



Centre for Health Systems
and Technology (CHeST)

A UNIVERSITY OF OTAGO RESEARCH THEME

2020 Annual CHeST Symposium Programme

Improving health care with
emerging technologies

Wednesday 26 August
8:30am - 5:00pm
OBS Seminar Room 1.17
All welcome.

Centre for Health Systems and Technology Symposium 2020

Healthcare systems are notorious for being complex and challenging—where introducing, implementing and sustaining any change is considered a mission. Emerging technologies to drive process and quality improvement such as digitalisation, big data, automation and AI have opened up a new research stream that addresses the organisational and policy-related prerequisites to ensure successful implementation of such innovations.

This year, CHEST invited researchers and practitioners to present their research on the topic of Improving Healthcare with Emerging Technologies. Our participants will be sharing some exciting and innovative research with you today. These innovations and their successful implementation could serve as a valuable source of supporting healthcare operations, and drive public policy and management discussion forward.

As always, the aim of our centre has been to bring together researchers, health practitioners and health service managers to explore how the New Zealand Healthcare System should engage with this development. This year we have opted for an online/offline format to ensure the CHEST members from all over New Zealand are able to contribute to our mission.

We hope you enjoy the symposium.

Symposium Schedule

Time	Item
8:30am – 9:00am	Registration
9:00am – 9:15am	Opening Remarks
9:15am – 10am	Mike Collin's Keynote – MyLab: A health technology hub for the Southern health system
10:00am – 10:50am	Enrico Coiera's Keynote – The fate of healthcare in the time of AI
11:00am – 12:30pm	Presentation Session 1 – Covid-19 and the Community
12:30pm – 1:30pm	Lunch Break
1:30 – 3:00pm	Presentation Session 2 – Health Systems and Emerging Technologies
3:10pm – 4:40pm	Presentation Session 3 – Operations, Quality Improvement and Supply Chain Management
3:10pm – 4:40pm	Presentation Session 4 – Public Health and Policy
4:40pm – 5:00pm	Closing Remarks

Note: Presentation session 3 and Presentation session 4 are going to run parallel in two different rooms.

Keynote Speakers

Professor Enrico Coiera

Trained in medicine and with a computer science PhD in Artificial Intelligence, Professor Coiera has a research background in both industry and academia and a strong international research reputation for his work on digital health safety, decision support and communication processes in biomedicine.

Coiera is the Director for the Centre for Health Informatics (CHI) celebrating its 20th year in 2019, Director for the NHMRC Centre of Research Excellence in Digital Health and Director of the Australian Alliance for Artificial Intelligence in Healthcare (AAAiH). His textbook Guide to Health Informatics is in its 3rd edition, is widely used internationally, and is translated into several languages. He was elected Foundation Fellow and first President of the Australasian College of Health Informatics, is a foundation member of the International Academy of Health Sciences Informatics, a Fellow of the Australian Academy of Health and Medical Science, and is a Fellow of the American College of Medical Informatics.



Mike Collins

Mike Collins is the Executive Director People, Culture and Technology at the Southern District Health Board. Previously Mike was the Director of the Learning Environment and the Director of Service Excellence at Otago Polytechnic with a passion for creating dynamic working environments and believes in a team culture aligned to values.

Mike believes a successful organisation requires a clear strategy with innovative aspirations supported by people working within an empowering culture where staff own and enable the business values. One of the keys to success is to form a highly effective team by promoting efficient and transparent communications, focusing on the customer at the center of all decisions, creating a fun and enjoyable work environment and providing an on-going investment into staff education, knowledge transfer and mentoring.



ACC Telehealth Response for Primary Care Through the COVID-19 Response Period

Melissa Barry and Meagan Stephenson

ACC

Physical distancing restrictions implemented during the COVID-19 pandemic presented a unique challenge for health professionals in New Zealand and forced funders like ACC to quickly implement policies for virtual delivery of healthcare. Eleven health professions working under the ACC Cost of Treatment Regulations (CoTR), and 32 contracted services were supported to provide telehealth services over Lockdown using video or teleconferencing platforms.

Two comprehensive monitoring programmes were put in place to understand the utilisation of telehealth and the experiences of health professionals and patients using telehealth platforms. Evidence from the monitoring programmes enabled ACC to understand how the sector and public were using telehealth, and whether patients were able to progress towards their rehabilitation goals.

From 26 March 2020 to 16 July 2020 ACC has been invoiced for over 210,000 Telehealth sessions. Responses to experience surveys were received from over 1200 health providers and 4500 clients, yielding a rich data set of experiences with telehealth services and preferences for accessing primary healthcare. This presentation will highlight some of the key findings from the dataset including the patterns of utilisation over different levels of Lockdown and by provider groups; satisfaction with telehealth and potential drivers for telehealth and face-to-face primary healthcare services.

