

Title page

Rapid Communication

Rapid assessment of regional SARS-CoV-2 community transmission through a convenience sample of health care workers.

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1 On 27 February 2020, the first case of COVID-19 was diagnosed in the Netherlands [1]. By 6 March
2 the number of cases had increased to 128 [2]. Most of these cases had a travel history to northern
3 Italy or had been in close (household) contact with a laboratory confirmed case. For 15 of the 128
4 cases the source of infection had not been determined. In the province of Noord-Brabant, the source
5 of infection could not be established for 7 of the total of 35 cases in the province while some cases
6 elsewhere in the Netherlands were also linked to Noord-Brabant. Furthermore, in a hospital (Amphia
7 hospital in Breda) that offered low threshold testing for employees with respiratory complaints since
8 2 March 2020, several health care workers (HCW) had tested positive for SARS-CoV-2. On Friday 6
9 March, the Dutch National Outbreak Management Team (OMT) convened to discuss the COVID-19
10 situation in the Netherlands. The OMT decided that an urgent assessment was needed of possible
11 community transmission in the province of Noord-Brabant. The hospitals were asked to offer the
12 screening to HCW and share the results by Monday 9 March to advise governmental decision makers
13 about additional control measures.

14 **Study**

15 It was decided to approach the assessment of possible community transmission in Noord-Brabant
16 through sampling of HCW in hospitals in the province. A focus on HCW would simplify sampling at
17 such short notice of adequate numbers of persons with mild respiratory symptoms (coughing and/or
18 sore throat and/or common cold) without a known epidemiological link for SARS-CoV-2 (travel to
19 high risk areas, close contact with confirmed case). Furthermore, knowledge of the status of SARS-
20 CoV-2 infection among HCW would provide important insight for the participating hospitals in the
21 infection status among their personnel and would inform hospital policies on testing algorithms for
22 their personnel and on infection prevention measures.

23 Seven hospitals in the province of Noord-Brabant were approached Friday afternoon and Saturday
24 morning, 6 and 7 March 2020 with the request to test HCW through Sunday 8 March. Some hospitals
25 indicated that they had already started sampling HCW, as part of their hospital policy. Others had no

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26 such policy but were testing all patients that presented at the emergency ward with respiratory
27 complaints. In addition, two hospitals just outside Noord-Brabant with a large proportion of staff
28 residing in the affected province participated in the assessment (figure). The participating hospitals
29 were asked to offer the screening to HCW and share the results of the testing by 14:00 Monday 9
30 March 2020. Upper respiratory tract specimens (throat and/or nasopharyngeal swab) were
31 collected. Testing was based on an uniform national protocol based on Corman et al., [3] that was
32 rolled out by two central laboratories in the Netherlands. Testing was done either locally or in one
33 of the two central laboratories in the Netherlands. Ethical approval was not required for this study
34 as only anonymous aggregated data were used, and no (medical) interventions were made on
35 human subjects. Sampling of HCW or patients was part of hospital policy.

37 Results

38 In the period 6-8 March 2020, a total of 1097 HCW (range 11-294) in nine hospitals were tested for
39 SARS-CoV-2 of whom 45 (4.1%) were found positive (figure). Six hospitals had positive HCW of which
40 two (Amphia hospital in Breda and Elisabeth-Tweesteden hospital in Tilburg) accounted for 38 of the
41 45 positive HCWs. The percentage positive HCW per hospital varied between 0% and 9.5% with the
42 highest percentages in Amphia hospital (4.2%), Bernhoven hospital in Uden (5.6%) and Elizabeth
43 Tweesteden hospital (9.5%). Additionally, seven hospitals (Amphia, Bernhoven, Jeroen Bosch
44 hospital in 's-Hertogenbosch, Bravis hospital in Roosendaal, Catharina hospital in Eindhoven,
45 Elisabeth Tweesteden, Radboudumc in Nijmegen), had already tested HCW in the period 27
46 February - 6 March 2020. They reported 10 positive HCW among 400 tested (2.5%). The percentage
47 positive HCW per hospital varied between 0% and 5.6% in this period with the highest percentage in
48 Jeroen Bosch hospital.

