

Supplementary webappendix

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Supplementary Material for

“A forgotten epidemic that changed medicine: measles in the US Army, 1917-18”

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Supplementary Figures and Supplementary Table



Figure S1. Army recruits arriving at Camp Zachary Taylor, Louisville, Kentucky.



Figure S2. Measles receiving station, Camp Zachary Taylor, Louisville, Kentucky. The measles patient, masked within an isolation cubicle, provides a medical history to a masked, gowned and gloved physician, while five other masked patients wait their turn to be interviewed¹¹ (left). Intensive infection control efforts were undertaken in all camps to try to prevent measles introductions, but these efforts failed, largely due to pre-arrival exposures and inability to identify incubating cases by medical history.

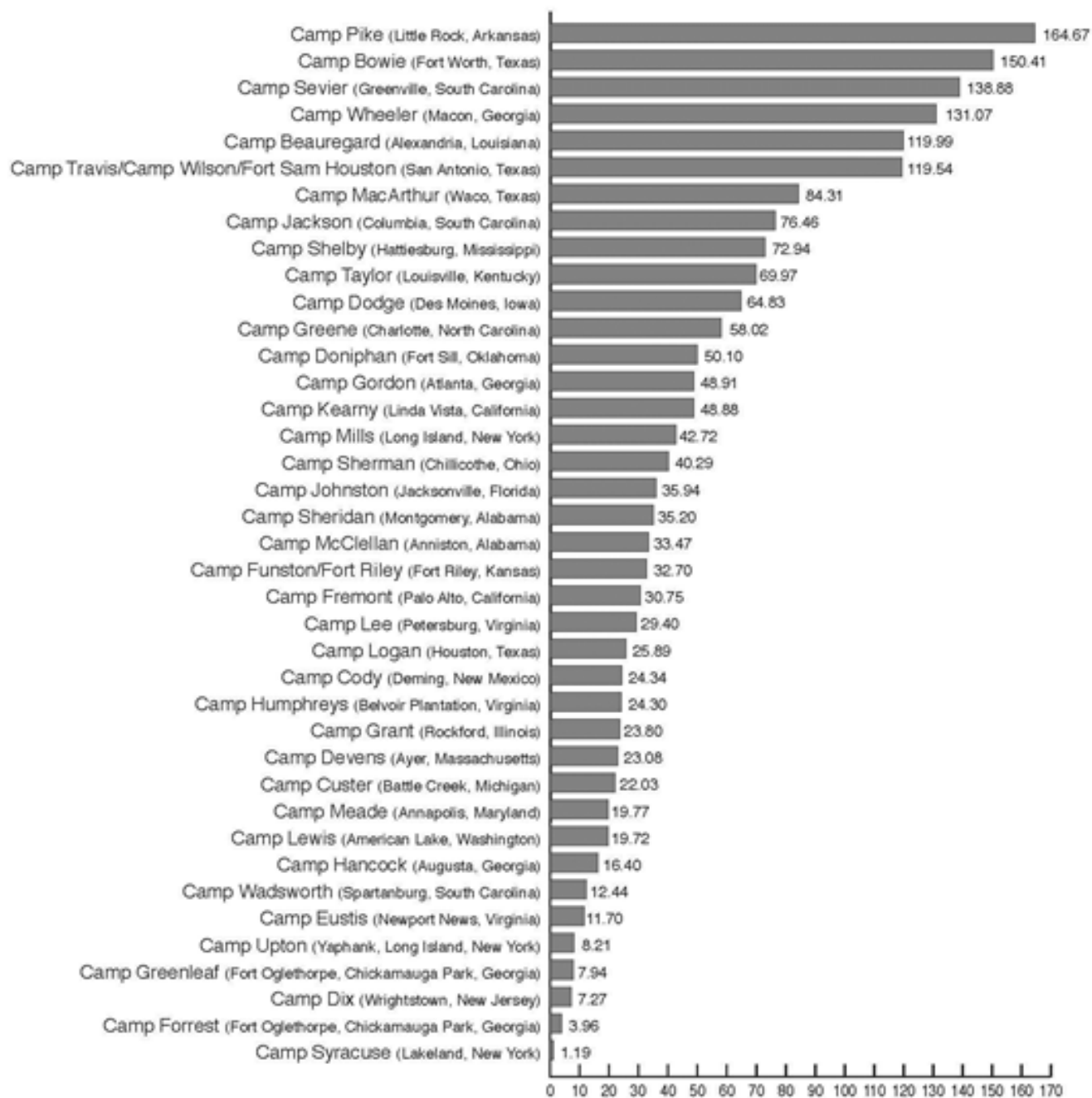


Figure S3. Measles admissions, white enlisted men, 39 U.S. Army camps, 1 April 1917 to 31 December 1919¹⁰. The Figure is derived from a previously published image¹⁰.

