Contents

Editorial
247 Innovation will help us leave a positive health legacy from COVID-19
A McKimm

Innovations during COVID
249 One nudge for hand hygiene
D A Redelman, R H Thaler

253 Use of symptom checkers for COVID-19-related symptoms among university students: a qualitative study
S Aboueid, S B Meyer, J R Wallace, S Mahajan, T Nur, A Chaurasia

261 Deep learning model to predict the need for mechanical ventilation using chest X-ray images in hospitalised patients with COVID-19
A R Kulkarni, A M Athavale, A Sahni, S Sukhal, A Saini, M Itteer, S Zhukovsky, J Vernik, M Abraham, A Joshi, A Amarath, J Ruiz, P D Hare, H Kulkarni

271 Rapid implementation of Inpatient eConsult Programme addresses new challenges for patient care during COVID-19 pandemic
S Rikin, E J Epstein, J Gendina

278 Population eye health education using augmented reality and virtual reality: scalable tools during and beyond COVID-19
D V Gunasekaran, R Lown, R Gunasekaran, B Chan, H Y Ong, D Raji, H Mi, C Pavesio, Q D Nguyen, R Agrawal

284 Virtual hackathon to tackle COVID-19 unmet needs
W S Bolton, S Ng, A Lam, J Kinch, V Parchment, W P Foster, M R Zimmermann, J Q Teh, A Simpson, K Sharma, R Kerstein, J Burke, S J Chapman, P R Culm, D G Jayne, on behalf of the MedTech Foundation

288 Ingenuity during the COVID-19 pandemic: a controlled experiment for respirator mask efficacy testing
M Haasman, D Rybalke, P Nasser, D Lauder, D Charen, E Ferreri, J Iatridis, L Galatz

292 Negative pressure patient isolation device to enable non-invasive respiratory support for COVID-19 and beyond
A August, M Bolhouse, B Rice, J K Wall

297 Feasibility of manual ventilation replacing mechanical ventilation
M F Brady, N K Weber, R Walker, Ill, J E Holley, S A Ni, S Young, E D Monhollon, R S Carpenter, J W Tsao

302 Zero cost approach to fostering multidisciplinary engagement and innovation in an academic medical centre during COVID-19: experience from the Jugaar Innovation Challenge
R Ahmed, K Dayani, H A Amir, A Misra

308 Modified full-face snorkel mask: answer to the PPE crisis?
H D Measuria, Y V Verma, R Kerstein, S Tucker

311 Remote multidisciplinary heart team meetings in immersive virtual reality: a first experience during the COVID-19 pandemic

316 Enabling patient communication for hospitalised patients during and beyond the COVID-19 pandemic
S Ganesan, E Hsiang, T Peng, N Thomas, J Garcia-Grossman, K Javaherian, Z Lyon, A Vidyarthi
321 Exploring the challenges and hidden opportunities of hosting a virtual innovation competition in the time of COVID-19
M El Akoum, M El Achi

327 Epidemiological impact of prioritising SARS-CoV-2 vaccination by antibody status: mathematical modelling analyses

337 The way forward after COVID-19 vaccination: vaccine passports with blockchain to protect personal privacy
K K F Tsok, J Y Sung, H W Y Lee, K K L Yu, H Fung, S Y S Wong

342 Telemonitoring programme on COVID-19 for a low-income community in Brazil: case study
T U d S Graça, A L Santos, G Yamanoto, R W de Souza, M P P Srougê, R L Pacheco, C Lima, R Riera

347 'Fighting a Global War Using a Local Strategy': contextualism in COVID-19 response in Africa
C L Ochu, O W Akenade, O Oyetan, O Ademola, O Ogundibe, R Atteh, T Obwor, E Ogianao, T Ojumu, C Ofoegbunam, B Ehrhadaghe, G Joseph, P Ibeoke, C Ikekeazu