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49 In total, in the period 27 February-8 March 2020, four of the nine hospitals had tested 786 patients
50 with respiratory complaints of whom 27 (3.4%) were positive. The percentage positive patients
51 varied between 1.1% and 16.2%, with the highest percentage in Bernhoven hospital.

53 **Background and Discussion**

54 Since its first emergence in China in December 2019, a novel human pathogenic coronavirus named
55 SARS-CoV-2 has caused a pandemic affecting 134 countries with a total of 142,539 cases with 5393
56 deaths by 14 March 2020 [4]. SARS-CoV-2 causes a disease named COVID-19 that is characterized by
57 a spectrum of illness ranging from subclinical/mild respiratory disease to severe acute respiratory
58 illness. Fatal outcome was reported in the largest study from China to be 2,3 % [5]. As at 15 March
59 2020, the Netherlands had officially registered 1135 patients with the majority of cases in the south-
60 western part of the country [6]. Currently (15 March 2020), evidence is accumulating for unnoticed
61 community transmission in provinces Noord-Brabant and Limburg with sporadic cases with unknown
62 sources of infection elsewhere in the country.

63 A two day rapid study among nine hospitals with HCW working and/or residing in an area of the
64 Netherlands with suspected community transmission showed that 4.1% of hospital staff with mild
65 respiratory symptoms were infected with SARS-CoV-2. The observed geographic differences in
66 positivity rates among HCW demonstrated focality of SARS-CoV-2 infection with foci in the region
67 Breda-Tilburg and Uden. SARS-CoV-2 infections amongst patients with respiratory complaints were
68 primarily found in the hospital in Uden. Source and contact tracing was started by the regional
69 public health service upon positive testing in the patients.

70 The results of the rapid assessment confirmed the suspicions at the OMT meeting on 6 March 2020
71 that unnoticed community transmission was ongoing in parts of Noord-Brabant. The results directly
72 informed decision making for control measures at the national level (9 March) and subsequently for

73 additional regional measures (10 March). The study supported the implemented mitigation policy
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74 that was advised by the OMT on 6 March in anticipation of the results of the assessment [7]. The
75 additional measures undertaken by regional authorities involved enforcing social distancing by
76 requesting inhabitants of Noord-Brabant to practice self-isolation at home when they developed a
77 cough, symptoms of common cold and/or a fever. Furthermore, a ban of public events involving
78 more than 1000 people was implemented in this province [8]. As the epidemiological situation
79 developed, on 12 March 2020, self-isolation upon mild respiratory symptoms was implemented for
80 the whole country, together with a ban of events with more than 100 people [9]. Tailored advice was
81 issued for the elderly, persons belonging to medical risk groups and for persons involved with their
82 care.

83 Here, we used SARS-CoV-2 infection rates among HCW with mild respiratory complaints without an
84 epidemiological link as a proxy for community transmission. As the study had to be conducted under
85 enormous time constraints (to be started and completed within two days) to be able to rapidly
86 inform urgent decision making, there was no opportunity to roll out a standardized study protocol.
87 Nevertheless, data provided by the WHO-China joint mission on COVID-19, supports our approach.
88 The mission report indicated that there were 2055 laboratory confirmed cases of COVID-2019
89 among HCW from 476 hospitals in China. Close investigation into these cases revealed that most of
90 these could be traced back to exposure in households rather than in a health care setting [10].

91 We interpret the prevalence of 4% among HCW with mild respiratory illness and no epidemiological
92 link as high and of concern. It suggests unnoticed community transmission, with a potential risk of
93 nosocomial transmission. Further evidence for ongoing community transmission is provided by the
94 Nivel Primary Care Database sentinel surveillance for influenza-like illness (ILI) and other acute
95 respiratory infections (ARI) [11]. While this is a small group of about 40 practices covering 0.8% of
96 the Dutch population, by 14 March eight ILI or ARI patients had tested positive, 1/109 (0.9%) with a
97 collection date in week 10 and 7/84 (8.3%) in week 11 so far. The epidemiological situation in the

98 Netherlands, and elsewhere is rapidly developing, and additional measures involving further
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100 References

