

Compliance and performance characteristics of subject collected versus health-care worker collected nasal swabs for respiratory viral surveillance

Michelle Kautz¹, Nusrat J Epsi PhD^{2,3}, Stephanie A Richard, PhD, MHS^{2,3}, Rhonda E Colombo, MD, MHS^{2,3,4}, Anuradha Ganesan, MD^{2,3,5}, Limone Collins, MD⁶, CAPT Timothy H Burgess, MD, MPH², CAPT Ryan Maves, MD^{2,7}, LTC Ana E Markelz, MD⁸, Casey Geaney, MD⁵, Srihari Seshadri, MBBS, PhD, MPH⁶, CAPT Gregory Utz, MD^{2,3,7}, Katrin Mende, PhD^{2,3,8}, David Hrcir, MD^{9,10}, Jitendrakumar R Modi, MD¹², Anthony C Fries,¹³ Bruce McClenathan, MD^{6,11}, Christina Schofield, MD⁴, Jay R. Montgomery, MD⁵, Catherine Skerrett, APRN¹⁰, Christina Spooner, MS⁶, Christian L Coles PhD^{2,3}, Tahaniyat Lalani MBBS MHS^{1,2,3}

¹Naval Medical Center Portsmouth, Portsmouth VA, USA, ²Infectious Disease Clinical Research Program, Department of Preventive Medicine and Biostatistics, Uniformed Services University of the Health Sciences, Bethesda, MD, USA, ³The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., Bethesda, MD, USA, ⁴Madigan Army Medical Center, Tacoma, WA, USA, ⁵Walter Reed National Military Medical Center, Bethesda, MD, USA, ⁶Immunization Healthcare Division, Defense Health Agency, Bethesda, MD, Falls Church, VA, Fort Bragg, NC, and San Diego, CA, USA, ⁷Naval Medical Center San Diego, San Diego, CA, USA, ⁸Brooke Army Medical Center, San Antonio, TX, USA, ⁹Carl R. Darnall Army Medical Center, Fort Hood, TX, USA, ¹⁰Lackland Air Force Base, San Antonio, TX, USA, ¹¹Womack Army Medical Center, Fort Bragg, NC, USA, ¹²Naval Health Clinic Annapolis, MD, USA, ¹³The United States Air Force School of Aerospace Medicine

Background

- At home, self-collection of nasal swabs (SCNS) by subjects during an influenza-like illness (ILI), is a convenient alternative to healthcare worker-collected swabs (HCWC) for PCR detection of respiratory pathogens
- Unsupervised SCNS and completion of symptom-based questionnaires benefit surveillance studies by reducing clinic staffing needs, study budgets and increasing the convenience of study participation. In addition, SCNS can reduce delays in swab collection after symptom onset, since subjects do not have to visit a research facility for HCWC
- We utilized a cohort of adult US Military Health System (MHS) beneficiaries enrolled in a flu vaccine effectiveness trial (PAIVED) between 2019-2020 to evaluate the following:
 - Compliance with SCNS and HCWC swabs
 - Time from symptom onset to SCNS and HCWC collection.
 - PCR detection of viral respiratory pathogens in SCNS vs. HCWC

