persist for as long as 2 weeks. Though brief recurrences have occurred, no permanent residuae have been reported. It is felt that these symptoms are consistent with manifestations of natural disease.

In susceptible women, reactions of arthralgia and arthritis are much more frequent and more likely to be severe. Not enough susceptible men have been studied to show whether they experience comparable reactions as frequently as women.

Vaccinees may shed relatively small amounts of virus from the pharynx for brief periods between the first and fourth weeks after inoculation. For this reason, transmission of vaccine virus to susceptible contacts is considered theoretically possible. In studies involving deliberate exposure of vaccinees to several thousand susceptible uninoculated persons, only a few contacts developed antibodies. Investigation of the circumstances indicated that most of these seroconversions could be accounted for by the occurrence of natural rubella or experimental error. In a few instances, seroconversion was thought to be compatible with vaccine virus transmission. However, in view of the

*The official name is Rubella Virus Vaccine, Live.

sizable negative experience and the recognized background of unrelated seroconversions, it is difficult to interpret the significance of each individual report of possible vaccine virus spread. Though further documentation is necessary, the probability of such spread is exceedingly low. Thus, the potential hazard to pregnant women is considered to be of such a low order of magnitude that use of vaccine in community programs or in children whose mothers are pregnant is not contraindicated.

Vaccinees exposed to rubella often develop increases in antibody titers without clinical symptoms. These reinfections, which are more frequent in individuals with low antibody titers, occur more commonly in vaccinees than in naturally immune persons. Investigations conducted to date indicate that these reinfections are virologically abbreviated in that viremia has not been detected and virus excretion in the pharynx appears to be significantly diminished in amount and duration. There is no evidence indicating that reinfected vaccinees can transmit virus to susceptible contacts. Likewise, the absence of demonstrable viremia during reinfection suggests that women with vaccine-induced immunity if exposed to rubella during pregnancy would be unlikely to transmit virus to the fetus. However, further study is needed to document the precise clinical and epidemiologic significance of reinfection.

RECOMMENDATIONS FOR VACCINE USE

Live rubella virus vaccine is recommended for boys and girls between the age of 1 year and puberty. Vaccine should not be administered to infants less than 1 year old because of possible interference from persisting maternal rubella antibody.

In the continental United States, children in kindergarten and elementary school deserve priority for vaccination because they are commonly the major source of virus dissemination in the community. A history of rubella illness is not reliable enough to exclude children from immunization.

Vaccination of adolescent or adult males is of lower priority. The vaccine may be useful in preventing or controlling outbreaks of rubella in circumscribed population groups.

Pregnant women should not be given live rubella virus vaccine. It is not known to what extent infection of the fetus with attenuated virus might take place following vaccination, or whether damage to the fetus could result. Therefore, routine immunization of adolescent girls and adult women should not be undertaken because of the danger of inadvertently administering vaccine to pregnant women.

Women of child-bearing age may be considered for vaccination only when the possibility of pregnancy in the following 2 months is essentially nil; each case must be considered individually. This cautious approach to vaccinating postpubertal females is indicated for two reasons: First, because of the theoretical risk involved in vaccination of pregnant women; and second, because significant congenital anomalies occur in approximately 3 percent of all births, and their fortuitous appearance after vaccine had been given during pregnancy could lead to serious misinterpretation.

If vaccination of a woman of child-bearing age is contemplated, the following steps are indicated:

- 1) The woman should be tested for susceptibility to rubella by the HI test (See *Rubella Immunity*).
- 2) If immune, she should be assured that vaccination is not necessary.
- 3) If susceptible, she may be vaccinated only if it is ascertained that she is not pregnant and if she understands that it is imperative for her to avoid becoming pregnant for the following 2 months. (To ensure this, a medically acceptable method for pregnancy prevention should be followed. This precaution also applies to women in the immediate post-partum period.) Additionally, she should be informed of the frequent occurrence of joint involvement (see above).

There is no evidence that live rubella virus vaccine given after exposure will prevent illness. There is, however, no contraindication to vaccinating children already exposed to natural rubella.

