Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Detection of SARS-CoV-2 on laboratory paper request forms: a potential source of infection for laboratory personnel

Sir,

We read with interest the letter by Bloise *et al.*, who detected severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) on high-touch surfaces in a microbiology laboratory [1]. The literature has focused on the risks of coronavirus disease 2019 (COVID-19) to front-line healthcare workers (HCWs); however, there has been little investigation of the risks faced by laboratory personnel. The increased diagnostic demand posed by COVID-19 has placed extraordinary pressures on microbiology laboratories. Issues include shortages of technical staff, shortages of consumables, and pressures to maintain turnaround times.

Whilst Bloise *et al.* identified possible environmental sources of infection for laboratory staff, Hasan *et al.* highlighted that paper request forms (PRFs) and other laboratory paperwork could represent sources of infection for laboratory staff [2]. They reported that 80% of PRFs were handled by laboratory staff within 24 h of being handled in clinical areas. SARS-CoV-2 has been found to survive for up to 24 h on cardboard [3], and it is known that SARS-CoV-1 can survive and maintain infectivity for over 60 h on paper at room temperature [4].

To investigate the potential for PRFs and specimen packaging to act as sources of infection for laboratory staff, COVID-19 PRFs and specimen packaging were swabbed for the presence of SARS-CoV-2 at the time of receipt. At the time (late August 2020), Birmingham Public Health Laboratory was processing approximately 700 COVID-19 polymerase chain reaction tests daily, and the positivity rate was approximately 1%. PRFs and specimen packaging were selected at random (opportunistically) and categorized as 'high risk' (from intensive care units/emergency departments and acute medical wards) or 'low risk' (from surgical wards, asymptomatic pre-operative and public health screens). Additionally, the duty virologist's baton bleep and COVID-19 duty 'phone were swabbed daily for 5 consecutive days. World Health Organization protocols were used for sampling [5]. Sterile sponge swabs (15-mm diameter; Malvern Medical Developments, Worcester, UK) were pre-moistened with nuclease-free water, and rubbed gently along high-touch points of the items to be tested. After collection, specimens were frozen at -20°C until magnetic bead extraction (Nonacus Ltd, Birmingham, UK) on an automated MicroStar liquid handling robot (Hamilton, Birmingham, UK). The ViaSure RT-qPCR kit (Certest Biotec, Zaragoza, Spain) was used to test for the presence of detectable viral genomic RNA (targeting *ORF1ab* and *N* genes). Results were processed through the Thermo Scientific analysis cloud (ThermoConnect, Stockdorf, Germany) and analysed with automated baseline and threshold.

Thirty-seven swabs were taken (19 PRFs, eight specimen packages, five from the duty bleep and five from the COVID-19 duty 'phone) (Table I). Of the 37 swabs taken, one was positive for SAR-CoV-2 RNA — a PRF from a low-risk clinical area. This PRF accompanied a negative clinical specimen received in the laboratory within 4 h of the clinical sample being taken on a surgical ward. In common with the detection of SARS-CoV-2 by Bloise *et al.*, amplification of one gene target in an early cycle [cycle threshold (Ct) 27] was observed on the positive PRF. A further three samples (two PRFs and one taken from the duty bleep) were inconclusive, with a satisfactory internal control result but amplification of the *N* gene with Ct values between 28 and 36, suggesting possible low-level contamination with SARS-CoV-2 RNA.

Limitations of this study include the fact that no differentiation was made between infectious and non-infectious virus, and that a small number of samples was investigated. However, despite sampling small numbers of PRFs and specimen packaging, this study found that SARS-CoV-2 RNA could be detected on PRFs. Therefore, PRFs represent an infection risk to laboratory personnel. RNA was not detected conclusively on multi-use fomites (duty bleep and duty 'phone), suggesting

Table I
Results of swabbing for detection of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by polymerase chain reaction

Samples	SARS-CoV-2 detected (%)
PRF/specimen packaging type (*N*)	
High risk (22)	0 (0%)
Low risk (5)	1 (20%)
Fomites (*N* of swabs)	
Duty bleep (5)	0 (0%)
Duty 'phone (5)	0 (0%)

PRF, paper request form

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that adequate cleaning and staff handwashing are taking place. This highlights the need for stringent laboratory practices (i.e. hand hygiene, appropriate personal protective equipment) whilst handling PRFs, and use of electronic test requesting where possible. Given that SARS-CoV-2 was detected on a 'low-risk' PRF and was associated with a negative clinical specimen (indicating that contamination may be occurring as a result of environmental or HCW contamination), it is prudent that all laboratory staff should exercise caution when handling any PRFs.

Conflict of interest statement
GW is the Editor of *IPIP*, a sister journal of *JHI*. The authors declare no conflict of interests.

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