Methods

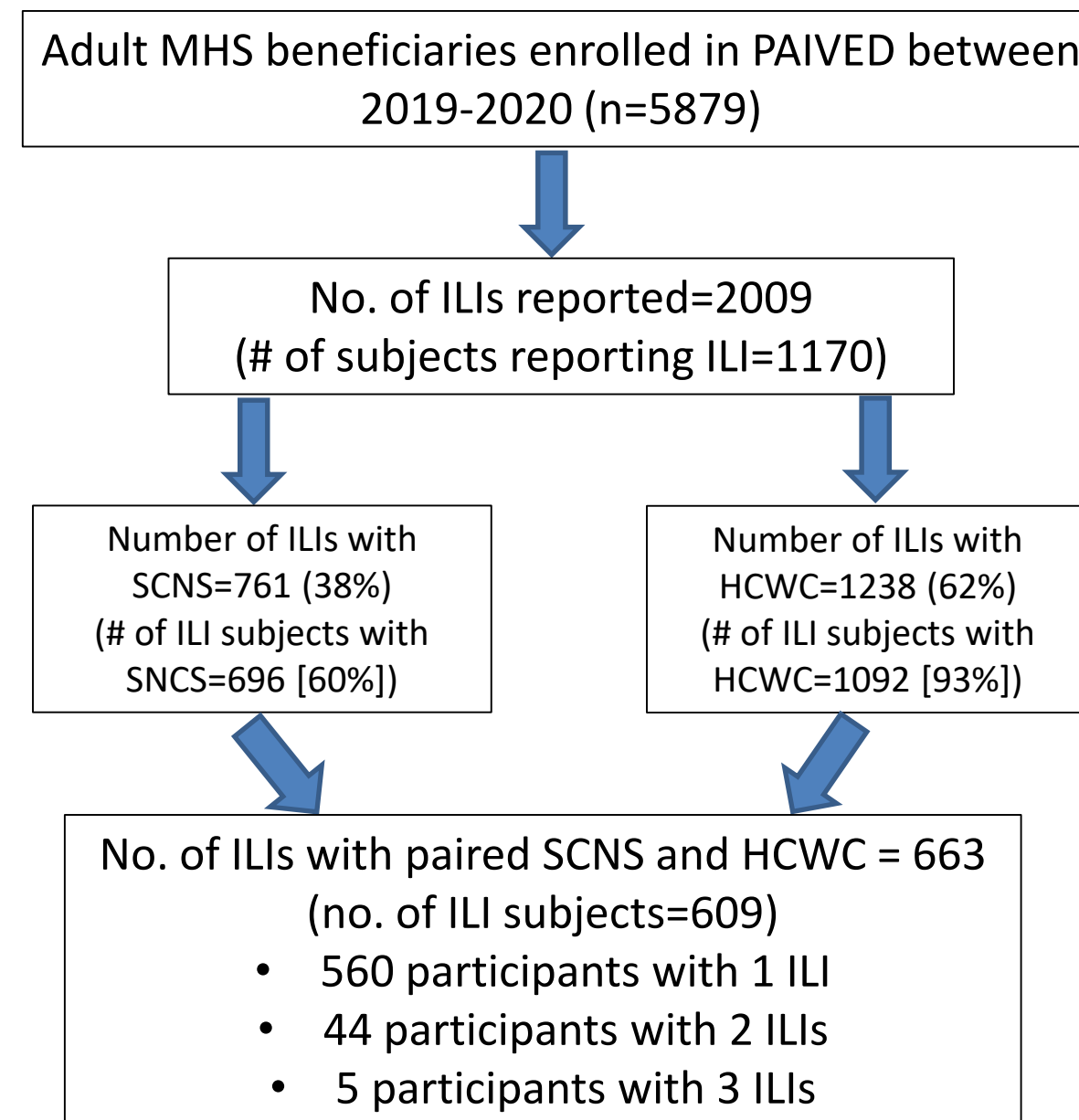
- This is a sub-analysis of clinical trial (PAIVED) evaluating the effectiveness of influenza vaccination in MHS beneficiaries:
 - Subjects were randomized in a 1:1:1 ratio to receive one of 3 commercially available influenza vaccines (Flublok[®], Flucelvax[®] and egg-based vaccines (e.g., Afluria[®]))
 - Following vaccination, subjects were instructed on SCNS and completion of a symptom diary
- Subjects were contacted weekly to ascertain ILI symptoms (cough or sore throat AND subjective fever, myalgias or fatigue)
- In the event of an ILI, subjects completed the symptom diary and SCNS and scheduled a clinic visit for HCWC. Subjects could have multiple ILIs and were compensated for completing study procedures (\$10 for SCNS, HCWC and \$50 for a blood sample collected at the clinic visit)
- Swabs were tested with the Luminex NxTAG[®] Respiratory Pathogen Panel
- In this sub-analysis, we included subjects who developed an ILI and were asked to complete a SCNS and HCWC

