Modelling of hypothetical SARS-CoV-2 point-of-care tests on admission to hospital from A&E: rapid cost-effectiveness analysis

Matt Stevenson,1* Andrew Metry1 and Michael Messenger2,3

1School of Health and Related Research (ScHARR), University of Sheffield, Sheffield, UK
2Leeds Institute of Health Sciences, University of Leeds, Leeds, UK
3NIHR Leeds Medtech and In Vitro Diagnostics Co-operative, Leeds, UK

*Corresponding author m.d.stevenson@sheffield.ac.uk

Declared competing interests of authors: Matt Stevenson reports that he is part of a team that has received funding from Roche Diagnostics (Basel, Switzerland) in the area of biomarkers following head trauma. Michael Messenger reports that he has been a paid expert advisor to Cepheid, Inc. (Sunnyvale, CA, USA) on the development of their cancer test portfolio; he is a partner of Roche Diagnostics, with current collaborations in the field of early cancer detection and diagnosis; he is a partner of SomaLogic, Inc. (Boulder, CO, USA), with current collaborations in the field of personalised health management of pre-diabetes; that he has received in-kind co-funding from Abbott Laboratories (Chicago, IL, USA) on a kidney research project; that Siemens Healthineers (Erlangen, Germany) holds the pathology contract for Leeds Teaching Hospitals NHS Trust where he holds an honorary contract of employment; and that Avacta Life Sciences Limited (Wetherby, UK) is a spin-out company of the University of Leeds. All of these companies listed are working in the field of COVID-19 diagnostics. Furthermore, Michael Messenger is, or has been, a paid expert advisor to the European Union, including for COVID-19 therapeutics and diagnostics, a seconded scientific advisor to the UK Department of Health and Social Care to support the COVID-19 testing programme and a member of the UK Government Scientific Advisory Group for Testing.

Published March 2021
DOI: 10.3310/hta25210

Plain English summary

SARS-CoV-2 POCTs on admission to A&E
Health Technology Assessment 2021; Vol. 25: No. 21
DOI: 10.3310/hta25210

NIHR Journals Library www.journalslibrary.nihr.ac.uk
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019 (COVID-19). SARS-CoV-2 is highly infectious, and this can cause problems in hospitals, where the virus can spread quickly. Laboratory-based tests can determine whether or not a patient has SARS-CoV-2, but these tests are not perfect and can require a considerable time to provide a result. Point-of-care tests to detect SARS-CoV-2 are being developed that may have much shorter times to a test result, although these are likely to be less accurate than laboratory-based tests. The benefit of quicker tests is that a decision to put a patient in a SARS-CoV-2-infected bay or in a non-SARS-CoV-2-infected bay can be made sooner, limiting contact between patients with SARS-CoV-2 and patients without SARS-CoV-2 and reducing the risk of infection transmission. The disadvantage of reduced accuracy is that some patients may be allocated to the wrong bay, increasing the risk of SARS-CoV-2 infection.

A computer model was built to explore the impact of using SARS-CoV-2 point-of-care tests for people admitted to hospital. This model estimated the number of infections and deaths due to COVID-19, the costs of testing, and the number of people waiting to be put in an appropriate bay. Strategies were run using different values, including the time to get a test result, the accuracy of tests and whether or not staff who do not have symptoms should be tested. The results of the model indicated that point-of-care tests could be good if there was a large reduction in the time to get a test result and if accuracy was high. However, it is not certain whether or not such tests will become available. When newer SARS-CoV-2 tests are available, the model will allow an estimate of the clinical effectiveness and cost-effectiveness of the test to be made.
Criteria for inclusion in the Health Technology Assessment journal

Reports are published in Health Technology Assessment (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in Health Technology Assessment are termed ‘systematic’ when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

Health Technology Assessment (HTA) research is undertaken where some evidence already exists to show that a technology can be effective and this needs to be compared to the current standard intervention to see which works best. Research can evaluate any intervention used in the treatment, prevention or diagnosis of disease, provided the study outcomes lead to findings that have the potential to be of direct benefit to NHS patients. Technologies in this context mean any method used to promote health; prevent and treat disease; and improve rehabilitation or long-term care. They are not confined to new drugs and include any intervention used in the treatment, prevention or diagnosis of disease.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

This report

The research reported in this issue of the journal was commissioned and funded by the HTA programme on behalf of NICE as project number NIHR132154. The protocol was agreed in August 2020. The assessment report began editorial review in October 2020 and was accepted for publication in January 2021. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. This report has been published following a shortened production process and, therefore, did not undergo the usual number of proof stages and opportunities for correction. The HTA editors and publisher have tried to ensure the accuracy of the authors’ report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health and Social Care.

Copyright © 2021 Stevenson et al. This work was produced by Stevenson et al. under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This is an Open Access publication distributed under the terms of the Creative Commons Attribution CC BY 4.0 licence, which permits unrestricted use, distribution, reproduction and adaption in any medium and for any purpose provided that it is properly attributed. See: https://creativecommons.org/licenses/by/4.0/. For attribution the title, original author(s), the publication source – NIHR Journals Library, and the DOI of the publication must be cited.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).
NIHR Journals Library Editor-in-Chief

**Professor Ken Stein**  Professor of Public Health, University of Exeter Medical School, UK

NIHR Journals Library Editors

**Professor John Powell**  Chair of HTA and EME Editorial Board and Editor-in-Chief of HTA and EME journals. Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK, and Professor of Digital Health Care, Nuffield Department of Primary Care Health Sciences, University of Oxford, UK

**Professor Andrée Le May**  Chair of NIHR Journals Library Editorial Group (HS&DR, PGfAR, PHR journals) and Editor-in-Chief of HS&DR, PGfAR, PHR journals

**Professor Matthias Beck**  Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

**Dr Tessa Crilly**  Director, Crystal Blue Consulting Ltd, UK

**Dr Eugenia Cronin**  Senior Scientific Advisor, Wessex Institute, UK

**Dr Peter Davidson**  Consultant Advisor, Wessex Institute, University of Southampton, UK

**Ms Tara Lamont**  Senior Scientific Adviser (Evidence Use), Wessex Institute, University of Southampton, UK

**Dr Catriona McDaid**  Senior Research Fellow, York Trials Unit, Department of Health Sciences, University of York, UK

**Professor William McGuire**  Professor of Child Health, Hull York Medical School, University of York, UK

**Professor Geoffrey Meads**  Emeritus Professor of Wellbeing Research, University of Winchester, UK

**Professor James Raftery**  Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

**Dr Rob Riemsma**  Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

**Professor Helen Roberts**  Professor of Child Health Research, UCL Great Ormond Street Institute of Child Health, UK

**Professor Jonathan Ross**  Professor of Sexual Health and HIV, University Hospital Birmingham, UK

**Professor Helen Snooks**  Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

**Professor Ken Stein**  Professor of Public Health, University of Exeter Medical School, UK

**Professor Jim Thornton**  Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

Please visit the website for a list of editors: www.journalslibrary.nihr.ac.uk/about/editors

**Editorial contact:** journals.library@nihr.ac.uk