1   **Title**: Rapid antigen test to identify COVID-19 infected patients with and without symptoms admitted

2   to the Emergency Department.

3   **Introduction**

4   Since the beginning of the SARS-CoV-2 pandemic, the rapid recognition and isolation of infected

5   patients have proven to be crucial factors in limiting the spread of the virus and containing the

6   pandemic [1, 2]. The early and accurate identification of SARS-CoV-2 patients in the emergency

7   department (ED) remains a major challenge [2, 3]. In addition to the confirmation or exclusion of

8   SARS-CoV-2 infection in symptomatic patients, the ED must simultaneously manage a large number

9   of patients with pathological conditions other than COVID-19 [4]. These patients may be

10   asymptomatic carriers of SARS-CoV-2 infection or, if not infected, they should be separated from

11   patients infected with SARS-CoV-2 [5]. The consequences of failing to correctly identify a SARS-

12   CoV-2-infected patient, whether symptomatic or asymptomatic, can be catastrophic [1, 5].

13   Currently, the diagnostic reference standard for the detection of SARS-CoV-2 is the real-time

14   polymerase chain reaction (RT-PCR) test for viral RNA, primarily from orotracheal secretions [6].

15   Although the molecular techniques have progressed in recent months and the overall performance of

16   the RT-PCR test has been improving, there are still some difficulties in its application in the daily

17   routine of EDs [7]. For instance, the test is not immediately available for every patient (few procedural

18   sessions per day). The delay in test results and the lack of dedicated analysers in every ED are just

19   some of the conditions that limit the effectiveness of the RT-PCR test for COVID-19 in the

20   complicated clinical context of the ED [7, 8].

21   The US Food and Drug Administration approved the first COVID-19 antigen test, which is rapid,

22   direct and economical, at the end of August 2020. This test detects specific proteins attached to the

23   surface of SARS-CoV-2 in samples obtained from the upper airways using an immuno-

24   chromatographic procedure [9]. Early laboratory evidence suggested a good correlation between

25   antigen testing and RT-PCR performed on samples with a high viral load [9, 10].

26   A recent systemic review synthesized the evidence on the performance of the antigen test, evaluating

27   943 samples from five different studies. Although the sensitivity is not optimal (average sensitivity

28 56.2%), the specificity above 99% may suggest a preliminary role for rapid antigen tests in a more

29 complete clinical evaluation for the determination of SARS-CoV-2 infection [11]. The results of the

30 studies included in the review, which were largely based on remnant laboratory samples, currently

31 have limited clinical applicability due to the absence of evidence in real clinical contexts (e.g. the ED)

32 and the lack of information about the symptomatic status of the patients, the timing of symptom onset

33 and the time elapsed since possible exposure [11].

34 This study reports the performance of the rapid antigen test in the identification of SARS-CoV-2-

35 infected patients in the clinical context of the ED. Both symptomatic patients suspected of having

36 COVID-19 and asymptomatic patients who needed hospital evaluation for conditions other than

37 COVID-19 were evaluated.

38

39 **Methods**

40 ***Setting and sample***

41 This retrospective observational study was conducted in the ED of the General Hospital of Merano

42 (70,000 visits per year). The study period was from 1 July 2020 to 10 December 2020. This study

43 considers patients with data previously published in the form of a preliminary report [12]. The data

44 reported in this study are the conclusion of the previous report [12].

45 In July a new clinical protocol for the management of patients requiring an ED evaluation was

46 introduced considering the use of rapid antigen tests for the timely identification patients with a

47 SARS-CoV-2 infection.

48 According to the clinical protocol, the rapid antigen test for SARS-CoV-2 was performed at the initial

49 triage and at the same time as the RT-PCR swab for SARS-CoV-2 (with two different swabs) in all the

50 patients reporting: 1) symptoms suspicious for COVID-19 infection (fever, dyspnoea, cough, sore

51 throat, diarrhoea, vomiting, asthenia, myalgias, conjunctivitis and deficits in smell and taste); 2) all

52 patients without COVID-19-like symptoms but with an increased temperature (>37.3°C); and 3) one

53 positive epidemiological criterion, such as i) provenance from areas with a high incidence of SARS-

CoV-2 cases, ii) coming from other European countries (independently if as a tourist or worker), or iii) reporting contacts with a person who tested positive for SARS-CoV-2. In addition, in order to prevent the possible intra-hospital spread of the infection, we included 4) all patients evaluated in the ED for other problems not related to COVID-19 infection and who needed hospitalisation underwent both a rapid antigen test and the RT-PCR swab for SARS-CoV-2. Data from all patients who received a rapid antigen test and at least one RT-PCR swab consecutively in the ED were retrieved from the electronic database and retrospectively evaluated.