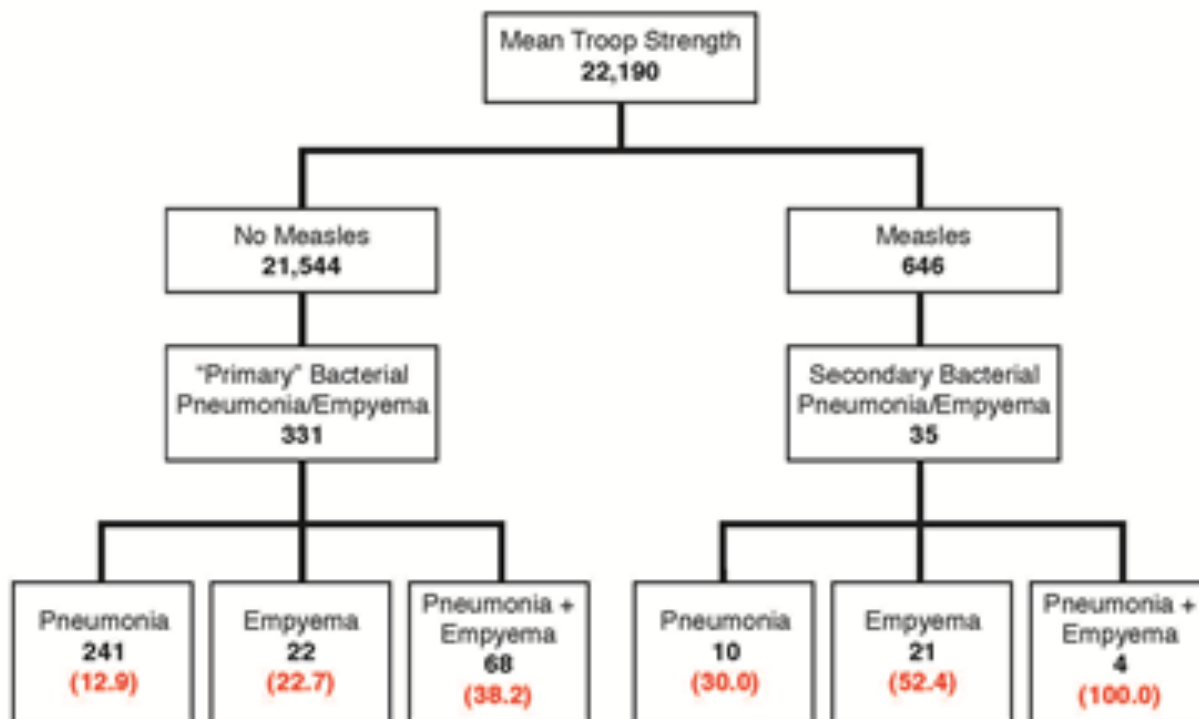


Figure S4. Bacterial lower respiratory tract disease incidence and mortality, by measles infection status, in troops stationed at Camp Custer, Battle Creek, Michigan, September 1917 to March 1918²². Troop strength is taken as the strength in January 1918. Figures in parentheses represent case-fatality. Soldiers who acquired measles were approximately three times more likely than soldiers without measles to develop bacterial pneumonias (secondary post-measles pneumonia in the case of soldiers with measles, and "primary" pneumonia in the soldiers without measles; 5.4 v. 1.5 percent, respectively, $p < 0.0001$), and approximately three times more likely to die (51.4 v. 18.7 per cent respectively, $p < 0.0001$). Most "primary" pneumonias were suspected of having been complications of non-specific respiratory tract infections (see text).