Statistical Analysis:

- Positive Percent Agreement (PPA) of SCNS - a positive result of either HCWC or SCNS was used as the reference standard
- Agreement between paired swabs was determined using the Cohen Kappa coefficient (K)

Results

Figure 1: Compliance with collection of SCNS and HCWC



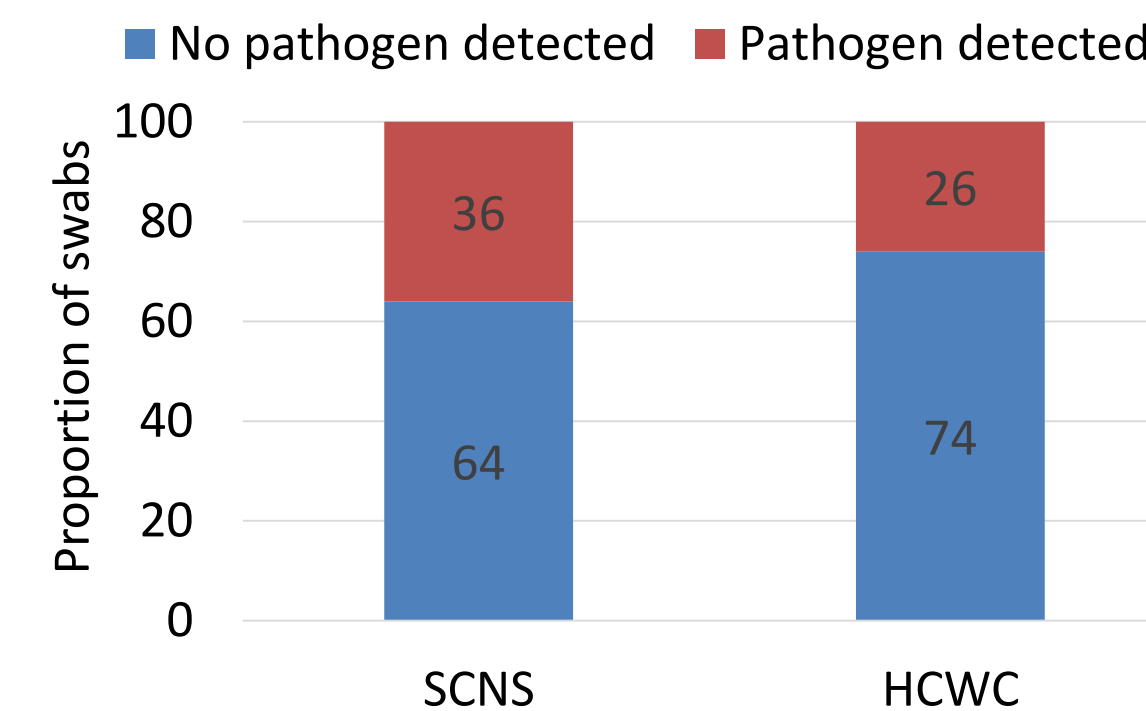
- Compliance was higher for HCWC (62%) vs. SCNS (38%; p<0.001)
- SCNS were associated with a shorter interval between symptom onset and collection (SCNS median: 4 days [IQR:2-6 days] vs. HCWC: 7 days [IQR:4-9 days]; p < 0.001)

Table 1. Demographics and swab collection data of 609 participants who provided 663 paired swabs

Characteristic	N (%)
Age – years	
Median (range)	36 (19-84)
Male Gender	318 (52%)
Race/Ethnicity	
Black	73 (12%)
Hispanic	109 (18%)
White	353 (58.%)
Other	74 (12%)
Military Status	
Active Duty	381 (63%)
Dependent	131 (22%)
Retired	97 (16%)

