



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.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

sample size of 100. Consequently, by substantially improving cost-effectiveness, this strategy enables and provides the necessary sustainability for large scale HCV testing, including universal or age-based screening.

In summary, the strategy of pooling samples for the diagnosis of active HCV infection has numerous advantages that can be implemented and scaled up with the aim of eliminating HCV as a public health threat by 2030.

FG has received grants or contracts from ViiV Healthcare, Merck, Gilead, AbbVie, Seegene, Roche, and Werfen; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, educational events, support for attending meetings, and travel grants from ViiV Healthcare, Roche, Merck, Gilead, AbbVie, Qiagen, Hologic, Seegene, and Werfen. All other authors declare no competing interests.

Antonio Aguilera, Sara Pereira,
Ana Fuentes, Adolfo de Salazar,
Rocío Trastoy, Daniel Navarro,
Camila A Picchio, Jeffrey V Lazarus,
*Federico García
fegarcia@ugr.es

Servicio de Microbiología, Complejo Hospitalario Universitario de Santiago, Santiago de Compostela, Spain (AA, SP, RT, DN); Departamento de Microbiología, Universidade de Santiago de Compostela, Santiago de Compostela, Spain (AA); Instituto de Investigación Sanitaria de Santiago, Santiago de Compostela, Spain (AA); Servicio de Microbiología, Hospital Universitario Clínico San Cecilio, Granada, Spain (AF, AdS, FG); Barcelona Institute for Global Health, Hospital Clínic, University of Barcelona, Barcelona, Spain (CAP, JVL); Instituto de Investigación Biosanitaria, Granada, Spain (FG)

- 1 Roth WK, Busch MP, Schuller A, et al. International survey on NAT testing of blood donations: expanding implementation and yield from 1999 to 2009. *Vox Sang* 2012; **102**: 82–90.
- 2 Dorfman R. The detection of defective numbers of large populations. *Ann Math Stat* 1943; **14**: 436–40.
- 3 de Salazar A, Aguilera A, Trastoy R, et al. Sample pooling for SARS-CoV-2 RT-PCR screening. *Clin Microbiol Infect* 2020; **26**: 1687.e1–5.
- 4 Ministerio de Sanidad, Consumo y Bienestar Social. Prevalencia de la infección por hepatitis C en población general en España; 2017–18. Resultados del 2º Estudio de Seroprevalencia en España (2017–18). 2019. https://www.mscbs.gob.es/ciudadanos/enfLesiones/enfTransmisibles/sida/docs/INFORME_INFECION_VHC_ESPANA2019.pdf (accessed March 21, 2021).
- 5 Aguilera A, Alados JC, Alonso R, Eiros JM, García F. Current position of viral load versus hepatitis C core antigen testing. *Enferm Infecc Microbiol Clin (Engl Ed)* 2020; **38** (suppl 1): 12–18.

Management of gastrointestinal services in Tamil Nadu, India, during COVID-19

In India, during the first wave of the COVID-19 pandemic, the state of Tamil Nadu become a COVID-19 hotspot between April and September, 2020, with peak infection rates in July, 2020.¹

Each year, the department of gastroenterology and hepatology at Kovai Medical Center and Hospital, Coimbatore, Tamil Nadu, treats 16 000 outpatients, admits 1600 inpatients, and carries out 3500–4000 endoscopies. Initial data showed that the case fatality rate due to COVID-19 in India² was about 3%. Our audit data showed that inpatient mortality from gastrointestinal conditions was more than 4%. Gastrointestinal cancers represent 20% of all cancers in India, and nearly one in five require immediate surgery.³ As a result, and because the majority of our population had travelled (from nearby districts without public transport) after lockdown on March 24, 2020, the decision was taken to restart gastrointestinal services on April 15, 2020. We began by implementing the Asian Pacific Society for Digestive Endoscopy (APSDE) COVID-19 guidance⁴ for screening (fever, travel history, occupation, cluster, close contact, evaluate for dyspnoea), with appropriate levels of personal protective equipment for the entire department (appendix p 5). An endoscopy was done only if essential and appointments for older patients and those in shielding were offered only if mandatory or an emergency. Since it was not practical to create negative pressure rooms, we took the pragmatic decision to ventilate endoscopy suites and outpatient rooms with air from the outside⁵ to reduce indoor airborne transmission of COVID-19.