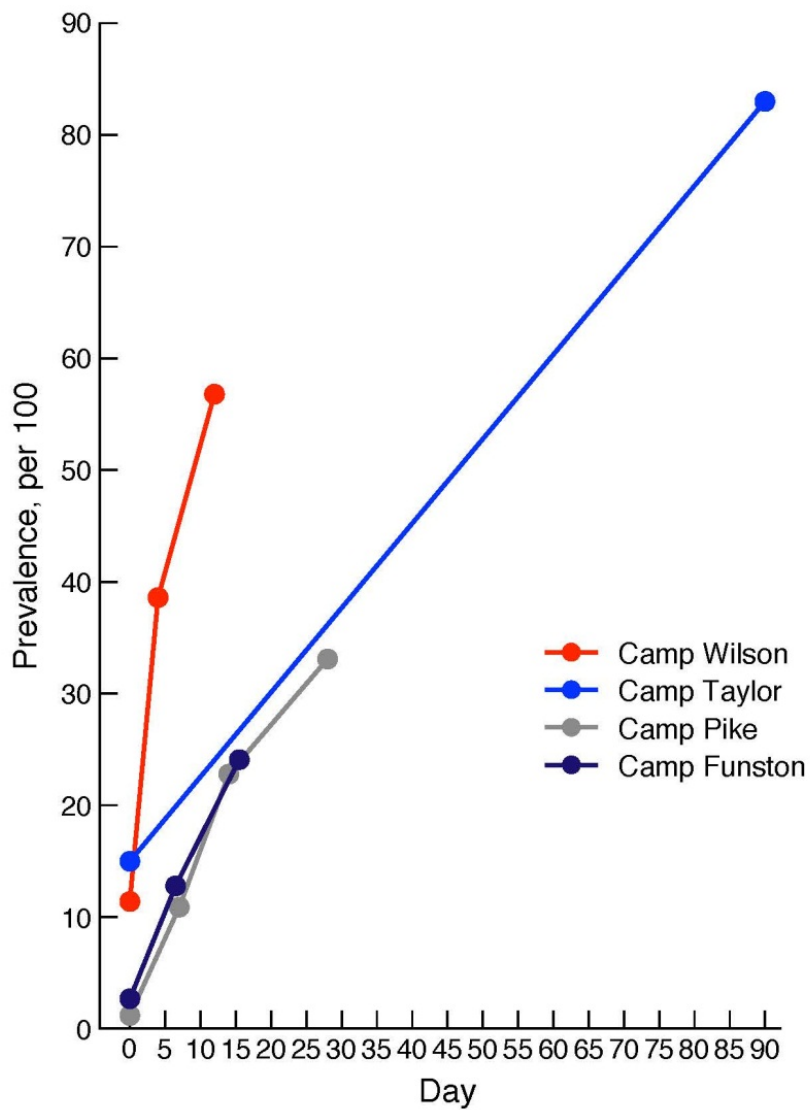


Figure S5. Streptococcal nasopharyngeal colonization prevalence rates by days in camp in normal recruits, Camp Taylor, and by days after admission in soldiers admitted to measles wards at Camps Funston, Pike and Wilson, winter 1917-1918^{11,21,24,28,40}.

MEASLES COMPLICATIONS	DEATHS	ADMISSIONS	CASE-FATALITY
Bronchopneumonia (including empyema)	1,584	4,463	35·5%
Lobar pneumonia (including empyema)	602	1,820	33·1%
Suppurative and serofibrinous pleurisy	296	750	39·5%
Mastoiditis and otitis media	140	4,492	3·1%
Concurrent diseases (mumps, rubella, diphtheria, tuberculosis)	70	2,167	3·2%
Cerebrospinal meningitis	37	93	39·8%
Endocarditis/pericarditis	26	57	45·6%
Scarlet fever and erysipelas	23	452	5·1%
All other complications	428	9,112	4·7%
TOTAL	3,206	22,809	14·1%

Table S1. Army-wide admissions for, and deaths from measles complications, by diagnostic categories, all enlisted men in the U.S. and Europe, 1 April 1917 to 31 December 1919¹⁰. Most of the complications were streptococcal. Such data are not available for only the men in U.S. camps, but data on 1,473 measles deaths in encamped white enlisted men appear to be in accord: 0·7 per cent were attributed to primary viral infection, 90·5 per cent to secondary bacterial pneumonia and/or empyema, and 8·8 per cent to other (predominantly secondary bacterial) complications⁹.