Letters

RESEARCH LETTER

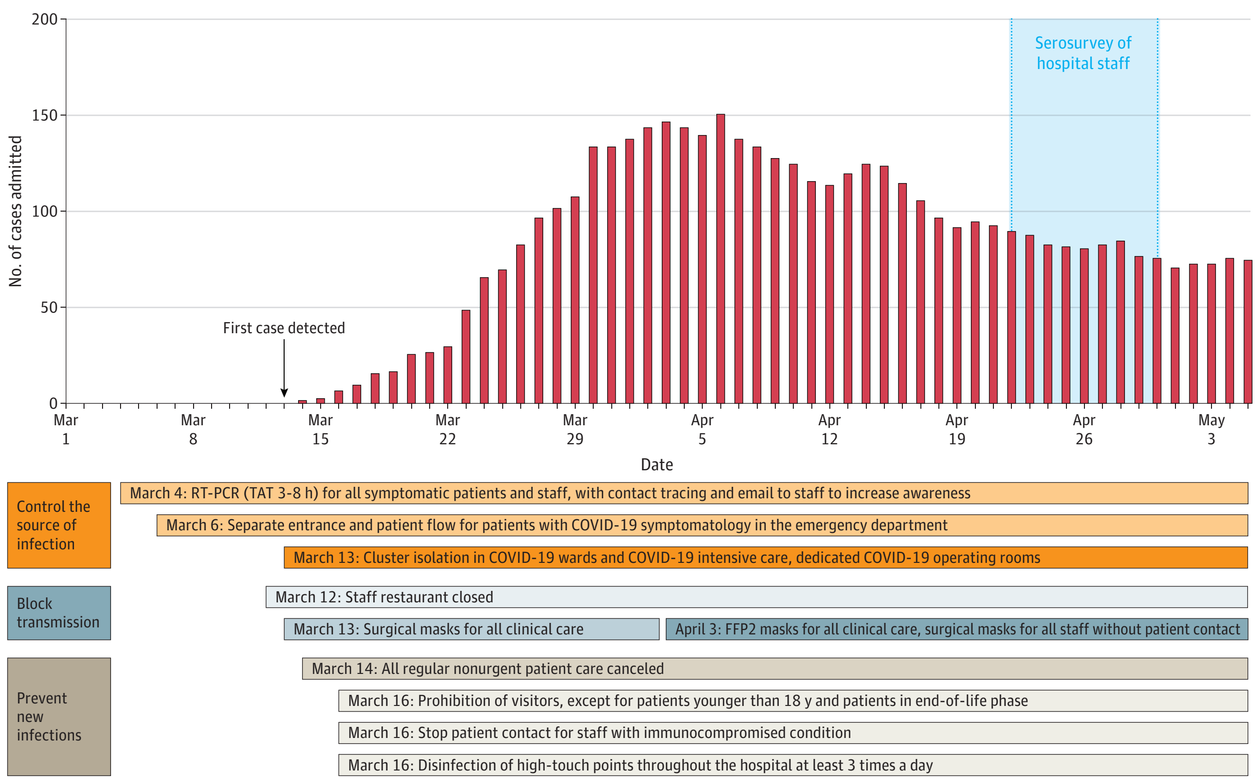
Hospital-Wide SARS-CoV-2 Antibody Screening in 3056 Staff in a Tertiary Center in Belgium

Belgium has a high burden of coronavirus disease 2019 (COVID-19), especially the region surrounding the Hospital East-Limburg, a tertiary care center.[1] Infection prevention measures were instituted in the hospital beginning March 4, 2020, including testing and contact tracing of all symptomatic patients and staff, changes in hospital operations, and provision of personal protective equipment (PPE). The first case was detected March 13 (**Figure 1**). We investigated the prevalence of antibodies against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) among hospital staff.

