

**An Outbreak of Influenza A among USAF Personnel
at Udorn Royal Thai Air Force Base**

Principal Investigators: Robert A. Williams, MAJ, USAF, MC*
 Franklin H. Top, Jr, LTC, MC
 Michael Benenson, MAJ, MC
 Chaninthorn Suwongse, M.D.

BACKGROUND: On 19 September 1972 this laboratory was requested by the 1st Medical Service Wing (PACAF) to assist in the investigation of an outbreak of febrile upper respiratory tract disease at Udorn Royal Thai Air Force Base, Thailand. An increase in URI dispensary visits was first noted on 10 September and by 17 September 53 flight crew members were grounded with a flu-like syndrome. The explosive nature of this outbreak, its impairment of the mission of the base, and its occurrence in a military population previously immunized with polyvalent influenza vaccines necessitated its immediate investigation. Accordingly, SMRL investigators visited Udorn RTAFB on 20 September. It was decided that epidemiologic investigation and institution of control measures were the responsibility of the 1st Medical Service Wing while etiologic investigation of the outbreak was the responsibility of SMRL.

RESULTS:

Etiology: Preliminary investigation established that approximately 300 men had developed the syndrome in the two days preceding 20 September, and that most units on the base were involved. Eighteen USAF personnel hospitalized or visiting the emergency room of the 432nd USAF Hospital were examined by SMRL investigators. Clinically these patients presented almost universally with a dry, hacking cough, sore throat of variable degree with marked pharyngeal injection but no exudate, marked malaise, headache, and myalgias. Systemic symptoms predominated. Oral temperatures ranged from normal to 105°F; all but 3 of the 18 had temperatures greater than 100°F. White counts on these patients were generally between 8,000 and 12,000.

Throat swabs obtained on the 18 patients were immediately plated and streaked on sheep blood agar plates. Small numbers of B hemolytic streptococci were isolated from but two patients and one of these isolates was Bacitracin resistant.

Throat washings in Hanks' balanced salt solution and 0.4 percent bovine plasma albumin were obtained on all 18 patients, immediately frozen on dry ice, transported to SMRL and inoculated into embryonated eggs and rhesus monkey kidney cell cultures. Strains of influenza A were isolated from throat washings of 13 patients—from all 6 hospitalized patients and from 7 of the 12 patients examined in the emergency room.

Acute serum was obtained on all 18 patients and 3 week convalescent serum was obtained by the 432nd USAF Hospital on 10 of these patients. Of those 7 patients with influenza A isolated, 6 had four-fold or greater rises in hemagglutination-inhibition (HI) antibody to one of the Udorn isolates, A/Udorn 302/72. None of the 3 patients without isolates had diagnostic antibody rises.

Antigens of one of the Udorn isolates, Udorn 302, was compared with previous influenza A strains in cross HI tests. Rooster antisera to A/JAP 305/57, A/HK 1/68, and A/Udorn 302/72 were used in these tests against A/JAP 305/57, A/HK 1/68, A/Korat/72 (a strain isolated in Korat, Thailand, in February 1972), and A/Udorn 302/72. Results are shown in Table 1. The data indicate that A/Udorn 302/72 is related to strains represented by A/HK 1/68, but is different antigenically from the 1968 and 1972 strains. Rooster

* 1st Medical Service Wing (PACAF)

antisera to these latter strains were but weakly reactive to the Udorn strain. This would suggest that human antibodies induced by previous infection or immunization with 1968 antigens would afford considerably less protection to the Udorn strain than to the 1968 or Korat 1972 strain.

Throat washings and strains isolated from the Udorn patients were forwarded to the WRAIR for more detailed antigenic analysis and for possible vaccine use. Although final reports have not been received on the Udorn isolates, a strain isolated in Bangkok in September 1972, A/Bangkok 2/72 (which appears antigenically identical to A/Udorn 302/72), has been characterized as identical to A/England 42/72 by the WHO Influenza Reference Laboratory in England.

Epidemiology: Between 10 September and 30 September, 1387 USAF personnel reported to base medical facilities with URI or influenza-like symptoms. All patients were examined by physicians or corpsmen; those seen after 20 September filled out a questionnaire at the time of examination while those examined before 20 September were contacted and questionnaires filled out retrospectively. The questionnaires specifically dealt with squadron, clinical symptomatology, and date of last influenza immunizations. Pertinent findings from this data obtained by 1st Medical Service Wing are summarized.

Total numbers of suspected influenza cases seen at Udorn RTAFB in September 1972 are shown in Table 2. The attack rate for total base personnel was 21%, but considerable variation between units was observed. Of interest was that 62% of the base flying personnel developed illness as opposed to 16% of non-flying personnel.

Dates of onset of involved personnel are shown in Figure 1. The explosive nature of the 1972 Udorn outbreak was in contrast with that observed by Smith, et al, in an A/HK/68 outbreak at Korat RTAFB in 1968 (SMRL Annual Report 1969).

The frequency of individual symptoms in the 1387 patients studied are shown in Table 3. Sore throat, coryza, fever, headache, and malaise were found in over 2/3 of the patients, while cough and myalgias were complaints of about 50%.

A history of previous immunization with polyvalent influenza vaccines was obtained in 91% of the 1387 patients studied; 88% of all patients had received immunizations on or after October 1971. Although the data obtained do not permit a comparison of attack rates in immunized versus unimmunized personnel, the available data suggests that influenza vaccines containing A/HK/68 antigens were at best of limited effectiveness against the 1972 Udorn strain.

Table 1. Comparative HI Tests with A/Udorn 302/72 Antigen and Early Influenza Isolates

Antigen	A/Jap 305/57	A/HK 1/68	A/Udorn 302/72
A/JAP 305/57	<u>40</u>	<20	<20
A/HK 1/68	40	<u>20</u>	80
A/Korat/72	20	160	80
A/Udorn 302/72	20	40	<u>160</u>

Table 2. The Totals of Influenza Cases at Udorn RTAFB during September 1972
Listed by Unit of Assignment

Unit	Population*	Cases	Attack Rate
			(%)
58 TFS	100	68	68
432 SPS	250	146	58
555 TFS	75	39	52
13 TFS	75	31	41
14 TFS	125	50	40
Det 1, 7AF (7/13 AF)	50	16	32
432 FMS	450	141	31
432 AMS	350	97	29
432 MMS	300	79	26
432 CES	150	35	23
432 OMS	300	70	23
432 USAF Hospital	125	27	22
621 TCS	125	24	19
1974 th Comm Sq	350	62	18
432 CSG	2000	341	17
432 Supply Sq	250	41	16
Det 5	15	2	13
307 th TFS	450	54	12
56 SW Det 1	300	31	10
523 rd TFS	400	26	7
Misc Small Units	400	7	3
TOTALS	6640	1387	

* All unit strengths are rounded to nearest twenty-five.

Table 3. A Comparison of Symptom Proportions in Influenza Cases
Interviewed at Udorn RTAFB During September 1972

Symptoms	Yes	No	Percentage with Symptom
Sore Throat	1140	247	88
Runny Nose	1080	307	87
Fever			
Less than 102°	1095	292	79
More than 102°	319	1068	23
Headache	1054	333	76
Malaise	943	444	68
Chills	874	513	63
Cough	721	666	52
Myalgia	600	787	47
G.I. Symptoms	443	944	32
Arthralgias	374	1013	27
Red Eyes	374	1013	27
Rash	34	1353	5

Figure 1. The Date of Patients First Symptom During Influenza Outbreak at Udorn RTAFB in September 1972.