The study was conducted in accordance with the local ethical committee (Comitato etico per la sperimentazione clinica, Azienda Sanitaria dell'Alto Adige, Bolzano, Italia, approval number 57-2020) and was conducted according to the Declaration of Helsinki regarding the Ethical Principles for Medical Research Involving Human Subjects.

Identification methods and patients

All of the patients who received a rapid antigen test and at least one RT-PCR swab consecutively in the ED were retrospectively evaluated. The patient extraction procedure was performed as follows: all the electronic ED folders of patients who had performed the rapid antigenic test in the ED (computer registered request) were extracted from the ED computer database using the dedicated management software QlickView (QlikTech, Pennsylvania, PA, US). The files of the patients thus identified were manually re-evaluated by a group of ED physicians and nurses (GTu, AZ, SS, GTe, NP, DA) and only those files in which a rapid antigenic test and an RT-PCR test were registered were considered. If other RT-PCR swabs were performed after the one performed in the ED (up to a maximum of three swabs within 15 days) the results were recorded and considered. No other rapid antigen tests were performed in addition to the one performed in the ED as the test was only available in the ED for initial screening.

The rapid antigen test and the RT-PCR swab for SARS-CoV-2 were performed in the ED by appropriately trained nurses. For each patient, one nurse collected both of the swabs.

80　　Based on the symptomatology presented at ED admission, the patients were divided into two groups:

81　　symptomatic for COVID-19 and asymptomatic for COVID-19.

82　　The rapid antigen test for COVID-19 was performed with the STANDARD Q COVID-19 Ag (R-Ag)

83　　(SD BIOSENSOR, KR), which is a ready-to-use test, according to the manufacturer's instructions. A

84　　control line is included in the test to assess the migration of the sample. Visual interpretation of the

85　　result was performed between 15 and 30 min. The test result was reported for each patient in the

86　　personal triage record. In the case of an invalid test, a second test was performed. RT-PCR was

87　　performed with the laboratory machine GeneXpert DX System (Cepheid, CA, US), the laboratory-

88　　processed swabs were developed with XPRSARS-COV2-10 (Cepheid, CA, US). The system has been

89　　approved by the World Health Organization (WHO), and the development of RT-PCR has been

90　　conducted in accordance with the WHO guidelines. The nasopharyngeal swab is collected and placed

91　　into a transport tube containing 3 mL of saline. The specimen is briefly mixed by rapidly inverting the

92　　collection tube 5 times. Using the supplied transfer pipette, the sample is transferred to the sample

93　　chamber of the Xpert Xpress SARS-CoV-2 cartridge. The GeneXpert cartridge is loaded onto the

94　　GeneXpert DX System platform, which performs hands-off, automated sample processing, and real-

95　　time RT-PCR for detection of viral RNA.

96

97　　*Statistical analysis*

98　　The continuous variables are expressed as median and interquartile range (25th–75th percentile), while

99　　the categorical variables are reported as percentage and total number of events. Comparisons were

100　　made using the Mann–Whitney test, Fisher's exact test or Chi-square test, as appropriate. The

101　　performance of the antigen test was determined by analysing sensitivity, specificity and accuracy

102　　using a 2X2 table with the result of the RT-PCR test, with 95% confidence intervals (95% CI)

103　　reported.

104　　The concordance between the antigen test and the RT-PCR test was evaluated with Cohen's kappa

105　　coefficient. The clinical benefit that may be provided by testing ED patients with antigen tests was

106　　evaluated through decision curve analysis (DCA) [13]. DCA is a new simple statistical method that

107   allows calculating the clinical practicality of predictive models and can lead to clinical considerations

108   for decision-making. DCA is a plot of net clinical benefit (y-axis) against threshold probability (x-

109   axis) [13]. The possible net clinical benefit of performing rapid antigen tests on ED arrival is

110   compared with the two default strategies of "all patients are infected with SARS-CoV-2 " (assuming

111   all patients are positive) and "no patient is infected with SARS-CoV-2" (assuming all patients are

112   negative). A higher net benefit within a wide threshold range than the two standard strategies indicate

113   the model has more potential in clinical application.