Video

Methods | From April 22, 2020, to April 30, 2020, all persons who worked at Hospital East-Limburg (including clinical and nonclinical staff and volunteers) were invited for serologic testing. Staff with active symptoms were quarantined and not tested. A single-lane rapid IgG/IgM lateral flow assay directed to the nucleocapsid protein of SARS-CoV-2 (COVID-19 IgG/IgM Rapid Test Cassette; Multi-G) was used. The manufacturer reported high sensitivity and specificity; external validation found performance for IgG comparable to enzyme-linked immunosorbent assay,[2] but the specificity and sensitivity for IgM were only 91.3% and 57.9%. Internal validation of the assay using 90 polymerase chain reaction–confirmed cases and 101 historic biobanked samples found a sensitivity of 92.2% and specificity of 97.0% for IgG. Because of inadequate performance, IgM results were excluded. Demographic characteristics and job title were obtained from human resources records. Staff were asked to complete a survey on exposure risks (patient, coworker, and household contact) and symptoms from March 1 (**Figure 2**). The seroprevalence 95% confidence interval was calculated by the asymptotic method. χ^2 Tests were used to compare proportions, *t* tests to compare age. Odds ratios and 95% CIs were calculated with bivariable logistic regression to assess demographic and job characteristics associated with seroprevalence and with multivariable logistic regression to

Figure 1. Epidemic Timeline of Patients With COVID-19 Admitted to Hospital East-Limburg, Belgium, 2020

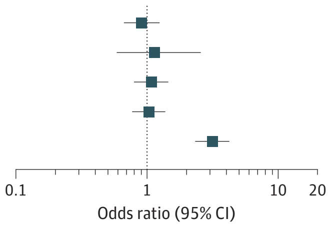


The epidemic curve is shown as the number of patients with coronavirus disease 2019 (COVID-19) admitted at the institution each day. The first case was detected March 13. Serosurvey of staff was initiated from April 22, 2020, to April 30, 2020. Details of the infection prevention measures are depicted below the curve. FFP indicates filtering facepiece; RT-PCR, reverse transcriptase–polymerase chain reaction; TAT, turnaround time.

Figure 2. Exposure and Symptomatology Predictors of SARS-CoV-2 Antibodies Among Staff, Hospital East-Limburg, Belgium, 2020

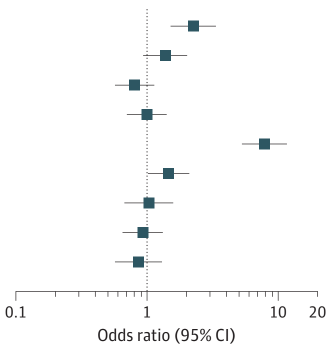
A Exposure

	No. with SARS-CoV-2 antibodies/total (%)		
	Exposure present	Exposure absent	Odds ratio (95% CI)
Patient contact	114/1864 (6.1)	67/1000 (6.7)	0.91 (0.67-1.25)
Worked during lockdown	188/2902 (6.5)	8/142 (5.6)	1.14 (0.59-2.57)
COVID-19+ patient contact	73/1092 (6.7)	120/1921 (6.2)	1.08 (0.80-1.45)
COVID-19+ coworker contact	95/1434 (6.6)	100/1548 (6.5)	1.03 (0.77-1.38)
Suspected COVID-19+ household	81/593 (13.7)	116/2435 (4.8)	3.15 (2.33-4.25)



B Symptoms

	No. with SARS-CoV-2 antibodies/total (%)		
	Symptom present	Symptom absent	Odds ratio (95% CI)
Fever[a]	81/480 (16.9)	116/2572 (4.5)	2.23 (1.49-3.31)
Myalgia	80/647 (12.4)	117/2405 (4.9)	1.36 (0.92-1.99)
Sore throat	86/1163 (7.4)	111/1889 (5.9)	0.79 (0.56-1.12)
Rhinitis	104/1312 (7.9)	93/1740 (5.3)	0.98 (0.69-1.39)
Anosmia	68/193 (35.2)	129/2859 (4.5)	7.78 (5.22-11.53)
Cough	107/1066 (10.0)	90/1986 (4.5)	1.44 (1.00-2.07)
Dyspnea	50/385 (13.0)	147/2667 (5.5)	1.02 (0.66-1.56)
Headache	101/1252 (8.1)	96/1800 (5.3)	0.92 (0.64-1.30)
Diarrhea	46/508 (9.1)	151/2544 (5.9)	0.85 (0.56-1.28)