- 101 1. Coronavirus disease 2019 (COVID-19) Situation Report –39. WHO.
 102 [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=5bbf3e7d_4)
 103 [39-covid-19.pdf?sfvrsn=5bbf3e7d_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=5bbf3e7d_4). Accessed 15-03-2020
- 104 2. Coronavirus disease 2019 (COVID-19) Situation Report –47. WHO.
 105 [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200307-sitrep-](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200307-sitrep-47-covid-19.pdf?sfvrsn=27c364a4_4)
 106 [47-covid-19.pdf?sfvrsn=27c364a4_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200307-sitrep-47-covid-19.pdf?sfvrsn=27c364a4_4). Accessed 15-03-2020
- 107 3. Corman VM, Landt O, Kaiser M, Molenkamp R, ^{(10)(2e)}, Chu DK, Bleicker T, Brünink S,
 108 Schneider J, Schmidt ML, Mulders DG, Haagmans BL, van der Veer B, van den Brink S,
 109 Wijsman L, Goderski G, Romette JL, Ellis J, Zambon M, Peirjs M, Goossens H, Reusken C,
 110 Koopmans MP, Drosten C. Detection of 2019 novel coronavirus (2019-nCoV) by real-time RT-
 111 PCR. Euro Surveill. 2020 Jan;25(3)
- 112 4. Coronavirus disease 2019 (COVID-19) Situation Report –54. WHO.
 113 [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200314-sitrep-](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200314-sitrep-54-covid-19.pdf?sfvrsn=dcd46351_6)
 114 [54-covid-19.pdf?sfvrsn=dcd46351_6](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200314-sitrep-54-covid-19.pdf?sfvrsn=dcd46351_6). Accessed 15-03-2020.
- 115 5. Wu Z and McGoogan JM. Characteristics of and Important Lessons From the Coronavirus
 116 Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the
 117 Chinese Center for Disease Control and Prevention. JAMA. 2020 Feb 24. doi:
 118 10.1001/jama.2020.2648. [Epub ahead of print]
- 119 6. Actuele informatie over het nieuwe coronavirus (COVID-19). RIVM.
 120 <https://www.rivm.nl/nieuws/actuele-informatie-over-coronavirus>. Accessed 15-03-2020
 121 7. COVID-19: Nieuwe aanwijzing voor inwoners Noord-Brabant. RIVM.
 122 <https://www.rivm.nl/nieuws/covid-19-nieuwe-aanwijzing-voor-inwoners-noord-brabant>.
 123 Accessed 15-03-2020.
- 124 8. Resultaat steekproef: 4% ziekenhuismedewerkers heeft coronavirus. RIVM.
 125 [https://www.rivm.nl/nieuws/resultaat-steekproef-4-ziekenhuismedewerkers-heeft-](https://www.rivm.nl/nieuws/resultaat-steekproef-4-ziekenhuismedewerkers-heeft-coronavirus)
 126 [coronavirus](https://www.rivm.nl/nieuws/resultaat-steekproef-4-ziekenhuismedewerkers-heeft-coronavirus). Accessed 15-03-2020
- 127 9. Uitbreiding maatregelen coronavirus. RIVM. [https://www.rivm.nl/nieuws/uitbreiding-](https://www.rivm.nl/nieuws/uitbreiding-maatregelen-coronavirus)
 128 [maatregelen-coronavirus](https://www.rivm.nl/nieuws/uitbreiding-maatregelen-coronavirus). Accessed 15-03-2020.

- 129 10. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19).
1
2
3 130 [19-final-report.pdf](https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-
4
5 131 <a href=). Accessed 15-03-2020
6
7 132 11. Cijfers huisartsen - Aanvullende gegevens uit Peilstations. [zorgregistraties-eerste-lijn/aanvullende-gegevens-uit-peilstations](https://www.nivel.nl/nl/nivel-
8
9 133 <a href=). Accessed 16-03-2020
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15 135 **Figure legend.**
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18 136 Locations of the nine participating hospitals in the south of the Netherlands, with numbers of health
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20 137 care workers (HCW) tested and percentage of HCW with positive test result for SARS-CoV-2. The
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22 138 background incidence of COVID-19 notifications by NUTS 3 region is based upon the national
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24 139 infectious diseases notification system.
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