We analysed outcomes at our centre from April 1 to Sept 30, 2020, and compared these with data from the

same period in 2019 (appendix pp 1–2). Patients were contacted by telephone 2 weeks after endoscopy and contact with inpatient gastrointestinal services during July, 2020, to enquire about any COVID-19 symptoms, and data on symptoms among health-care workers within the gastrointestinal services were collected weekly from April to September, 2020.

The number of endoscopies done in 2020 was 23.7% lower than in 2019 (1427 vs 1871; appendix pp 3, 6). In terms of procedure mix, there was a slight drop in the percentage of oesophagogastroduodenoscopies and sigmoidoscopies done in 2020 versus 2019, but the proportion of all other endoscopy procedures increased in 2020 compared with 2019 (appendix p 3). The proportion of endoscopies that resulted in a diagnosis of malignancy or inflammatory bowel disease increased significantly in 2020 versus 2019, and fewer endoscopies found no abnormalities (appendix p 3). Our therapeutic endoscopy volume increased significantly in 2020 compared with 2019 (appendix p 3).

Inpatient volume was 14.4% lower in 2020 than in 2019 (681 vs 796 patients) but the percentage volume of work was similar across all diagnoses except for increased upper gastrointestinal bleeds in 2020 (appendix pp 3, 6). Mortality was higher in 2020 than in 2019, but this difference was not statistically significant (appendix p 3). There was also a slight, non-significant increase in the mean duration of stay in hospital in 2020 versus 2019 (appendix p 3). Workload at our centre appeared to vary on the basis of COVID-19 positivity in the community, with patients seeking services only when needed (appendix p 6).

Of 195 patients who completed telephone follow-up following endoscopy in July, 2020, one (0.5%) reported developing COVID-19 symptoms after visiting the hospital in July, 2020, 13 days after endoscopy.



Published Online
June 2, 2021
[https://doi.org/10.1016/S2468-1253\(21\)00193-X](https://doi.org/10.1016/S2468-1253(21)00193-X)

See Online for appendix

No inpatients or health-care workers developed COVID-19 symptoms (appendix p 4).

The main limitation of our study is that we did not screen our patients and staff for SARS-CoV-2 with RT-PCR; nonetheless, close monitoring of both patients and staff suggest that the small risk of SARS-CoV-2 infection observed during the first wave of the pandemic should give confidence to patients and health-care providers that the benefits of endoscopy outweigh the risks of nosocomial transmission of SARS-CoV-2. Notably, 32 patients had a CO-RADS (COVID-19 Reporting and Data System) score of 3 or more on chest CT (done for other reasons in outpatient and for screening in emergencies), of whom more than half were subsequently confirmed to have SARS-CoV-2 infection by RT-PCR (appendix p 4). These patients were otherwise asymptomatic, suggesting that no screening strategy is foolproof. However, the transmission risk from an asymptomatic patient is lower than that from a symptomatic one,⁶ underlining the importance of symptom screening. Patients undergoing endoscopy without RT-PCR testing might inadvertently be positive for SARS-CoV-2; however, strict disinfection of endoscopes used in patients positive for SARS-CoV-2 has been shown to result in SARS-CoV-2 being undetectable on the devices,⁷ suggesting that the risk of spread via endoscopy is extremely low.