114   Statistical analyses were performed with STATA 13.0 software (StataCorp, College Station, TX,

115   USA).

116

117   **Results**

118   During the study period, 3899 patients required an ED evaluation and were tested with both rapid

119   antigen tests and RT-PCR tests (Figure 1). Of these, 30.5% (1191/3899) complained of at least one

120   symptom possibly associated with SARS-CoV-2 infection. According to the RT-PCR results, a

121   positive result for SARS-CoV-2 infection was found in 10.2% (397/3899) of the patients. Among the

122   patients evaluated in the ED for a symptom that could be associated with a SARS-CoV-2 infection

123   (n=1191), 24.7% (294/1191) tested positive for SARS-CoV-2 (86.2% in the ED, 13.8% at 48/72

124   hours, 0% at 14 days), and among asymptomatic patients (n=2708), 3.8% (103/2708) tested positive

125   with the RT-PCR test (95% in the ED, 3.1% at 48/72 hours, 1.9% at 14 days). 0.2% (8/3899) reported

126   an invalid rapid antigen test; all these patients underwent a second rapid antigen test with a valid

127   result. The patients' demographic and clinical characteristics recorded upon ED access are reported in

128   Table 1.

129   **[Figure 1]**

130   **[Table 1]**

131   The antigen test for SARS-CoV-2 was positive in 9.3% (361/3899) of all patients. Among patients

132   with SARS-CoV-2 (n=397), rapid antigen tests were positive in 82.9% (329/397) of cases. Among

133 patients not infected by SARS-CoV-2 (n=3502), a false-positive antigen test occurred in 0.9%

134 (32/3502) of patients.

135 Overall, the sensitivity and specificity of the antigen test for detection of SARS-CoV-2 infection were

136 82.9% (95% CI, 81.0-84.8) and 99.1% (95% CI, 98.8-99.3), respectively (Table 2). The accuracy of

137 the antigen test is 97.4% (95% CI, 97.1-97.6, Cohen's K = 0.854, 95% CI 0.826–0.882, p<0.001)

138 **[Table 2]**

139 *Performance of the SARS-CoV-2 antigen test in symptomatic and asymptomatic patients*

140 The clinical characteristics of the patients evaluated in the ED for COVID-19-like symptoms are

141 reported in Table 3.

142 **[Table 3]**

143 A total of 3.3% (30/906) of patients with a negative result in the antigen test were found to be infected

144 with SARS-CoV-2 via the RT-PCR test, while 7.4% (21/285) of patients with positive antigen test

145 were not to be infected with SARS-CoV-2 in a RT-PCR test.

146 In symptomatic patients, the sensitivity of the antigen test for the detection of SARS-CoV-2 infection

147 was 89.8% (95% CI, 88.0-91.5), specificity was 97.6% (95% CI, 97.1-98.1) and accuracy was 95.7%

148 (95% CI, 95.1-96.3, Cohen's K = 0.884, 95% CI 0.852–0.915, p<0.001).

149 **[Table 4]**

150 Finally, among asymptomatic patients, the sensitivity, specificity and accuracy of the antigen test

151 compared to RT-PCR are 63.1% (95% CI, 58.4-67.8), 99.6% (95% CI, 99.5-99.7) and 98.2% (95% CI,

152 97.9-98.4, Cohen's K = 0.717, 95% CI 0.642–0.793, p<0.001).

153

154 *SARS-CoV-2 antigen test and decision curve analysis*

155 In addition to the assessment of the diagnostic accuracy of the rapid antigen test, a wider evaluation on

156 the possible global clinical benefit from the use of rapid antigen test to identify COVID-19-infected

157 patients in ED was performed through DCA. The DCA plot seems to suggest that the use of rapid

158 antigen tests as an initial screening tool in EDs can provide a non-negligible clinical benefit, especially

159 when considering a population that includes asymptomatic individuals and in which the prevalence of

160 infection appears close to its true prevalence in the general population. The inclusion of rapid antigen

161 tests in ED had a net clinical benefit superior to clinical evaluation alone over a wide range of

162 threshold probabilities. Between a threshold probability of 20% and 30%, the use of rapid antigen tests

163 resulted in a net clinical benefit of between 3% and 5%, suggesting the possibility of detecting up to 5