There is no contraindication to vaccination of individuals with pre-existing antibody.

Precautions in Using Live Rubella Virus Vaccine

Pregnancy: Live rubella virus vaccine is contraindicated. (See *Recommendations for Vaccine Use*.)

Altered Immune State: Attenuated rubella virus infection might be potentiated by severe underlying diseases, such as leukemia, lymphomas, or generalized malignancy, and when resistance has been lowered by therapy with steroids, alkylating drugs, antimetabolites, or radiation. Such patients should not be given live rubella virus vaccine.

Severe Febrile Illness: Vaccination should be postponed until the patient has recovered.

Hypersensitivity of Vaccine Components: Rubella vaccine should theoretically not be given to children clearly sensitive to the tissue substrates or other components of the vaccine. To date, there have been no documented reports of serious hypersensitivity reactions to rubella vaccine.

Simultaneous Administration of Live Rubella Virus Vaccine and Other Live Virus Vaccines.

Simultaneous administration of live rubella virus vaccine and other live virus vaccines is not recommended as a routine practice until results of controlled clinical investigations are available. Until then, it is recommended that rubella vaccination be separated by at least 1 month from administration of other live virus vaccines.

SURVEILLANCE

Careful surveillance of rubella infection is particularly important with the general use of vaccine. Emphasis should be placed upon improved diagnosis and reporting of rubella, of the congenital rubella syndrome, and of complications of the disease and the vaccine. Competent laboratory investigation of all infants with birth defects suspected of being due to rubella is essential. It will likewise be important to observe patterns of vaccine use and determine its effectiveness.

SEROLOGIC TESTING FOR RUBELLA – A WARNING

The Public Health Service Medical Laboratory Services Advisory Committee issued the following statement on serologic testing for rubella.

Serologic tests for rubella are primarily used to determine: (1) the immune status of individuals in a given population; (2) the immune status of pregnant women who have been exposed to rubella; and (3) the etiology of cases of exanthematous disease. In the first instance, results of tests are used for epidemiological and immunization planning purposes; in the second and third instances, results are used to provide information for making medical management decisions in situations of some urgency.

At the present time the hemagglutination inhibition (HI) test is the technique most widely used for measuring rubella antibodies. This test is a complex procedure which must be performed by well trained, experienced individuals. In addition, a thorough knowledge of the immune response is essential for the proper interpretation of test results. Because of actions which may be taken on the basis of laboratory results, the need for accuracy is great, and certain problems associated with the HI test must be recognized.

The HI test for rubella is not a standardized technique, and several modifications of the basic procedure are in use. Methods for removing nonspecific inhibitors in serum specimens may not be completely effective, or they may remove specific antibody, leading to false positive or false negative results. Reagents obtained from different

sources are not uniform in quality or in suitability for all modifications of the HI test. Since the products from each manufacturer are for use in a specific HI procedure, intermixing reagents from different sources can lead to problems in test performance. Further, the wide variability of erythrocyte suspensions has considerable bearing on the sensitivity of the test. Because of the lack of uniformity in testing procedures and reagents, interpreting laboratory results is a sophisticated undertaking, and, of necessity, may vary from one laboratory to another.

In view of the problems associated with this serologic procedure, HI tests for rubella should not be attempted in a laboratory carrying out the tests on an infrequent basis. Such a laboratory cannot maintain the necessary skills and controls, and, in urgent cases involving therapeutic abortion, pressures may lead to failure to repeat tests or to perform more difficult supplemental tests, such as complement fixation, fluorescent antibody, and serum neutralization tests, or IgM determinations which may be necessary for accurate interpretation.

The laboratory asked to carry out HI tests for rubella only infrequently or to perform supplemental tests for which it is not qualified should refer diagnostic materials to a State health department or other competent reference laboratory.

STATE EPIDEMIOLOGISTS

Key to all disease surveillance activities are those in each State who serve the function as State epidemiologists. Responsible for the collection, interpretation and transmission of data and epidemiological information from their individual States, the State epidemiologists perform a most vital role. Their major contributions to the evolution of this report are gratefully acknowledged.

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