A, 95% CIs of the odds ratios based on bivariable logistic regression analyses. B, 95% CIs of the odds ratios based on multivariable (with all symptoms included in the model) logistic regression analyses. SARS-CoV-2 indicates severe acute respiratory syndrome coronavirus 2.

[a] Fever could be either subjective or confirmed.

assess symptoms independently associated with seroprevalence, with all symptoms included as covariates (Figure 2). Missing data were excluded. A 2-sided $P < .05$ defined statistical significance. Analyses were performed using RStudio version 0.99.902. This study was approved by the local institutional review board, and written informed consent was obtained.

Results | All 4125 staff were invited and 3056 (74%) participated (306 physicians, 1266 nurses, 292 paramedical staff, 555 technical staff, 445 administrative staff, and 192 others, including students and volunteers). At least one-third of those not tested were individuals not at work during the period. Overall, 197 staff (6.4% [95% CI, 5.5%-7.3%]) had IgG antibodies for SARS-CoV-2. Age and sex were not statistically significantly different among staff with or without antibodies (mean age, 39.5 [SD, 13.1] vs 41.3 [SD, 12.4] years; 38/197 [19%] vs 614/2859 [21%] men). Being involved in clinical care, having worked during the lockdown phase, being involved in care for patients with COVID-19, and exposure to COVID-19-positive coworkers were not statistically significantly associated with seroprevalence (Figure 2A). In contrast, having a household contact with suspected or confirmed COVID-19 was associated with antibody positivity (81/593 [13.7%] with household contacts vs 116/2435 [4.8%] without household exposure; $P < .001$), with an odds ratio of 3.15 (95% CI, 2.33-4.25).

A high proportion of staff mentioned at least 1 prior symptom (2294/3052 [75%]). Of those with antibodies, 30 of 197 (15%) reported no symptoms. Prior anosmia was associated with the presence of antibodies, with an odds ratio of 7.78 (95% CI, 5.22-11.53), as well as fever and cough (Figure 2B).

Discussion | In this hospital-wide screening study for SARS-CoV-2 antibodies among hospital staff, neither being directly involved in clinical care nor working in a COVID-19 unit increased the odds of being seropositive, while having a suspected COVID-19 household contact did. The high availability of PPE, high standards of infection prevention, and polymerase chain reaction screening in symptomatic staff, coupled with contact tracing and quarantine, might explain a relatively low seroprevalence.[3]

Limitations of this study include the single-center design and testing of only 74% of staff. Seroconversion may have been missed if testing was too early, especially without IgM results that might reflect more recent infection than IgG.

Quick screening of large cohorts is important to control the pandemic.[4] Hospital-wide antibody screening for SARS-CoV-2 can help monitor transmission dynamics and evaluate infection control policies.

Deborah Steensels, PharmD, PhD
Els Oris, MD
Laura Coninx, MSc, PhD
Dieter Nuyens, MD, PhD
Marie-Luce Delforge, MD, PhD
Pieter Vermeersch, MD, PhD
Line Heylen, MD, PhD

Author Affiliations: Ziekenhuis Oost-Limburg, Genk, Belgium (Steensels, Oris, Coninx, Nuyens, Heylen); Université Libre de Bruxelles, Brussels, Belgium (Delforge); University Hospitals Leuven, Leuven, Belgium (Vermeersch); Hasselt University, Hasselt, Belgium (Heylen).