164 additional true positives per 100 patients admitted in the ED who were not correctly identified by the

165 clinical evaluation alone (Figure 2A). In fact, compared to testing all ED patients immediately with

166 RT-PCR, at low prevalence rates (<20%) of SARS-CoV-2, the preliminary use of the rapid antigen

167 test leads to a net clinical benefit of approximately 8%. The net clinical benefit is gradually reducing

168 as the prevalence increases and at prevalence over 60%, indicating severe levels of infection

169 circulating in the general population, the use of a preliminary screening test may not be a useful

170 strategy. Moreover, clinical suspicion of SARS-CoV-2 infection based on the patients' history and

171 signs and symptoms (clinical evaluation) does not seem to be a useful strategy for discriminating

172 patients infected with SARS-CoV-2 admitted in ED, especially due to asymptomatic patients (Figure

173 2A). For prevalence values around 10%, the implementation of the antigen test strategy leads to the

174 detection of 8 true positives per 100 RT-PCR tests performed. In addition, a hypothetical strategy

175 involving adding the rapid antigen test to the clinical study of the symptomatology presented prior to

176 subjecting all ED patients to the RT-PCR swab could improve by 65 out of 100 RT-PCR tests when

177 the prevalence of SARS-CoV-2 is lower than 10% (Figure 2B).

178 **[Figure 2A-B]**

179

180 **Discussion**

181 Using a large cohort of patients consecutively managed in the ED, the study presents the diagnostic

182 performance of the rapid antigen test compared to the RT-PCR swab when used in a clinical setting to

183 identify SARS-CoV-2-infected patients in both symptomatic and asymptomatic patients managed

184   daily in the ED. The antigen test achieved good specificity and accuracy values, as reported in

185   previous laboratory studies, with a fair sensitivity. The results of the present study confirm the

186   previously published data on a partial cohort of this study, confirming the usefulness of the strategy of

187   performing the antigen test on all patients presenting in the ED, as demonstrated by DCA [12]. Even

188   when considering 489 more patients than in the previously published preliminary report, the

189   performance of the rapid antigen test did not change, demonstrating a clearly superior performance in

190   symptomatic patients compared to asymptomatic patients [12].

191   To the best of our knowledge, this is the study with the largest cohort that has evaluated antigen tests

192   in daily ED clinical practice con una that has considered patients who are symptomatic as well as

193   patients who came to the ED for other reasons and who may be asymptomatic carriers of the virus.

194   Since the hospitalisation of one of these patients (asymptomatic carriers) incorrectly identified as

195   SARS-CoV-2 negative can lead to dramatic consequences, the evaluation of appropriate strategies in

196   order to prevent this is crucial [14, 15].

197   Some of the characteristics of the rapid antigen test described at the time of commercialisation seem to

198   adapt well to the ED scenario [9, 11]. Its simplicity, repeatability, rapidity of execution and, more

199   importantly, immediate results could overcome the limitations presented by the RT-PCR swab,

200   adapting better to the dynamic nature of EDs [9, 10, 11].

201   The first laboratory studies for the validation of the methodology have provided good initial

202   indications for different types of antigen tests. The laboratory comparison with RT-PCR performed on

203   the same microbiological sample revealed a sensitivity of 68%, a specificity of 100% and an accuracy

204   of 72% for the antigen test [16]. Only 31 out of 239 patients were negative in the detection of the viral

205   RNA, indicating a high prevalence of the disease in the limited study cohort [16]. In addition to the

206   high prevalence of infection, the absence of clinical information may limit the application of these

207   results in clinical practice. Similarly, Porte et al., who tested 127 samples and found 82 to be positive

208   by RT-PCR, confirmed a 100% specificity of the antigen test and indicated a sensitivity and accuracy

209   of 93.9% and 96.1%, respectively [10]. Despite the high prevalence of SARS-CoV-2 in the present

210   study, the sensitivity of the antigen test seems to improve as the viral load presented in the samples

211 increases. In the case of reduced prevalence and reduced viral load, the antigen test seems to have a

212 decreased ability to identify patients infected with SARS-CoV-2 [10, 17]. More recently, Cerutti et al.

213 reported the first indications of the antigen test in a group of asymptomatic patients (travellers

214 returning from risk areas) [18]. The sensitivity and specificity of the antigen test in this group of

215 asymptomatic patients were 40% and 100%, respectively, with a RT-PCR swab agreement close to

216 98%, higher than in the symptomatic group [18].