The infection control measures that were established during the first wave of COVID-19 (appendix p 5), together with complete staff vaccination, are helping us to dynamically manage services during the ongoing second wave of the pandemic in India—ie, service delivery is inversely proportional

to infection rates in the community, with continuation of essential endoscopies but deferral of elective procedures without red flags. We have also introduced RT-PCR testing for SARS-CoV-2 before long duration endoscopies, screening all patients admitted to hospital with RT-PCR testing, and demarcation of hospital zones (red for RT-PCR-positive patients, amber for those who have been tested and are awaiting results of RT-PCR, and green for those who are RT-PCR negative).

Our findings seem to justify our mitigation strategies to ensure the continuation of gastrointestinal services. Transmission dynamics are different between India and western countries,⁸ and our strategy might well be applicable to countries with a pandemic profile similar to that of India. We feel that a cautious approach, with meticulous screening and infection control measures, is key to mitigate the unprecedented impact of the pandemic on gastrointestinal services without risking the health of health-care workers.

We declare no competing interests. AR and AS contributed equally. We thank Nalla G Palanisami, Arun N Palanisami, and other trustees of the Kovai Medical Center and Hospital for their continuous support. We thank Anjali Benchy for help in data collection and the gastroenterology team and the staff of the Kovai Medical Center and Hospital for adapting to the protocol changes.

*Arulraj Ramakrishnan,
Aravindh Somasundaram,
Nandhakumar Srinivasan,
Sibithooran Karmegan, Sneha Madav,
Krishnaveni Ramasamy,
Nagaselvapandi Balasubramani,
Sivakumar Venkatachalam,
Jeevithan Shanmugam,
Paari Vijayaragavan,
Ramesh Arasaradnam
arulraas@yahoo.com

KMCH Research Foundation, Kovai Medical Center and Hospital Campus, Coimbatore, Tamil Nadu, India (AR); Liver Unit (AR, AS, SK, SM, KR, NB, PV), Department of Internal Medicine (NS), Department of Information and Technology (SV), Kovai Medical Center and Hospital, Coimbatore, Tamil Nadu, India; Department of Community Medicine, KMCH Institute of Health Sciences and Research, Coimbatore, Tamil Nadu, India (JS); Department of Gastroenterology, University Hospitals Coventry and Warwickshire NHS Trust, Coventry, UK (RA)

- 1 The Hindu. Coronavirus: Tamil Nadu carries out 1 crore RT-PCR tests for COVID-19. Nov 2, 2020. <https://www.thehindu.com/news/national/tamil-nadu/coronavirus-tamil-nadu-carries-out-1-crore-rt-pcr-tests-for-covid-19/article32999572.ece2020> (accessed May 24, 2021).
- 2 Aggarwal DK. World covid meter. May 1, 2020. <http://www.emedinexus.com/post/17753/> (accessed Jan 23, 2021).
- 3 India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Oncol* 2018; **19**: 1289–306.
- 4 Chiu PWY, Ng SC, Inoue H, et al. Practice of endoscopy during COVID-19 pandemic: position statements of the Asian Pacific Society for Digestive Endoscopy (APSDE-COVID statements). *Gut* 2020; **69**: 991–96.
- 5 Repici A, Maselli R, Colombo M, et al. Coronavirus (COVID-19) outbreak: what the department of endoscopy should know. *Gastrointest Endosc* 2020; **92**: 192–97.
- 6 Meyerowitz EA, Richterman A, Gandhi RT, Sax PE. Transmission of SARS-CoV-2: a review of viral, host, and environmental factors. *Ann Intern Med* 2021; **174**: 69–79.
- 7 Boskoski I, Di Gemma A, Matteo MV, Grilli F, Cattani P, Costamagna G. Endoscopes used in positive and critically ill patients are SARS-CoV-2 negative at virological assessment. *Gut* 2021; published Jan 6. <https://doi.org/10.1136/gutjnl-2020-323577>.
- 8 Laxminarayan R, Wahl B, Dudala SR, et al. Epidemiology and transmission dynamics of COVID-19 in two Indian states. *Science* 2020; **370**: 691–97.