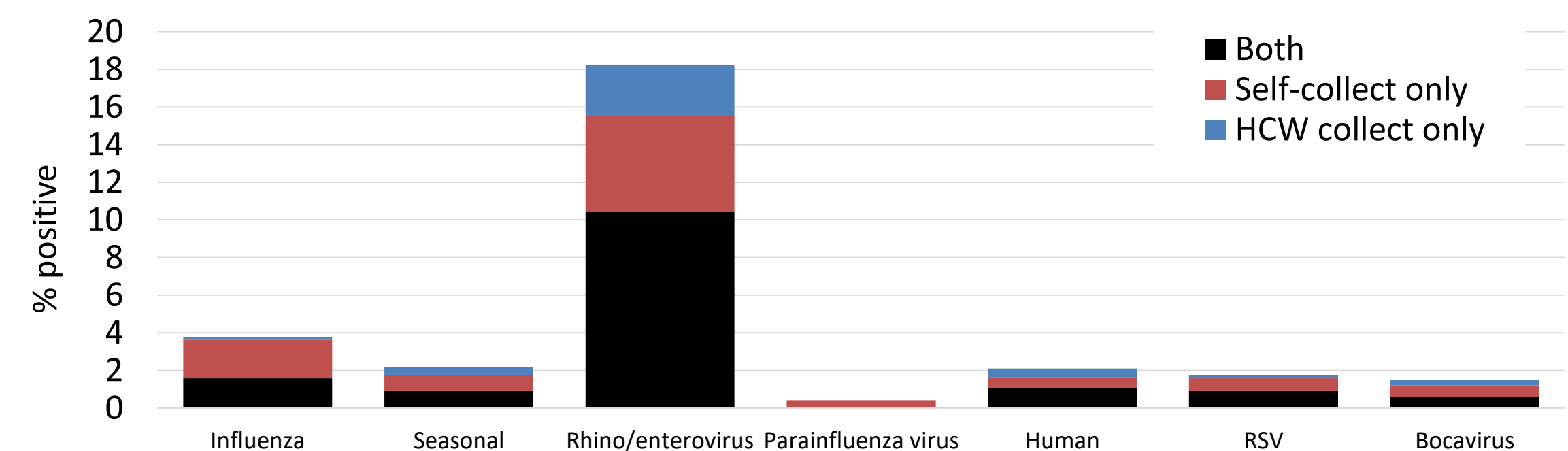
Results (cont.)

Figure 2. PCR detection rate in paired SCNS and HCWC (n=663)



- The overall detection rate was higher in SCNS (36%) than HCWC (26%; p<0.001) (Figure 2)
- The overall PPA was 85.7% and a PPA of approximately 79% of greater was observed for influenza, rhino/enterovirus, parainfluenza or respiratory syncytial virus

Figure 3. Detection by pathogen in 663 paired swabs, PPA and K.



	Influenza	Seasonal Coronavirus	Rhino/enterovirus	Parainfluenza virus	Human metapneumovirus	RSV	Bocavirus
SCNS PPA	0.91	0.67	0.79	1.00	0.70	0.86	0.5
K	0.57	0.56	0.68	0.30	0.66	0.68	0.57

Conclusions

- Higher compliance was noted with HCWC, possibly due to higher compensation provided for clinic visits (for blood collection), or subjects losing kits and being unable to complete SCNS
- SCNS were associated with higher detection rates compared to HCWC, likely due to the shorter interval between symptom onset and swab collection
- Agreement between paired swabs was poor due to the lower detection rates in HCWC
- Strategies to improve compliance with SCNS and minimize the interval between symptom onset and swab collection are needed to optimize detection of respiratory pathogens in this MHS cohort.

Acknowledgments and Correspondence

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Correspondence: michelle.a.kautz.mil@mail.mil