217 An initial systematic review of the performance of the antigen test was conducted in an attempt to

218 provide precise indications that can be applied in clinical practice [11]. By grouping 943 tests from

219 five studies, the sensitivity of the antigen tests was found to be relatively low (56.2%, 95% CI 29.5%–

220 79.8%), but a consistently high level of specificity was observed (mean 99.5%, 95% CI 98.1%–99.9%)

221 [11]. However, the absence of information on patient symptomatology limits the evaluation of the

222 usefulness of the antigen test in clinical practice.

223 The findings of the current study are the first to translate the evidence from previous laboratory studies

224 into clinical practice. Due to the fact that the consequences of a single error in the detection of a

225 SARS-CoV-2-infected patient accessing the hospital can have catastrophic consequences, in daily ED

226 practice, the confirmed high levels of specificity do not seem to be sufficient to compensate for the

227 sub-optimal levels of sensitivity and to provide perfect flow management based only on antigen tests

228 [14, 15, 19]. However, at the indicated levels of prevalence, a positive antigen test in symptomatic

229 patients could allow early and rapid identification of the infection while, in case of a negative antigen

230 test, the maintenance of a high clinical suspicion could guarantee safe management until successive

231 microbiological confirmations. Moreover, in asymptomatic patients, the use of the antigen test, which

232 alone cannot guarantee that all SARS-CoV-2-positive patients are identified, could allow an

233 immediate identification of a portion of patients and thus improve the entire ED decision-making

234 process. The ability of asymptomatic patients to spread the infection is well known [14, 20, 21].

235 Hospitalisation of an undiagnosed asymptomatic patient in a non-COVID-19 department can lead to

236 intra-hospital spread of the virus, affecting patients and healthcare workers [14, 20, 21]. The

237 development of specific strategies for these patients is important. The use of the antigen test in the ED,

238 as suggested by the DCA, provides a net clinical benefit in the process of identifying infected

239   individuals. Although it is still far from the performance of an 'ideal test', the antigen test seems to be

240   a good initial strategy in both symptomatic patients, in whom it is combined with clinical evaluation,

241   and asymptomatic patients, where it can immediately identify a portion of patients who otherwise

242   would not have been rapidly identified.

243   The study presents some limitations. First, there are no quantitative data available about the viral load

244   to confirm a possible condition of reduced viral load in the false-negative antigen tests. Second, there

245   are no analyses available about the risk of viral transmission by patients who received a false-negative

246   antigen test. Third, asymptomatic patients who were discharged after ED evaluation and did not

247   require hospitalisation were not included in the study because they were not subjected to a RT-PCR

248   swab.

249   **Conclusions**

250   Rapid and accurate identification of patients with SARS-CoV-2 infection in the ED is essential to

251   contain the progression of the pandemic and keep the hospital secure. The overall sensitivity,

252   specificity and accuracy of the rapid antigen test were very good, yet with low sensitivity in

253   asymptomatic patients. The assessment of patients admitted to the ED for a SARS-CoV-2 infection

254   during the initial triage via rapid antigen test has an additional clinical benefit. In symptomatic patients

255   arriving in the ED, where the prevalence of SARS-CoV-2 infection is higher, a positive antigen test

256   can accelerate and optimise the management of the infected patient. A negative antigen test in these

257   symptomatic patients should however be followed by RT-PCR testing to confirm the absence of

258   disease. In asymptomatic patients, for whom more secure and precise strategies need to be

259   implemented, an initial antigen test seems to identify patients with SARS-CoV-2 infection who

260   otherwise would not have been rapidly detected. However, a negative rapid antigen test in

261   asymptomatic patients is not sufficient to safely exclude SARS-CoV-2 infection.

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364   asymptomatic transmission of COVID-19 during the incubation period demonstrating strong

365   infectivity in a cluster of youngsters aged 16-23 years outside Wuhan and characteristics of young

366   patients with COVID-19: A prospective contact-tracing study. J Infect. 2020 Jun;80(6):e1-e13. doi:

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385   **Figure 1:** Flow chart of patients enrolled in the study.