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Corresponding Author: Deborah Steensels, PharmD, PhD, Department of Laboratory Medicine, Ziekenhuis Oost-Limburg, Schiepse Bos 6, 3600 Genk, Belgium (deborah.steensels@zol.be).

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Concept and design: Steensels, Oris, Nuyens, Heylen.
Acquisition, analysis, or interpretation of data: Steensels, Oris, Coninx, Delforge, Vermeersch, Heylen.
Drafting of the manuscript: Steensels, Oris, Nuyens, Heylen.
Critical revision of the manuscript for important intellectual content: Oris, Coninx, Delforge, Vermeersch, Heylen.
Statistical analysis: Steensels, Heylen.
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Changes in Hospital-Based Obstetric Services in Rural US Counties, 2014-2018

In 2014, 54% of rural US counties had no hospital-based obstetric services, following a steady decline over the prior decade.[1] Loss of rural maternity care is associated with adverse maternal and infant health outcomes. Rural counties that have lost hospital-based obstetric services experienced higher rates of emergency department births, and in rural counties not adjacent to urban areas, increases in preterm birth, a leading cause of infant mortality.[2]

Risks of infant and maternal mortality are elevated for rural residents,[3,4] highlighting the importance of clinical and policy efforts to ensure rural obstetric care access. The purpose of this study was to describe hospital-based obstetric service losses in rural US counties from 2014 to 2018.

Methods | Data came from the 2014-2018 American Hospital Association (AHA) annual survey, the Centers for Medicare & Medicaid Services' Provider of Services File, and the Area Health Resources File. Consistent with prior research, annual hospital obstetric service status was identified using AHA hospital-reported factors: provision of obstetric services, at least level 1 status for maternity care, at least 1 dedicated obstetric bed, and at least 10 births per year.[1,2] Hospitals were classified as having obstetric services each year if they reported all AHA factors or 1 factor and as having obstetric services in the Provider of Services File; discrepancies were verified via hospital website searches.

Hospitals within rural (nonmetropolitan) counties were placed into 4 categories based on county population (micropolitan, with a town of 10 000-50 000, and noncore, without a town >10 000) and urban adjacency. We categorized county-level obstetric services into 3 groups: (1) no services, (2) continual services, and (3) change in obstetric service availability. This was a descriptive, county-level analysis using SAS version 9.4 (SAS Institute Inc).

Results | This study included 6233 hospitals (2041 rural and 4192 urban hospitals) in all 3145 US counties (1976 rural and 1169 urban counties). Obstetric service losses were concentrated in rural US counties; among urban counties, there was a slight net gain in counties with hospital-based obstetric services. From 2014 to 2018, 53 rural counties (2.7%) lost hospital-based obstetric services, in addition to the 1045 counties (52.9%) that never had obstetric services during the study period (**Table**). Obstetric service losses were most frequent in rural noncore counties (3.5% overall lost services), where the proportion that never had obstetric services throughout 2014 to 2018 was already high (68.7% of counties). These losses in rural noncore counties included 3 counties with hospital closures and 52 counties where hospitals remained open but closed their obstetric units.

From 2014 to 2018, 1.0% (n = 4) of micropolitan urban-adjacent and 1.1% (n = 3) of micropolitan non-urban-adjacent counties lost hospital-based obstetric services, while 2.6% (n = 17) of rural noncore urban-adjacent and 4.3% (n = 29) of rural noncore non-urban-adjacent counties lost services. Changes in the number and proportion of counties with hospital-based obstetric services from 2014 to 2018 indicate the steepest declines among noncore non-urban-adjacent counties and a net gain in services among urban counties (**Figure**).

Discussion | Findings reveal 2 major patterns in hospital-based obstetric care in rural US counties. First, the least populated rural areas adjacent to urban areas (noncore urban-adjacent counties) were least likely to have local obstetric services. Second, the least populated, most remote rural counties (noncore non-urban-adjacent counties) experienced the greatest