The data set gathered during Alert Levels 2 – 4 is rich and only partially analysed to date. Reports thus far have focused on telehealth utilisation, satisfaction, progress in recovery and preferences for the future use of telehealth. The next steps will include further analysis of experiences with telehealth from both provider and client perspectives and input from the CHeST network on suggested areas of focus would be welcome.

Midwifery at Otago Polytechnic: Keeping Calm and Carrying on Through COVID-19

Carolyn McIntosh

Otago Polytechnic

When Aotearoa/ New Zealand went into lockdown on 25th March the nation had been given 48 hours to prepare. Everyone who could was to work from home, only essential workers could continue in the workplace, with strict criteria to maintain safety. Schools closed and students on work placement were not allowed to continue. Schools were given two weeks to prepare for online delivery. The health sector was particularly hard hit. There was anxiety about what might happen next. The Italian health service had been overwhelmed and could not deal with all the cases of COVID-19. Recently retired health workers volunteered to return to work to help manage the crisis. Students were also looking for ways to support their colleagues. Distance learning became the norm.

Undergraduate midwifery at Otago Polytechnic is a blend of online and face to face learning along with practice placements. Students meet weekly in small tutorial groups around the lower north and lower south islands of Aotearoa New Zealand. Although taking students out of practice was a challenge there were enough resources to be able to continue with the programme uninterrupted. Postgraduate midwifery courses are fully distance, however lockdown also impacted these midwives, as they too struggled with the reality of midwifery practice while meeting course requirements during lockdown. In this reflective narrative I will share my experiences as we worked through the ever-changing contexts of COVID-19 in the School of Midwifery.

Using Systems Thinking to Analyse COVID-19 Simulation Scenarios

Megan Anakin¹, Sierra Beck^{1,2}, Ohad Dar^{1,2}, Christie Fyfe¹, Raymond Phang¹, Joanne Robertson², Meghan Scanlan¹, Sophie Thomas¹, and Rebekah Wrigley¹

1: University of Otago

2: Southern District Health Board

The usefulness of simulation as a vehicle to rapidly transform health services has become apparent during the COVID-19 pandemic.

This qualitative study examined simulation scenario reports and interviews with scenario facilitators and participants to identify themes and then interpret them in relation to the systems thinking domain of the New Zealand Health Quality and Safety Commission's framework.

Three interconnected themes were identified from five reports and five interviews. First, simulation scenarios revealed potential routes for infection transmission such as when an elevator was used to transport a COVID positive patient and then used by others without personal protective equipment. Second, simulation tested infection prevention measures such as the creation of a COVID airway team and adapting the design of isolation spaces by mounting intercoms in rooms for remote communication. Third, simulation identified consequences from infection prevention measures such as delays in patient care, patient discomfort due to isolation, and breakdowns in communication among health team members.

By using a systems thinking perspective, health professionals engaging in simulation may be better equipped to strategically recommend changes to the health care environment based on simulation findings. Systems thinking also allows practitioners who engage in simulation to notice that by implementing rapid solutions to problems, they may also be creating new problems to solve.

A tale of two contact-tracing apps – Comparing Australia's CovidSafe and New Zealand's NZ Covid Tracer

Bronwyn E. Howell and Petrus H. Potgieter
Victoria University of Wellington

The Australian and New Zealand governments have recently released smartphone-based apps to complement contact tracing in the event that they face a resurgence of Covid-19 infections. The apps form part of both countries' policies to support a return to social and economic engagement following extended lockdowns. Using process mapping and analysis, we evaluate the potential of the two apps to improve the performance of existing contact tracing systems across a range of efficiency and effectiveness criteria. We find that the Bluetooth-based Australian app appears likely to assist that country's contact tracing system to perform more efficiently and effectively in the event of a resurgence of the virus, and should increase confidence in re-engagement. The New Zealand QR code-based app, however, is not well-aligned with these objectives. Its interaction with a range of other regulations and obligations, combined with the high operational costs it imposes on its users, is likely to militate against its use. Its focus on business locations rather than contact between individuals risks information overload for contact tracers if a resurgence should arise, while it fails to capture information from personal interactions between strangers taking place in locations where QR codes cannot be acquired or displayed, but which are likely to be high-risk in the event of a resurgence. The latter may significantly constrain the development of individual confidence to re-engage. Our analysis suggests that in the international context, Bluetooth-based apps based on interactions between individuals likely better support these population-based objectives than QR code-based location-specific apps.