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Figure 2: A) Decision curve analysis and its distribution. Grey dashed line: assume no patients have COVID-19. Black line: assume all patients have COVID-19. Grey dash-dotted line: a hypothetical perfect test. Black dashed line: the strategy of discovering COVID-19-infected patients only on the basis of their symptoms. Black dash-dotted line: the strategy of performing antigen tests on patients in the ED. The X-axis indicates the threshold probability for cardiological adverse event and the Y-axis indicates the net benefit. The black line assumes that all the patients would be SARS-CoV-2 infected, while the grey line reflects the assumption that no patients would be SARS-CoV-2 infected. The dashed black line represents the net clinical benefit provided by the clinical evaluation and the grey dashed and dotted line represents the net clinical benefit provided by the introduction of rapid antigen tests in the ED. As demonstrated in the graph, rapid antigen tests achieved greater clinical utility in the threshold probability, indicating that rapid antigen tests may be a valuable tool in identifying SARS-CoV-2 positive patients. B) Decision curve analysis plotting the decrease in RT-PCR swabs due to the clinical evaluation plus the implementation of the antigen test based on the prevalence of SARS-CoV-2 in the population.
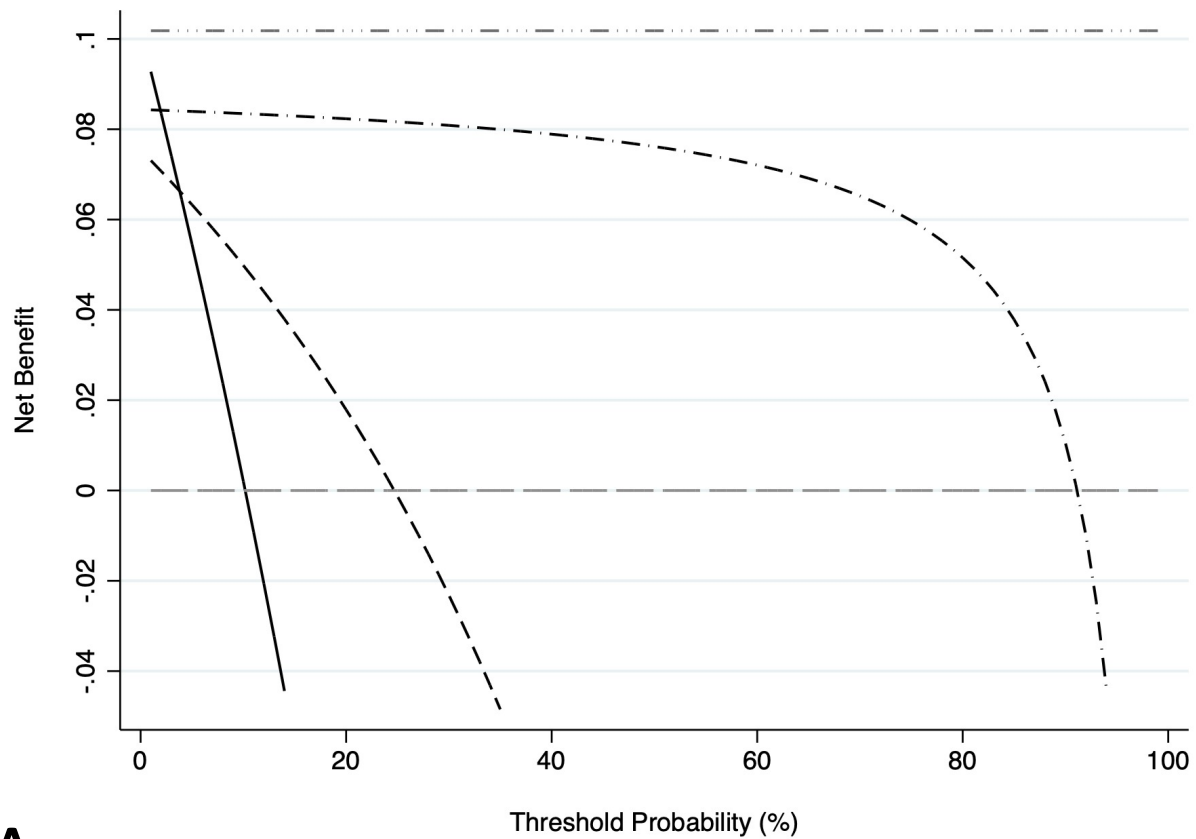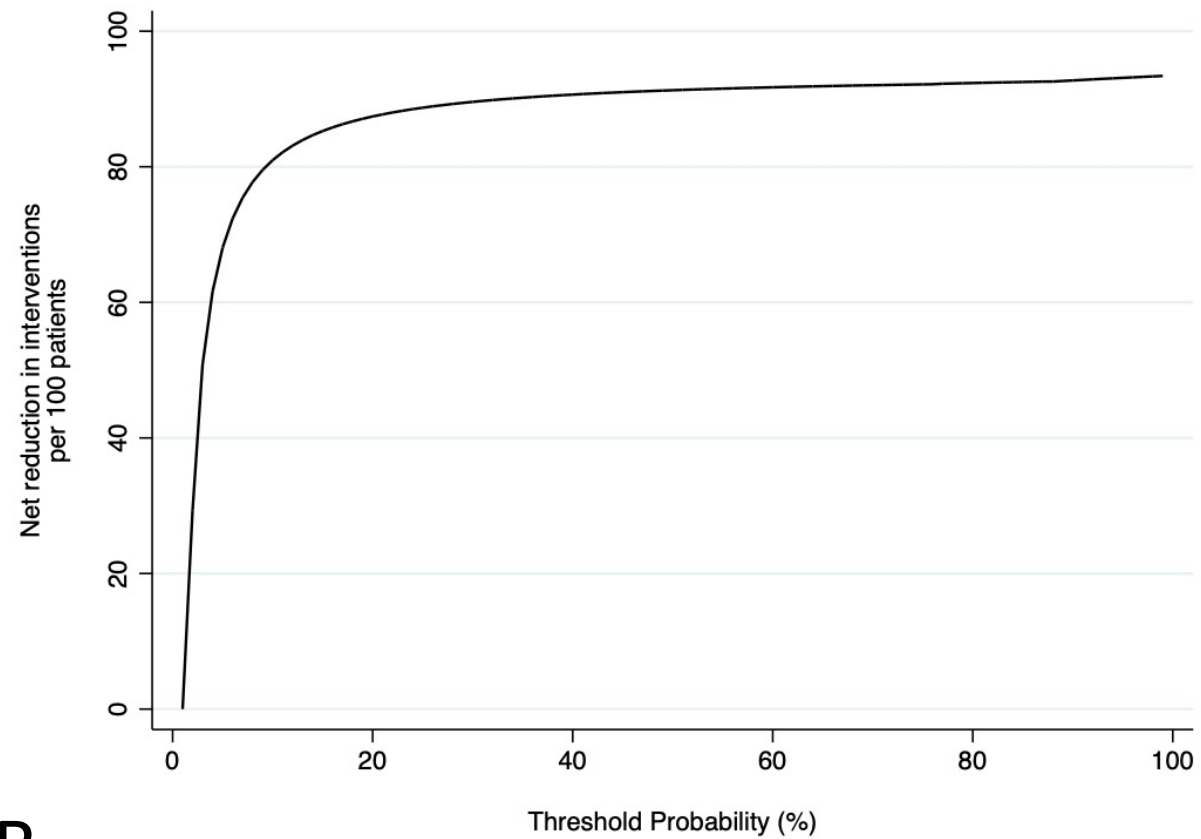