356 End-to-end convolutional neural network enables COVID-19 detection from breath and cough audio: a pilot study
H Coppock, A Gaskell, P Tzirakis, A Baird, L Jones, B Schuller

363 MyCOVIDRisk app: development and utilisation of a COVID-19 risk assessment and mitigation application
E M Goldberg, C S Bingaman, S Perera, M L Ranney

368 Contact-tracing applications: a review of technologies
M Nazayer, S Madanian, F Mirza

379 Extending tubing to place intravenous smart pumps outside of patient rooms during COVID-19: an innovation that increases medication dead volume and risk to patients
J W C Blake, K K Giuliani, R D Butterfield, T Vanderveen, N M Sims

387 Applications and challenges of AI-based algorithms in the COVID-19 pandemic
D Khemasuwan, H G Colt

Medical devices
399 Using human-centred design to develop an innovative female condom
P S Coffey, M Kilbourne-Bookey

407 Driving medtech innovation and start-up company formation through successful joint academic/commercial fellowship
F Sharif, I Quinn

Health technology assessment
414 Machine-learning-based hospital discharge predictions can support multidisciplinary rounds and decrease hospital length-of-stay
S Levin, S Barnes, M Toepfer, A Debain, A DeAngelo, E Hamrock, J Hineson, E Hoyer, T Dunganarsi, E Howell

Assistive technologies
422 Google translate in healthcare: preliminary evaluation of transcription, translation and speech synthesis accuracy
J Birkenbeuel, H Joyce, R Sahyouni, D Cheung, M Maducdoc, N Mostagmi, S Sahyouni, H Djallitan, J Chen, H Lin

Early-stage innovation reports
430 Design and user experience of Noxeno: a novel nasal foreign body removal device
A Chandran, K Sileka, B Jat, P Kadambo, R D’Souza, R Kumar, A Thakar, S Sharma

434 Single-unit, wireless device for salivary stimulation
Rajkumar K, Ramya R, Swarnalakshmi R

441 Development of a practical training method for a healthcare artificial intelligence (AI) chatbot

445 Use of a smart lip holder for minimally invasive minor salivary gland biopsy
A Dumuss, B Bannier, P Kellen, J Alvarez-Tromp, T Hugle
448  Pain alleviation during cryotherapy of plantar viral warts using a non-invasive vibratory device: a randomised individually controlled trial
Y P Koh, M M Chan, X Zhao, L Tan, H L Tey

452  Evaluating simple, affordable technology for ophthalmic diagnoses in rural Malawi: a potential tool to address skill shortage
A Noar, H Jeffery, J Hoffman

456  Assessing baseline practice and the implementation and efficacy of a novel device for medication security
H Young, M Z A Mariyaselvam, V Patel, J Gibson, E Hodges, N English, R Heij, G Wijewardena, D Pearson, M Blunt, P Young

463  Purpose-built, head-mounted 3D display for ophthalmic microsurgery: surgical skill performance and evaluation: a pilot study
E Korot, M M Rolain, A Evans, A Thanos, C Bergeles, E H Wood, M A Rolain

470  New technique and device for controlled and continuous drug delivery into the brain: a proof-of-concept study
Anoop U R, K Verma

478  Simple working sheath for lumbar and lumbosacral spine: technical note
D K Jha, J S Gosal, J Ruparel, N Kumar, T Sharma, P K Bhattacharya, P Khera

Reviews

482  Double standards in healthcare innovations: the case of mosquito net mesh for hernia repair
M Skopec, A Grillo, A Kureshi, Y Bhatti, M Harris

491  Design thinking as an approach for innovation in healthcare: systematic review and research avenues
M Oliveira, E Zancul, A L Fleury

499  Agile Innovation to transform healthcare: innovating in complex adaptive systems is an everyday process, not a light bulb event
R J Holden, M A Boustani, J Azar

506  Blockchain, health disparities and global health
D Vervoort, C R Guetter, A W Peters

Letter

515  Novel disinfesting spittoons during COVID-19
M M Khan, S R Parab