Variable	Global	COVID-19 negative	COVID-19 positive	p
Patients, n (%)	3899 (100)	3502 (89.8)	397 (10.2)	
Sex, n (%)				0.501
Male	1992 (51.1)	1789 (51.1)	212 (53.4)	
Female	1907 (48.9)	1713 (48.9)	185 (46.6)	
Age, years, median (IQR)	69 (49-82)	69 (49-82)	68 (47-81)	0.830
Paediatrics population*, n (%)	91 (2.3)	85 (2.4)	6 (1.5)	0.296
Elderly population$, n (%)	1866 (47.9)	1672 (47.7)	194 (48.9)	0.672
Arrival mode, n (%)				0.005
Walk-in/Private vehicle	1740 (44.6)	1612 (46.0)	128 (32.2)	
Ambulance	1798 (46.1)	1551 (44.3)	247 (62.2)	
Emergency medical service	361 (9.3)	339 (9.7)	22 (5.5)	
Days of the week, n (%)				0.132
During the week	2998 (76.9)	2705 (77.2)	293 (73.8)	
Weekend	901 (23.1)	797 (22.8)	104 (26.2)	
Access during night (20.00-08.00), n (%)	789 (20.2)	718 (20.5)	71 (17.9)	0.236
Tourist, n (%)	235 (6.0)	227 (6.0)	8 (2.0)	<0.001
Triage code, n (%)				0.016
Blue and Green	1666 (42.7)	1469 (41.9)	197 (49.6)	
Yellow	1501 (38.5)	1369 (39.1)	132 (33.2)	
Orange and Red	732 (18.8)	664 (19.0)	68 (17.1)	
COVID-19 symptoms	1191 (30.5)	897 (25.6)	294 (74.1)	<0.001
Area of treatment, n (%)				<0.001
Surgical area	1032 (26.5)	985 (28.1)	47 (11.8)	
Internal medicine area	2279 (58.5)	1945 (55.5)	334 (84.1)	
Gynaecological area	189 (4.8)	182 (5.2)	7 (1.8)	
Trauma area	399 (10.2)	390 (11.1)	9 (2.3)	
Rapid antigen test for COVID-19, n (%)				<0.001
Negative antigen test	3538 (90.7)	3470 (99.1)	68 (17.1)	
Positive antigen test	361 (9.3)	32 (0.9)	329 (82.9)	

Table 1: Demographic and baseline characteristics of all enrolled patients, divided according to RT-PCR

result for SARS-CoV-2. * =less than 14 years; $=over than 65 years.

Global population (n=3899)	Patients COVID-19 non-infected	Patients COVID-19 infected
Negative antigen test for COVID-19	3,470	68
Positive antigen test for COVID-19	32	329
Sensitivity	82.9% (81.0-84.8)	
Specificity	99.1% (98.8-99.3)	
Positive predictive value	91.1% (89.7-92.5)	
Negative predictive value	98.1% (97.8-98.3)	
Accuracy (correctly classified)	97.4% (97.1-97.6)	

Table 2: One 2 × 2 contingency table on rapid antigen test performance in the assessment of patients with COVID-19 among all patients.

Variable	Negative antigen test for COVID-19	Positive antigen test for COVID-19	p
Patients, n (%)	906 (76.1)	285 (23.9)	
SARS-CoV-2 positive	30 (3.3)	264 (92.6)	<0.001
Age, years, median (IQR)	75 (58-84)	68 (50-8)	0.002
Sex, n (%)			0.556
Male	486 (53.7)	161 (56.4)	
Female	420 (46.3)	124 (43.6)	
COVID-19 symptoms, n (%)			
Fever or history of fever	451 (52.7)	148 (53.2)	0.890
Cough	112 (13.2)	84 (30.2)	<0.001
Dyspnoea	327 (38.2)	114 (41.2)	0.395
Gastroenterological	204 (23.8)	61 (21.9)	0.568
Other symptoms	369 (43.2)	137 (49.5)	0.071
Time of onset of symptoms, days, median (IQR)	2 (1-3)	2 (2-4)	<0.001
Comorbidity, n (%)	415 (48.5)	91 (33.0)	<0.001

Table 3: Demographic and baseline characteristics of the patients evaluated in the ED for symptoms suspicious for SARS-CoV-2.

Only considering symptomatic patients for COVID-19		
	Patients COVID-19 non-infected	**Patients COVID-19 infected**
Negative antigen test for COVID-19	876	30
Positive antigen test for COVID-19	21	264
Sensitivity	89.8% (88.0-91.5)	
Specificity	97.6% (97.1-98.1)	
Positive predictive value	92.6% (91.0-94.1)	
Negative predictive value	96.7% (96.0-97.2)	
Accuracy (correctly classified)	95.7% (95.1-96.3)	
Only considering asymptomatic patients for COVID-19		
	Patients COVID-19 non-infected	**Patients COVID-19 infected**
Negative antigen test for COVID-19	2,594	38
Positive antigen test for COVID-19	11	65
Sensitivity	63.1% (58.4-67.8)	
Specificity	99.6% (99.5-99.7)	
Positive predictive value	85.5% (81.5-89.5)	
Negative predictive value	98.5% (98.3-98.7)	
Accuracy (correctly classified)	98.2% (97.9-98.4)	

Table 4: Two 2 × 2 contingency tables on antigen rapid test performance in the assessment of patients with COVID-19. The first table focuses on the rapid antigen test among symptomatic patients for SARS-CoV-2 and the table below focuses on the rapid antigen test among asymptomatic patients for SARS-CoV-2.