Learning Drug Calculations Online – Covid-19 Experience

Karole Hogarth and Anna Askerud
Otago Polytechnic

Nursing students are required to achieve a 100% pass in all drug calculation assessments across their degree. This learning begins in an applied pharmacology course which commences in the middle of semester 1 of their first year. In 2020 this coincided with Level 4 Lockdown in New Zealand due to the Covid-19 global pandemic.

Most learning in the pharmacology course is in the online learning platform KuraCloud Lt™. The face to face components, normally tutorials and laboratory sessions, were transferred into online delivery. At the beginning of the course students had never seen a drug calculation in their degree or completed one themselves. The Lt™ calculation learning package was thorough with videos, examples, and practice opportunities. What was missing was context such as students would have in the clinical laboratory sessions during a normal year. In 2020 the online examination for first year drug calculations resulted in an unprecedented 45% failure rate.

In comparison year 2 students had admission to Med+Safe, an online medication safety programme by Intellilearn. This allowed for open access practice of contextual calculations, scenarios, and case studies. There have been three assessments for this group in 2020 with a 100% pass rate to date, including during lockdown. Prior to using this programme this group would normally have only a 75% pass rate on these assessments.

Teaching drug calculation formulae remotely is relatively straightforward, but it must be accompanied by contextual application of the calculation for students to fully understand the process and the importance of accuracy. The success of Med+Safe has meant that this programme will be implemented for Year 1 students in 2021 with the goal to have 100% calculations pass on the first attempt.

Sleep Changes Between Lockdown Levels Among Staff at a Tertiary Education Institution

Sally Baddock, Kelli Te Maihāroa, Griffin Leonard and Suzanne Miller
Otago Polytechnic

Alert level 4 lockdown due to Covid19 was introduced on 25 March resulting in a requirement to work from home. On 22 April and 13 May we moved to less restrictive levels three and then two allowing a return to campus. We aimed to identify the impact of Alert levels on sleep among staff from a tertiary education institution.

This was part of a longitudinal observational study using an online survey of 35 questions on wellbeing and innovation, repeated during each alert level. Seven questions related to sleep were analysed from Alert level 4 and level 2 for this report. Participants rated sleep quality and quantity on a four point scale, and reported sleep latency and number of wakes. Sleep duration was calculated from bedtime to final awake time. Wilcoxon Signed Rank Tests and paired t-tests compared differences between alert levels.

Sleep data was available for both time points for 75 participants. Their perception of sleep quantity was greater ($p = 0.03$) at alert level four than at level two, supported by sleep duration (median 510min vs 480 min, $p < 0.001$), later bedtime (22:15 vs 22:00, $p = 0.05$), and wake up time (6:30 vs 6:56, $P = 0.01$). Perceived sleep quality, sleep latency and number of wakings were not different between alert levels.

These preliminary results suggest that living under the restricted conditions of Alert level four favoured participants' sleep duration when working from home. Without the need to commute to work people may take on more weekend-like sleep patterns.

Exploring the Use of Mixed Reality in Healthcare Education

Emma Collins and Liz Ditzel
Otago Polytechnic

In this presentation we demonstrate how we use Microsoft HoloLens mixed reality simulation technology to teach first and second-year nursing students clinical reasoning and assessment skills. Microsoft HoloLens is a device that provides nursing educators with access to virtual standardised patients via an app, who display symptoms and behaviours typical of a medical condition (e.g. burns), event (e.g. heart attack) or the clinical presentation of Covid-19.

In tutorial groups, students followed the steps of the clinical reasoning cycle (i.e., look, collect, process, decide, plan, act, evaluate & reflect) to collect cues and information on a holographic patient, such as Jerry', a life-sized moving and breathing hologram of young man admitted to Emergency Department following a mountain bike accident, or Sandra, a young woman experiencing asthma. Data were collected via a post-activity survey approved by the institution's Research Ethics Committee (OPREC 2019-790).

Respondents (Year 1: N=91, 72.5%; Year 2: N=99, 91%) reported a high level of satisfaction and engagement with this mode of learning. Quantitative data showed that students were confident about assessing the patient from the visual and aural cues and found the experience surprisingly real. Thematic analysis of qualitative data identified 17 advantages of using holograms, including realism, a reduced level of self-consciousness, and better preparation for clinical practice. Disadvantages mostly related to technical projection issues such as blurry image quality. We conclude by exploring opportunities for further uses of extended realities in educational contexts.

Apps as Supporters for Long-Term Physical Activity

Wendy Wlasak
University of Otago

Apps yield many advantages over traditional intervention approaches like a wide reach, high scalability, and lasting support. However, their supportiveness for maintained physical activity has been questioned. But how can we measure this supportiveness? We are using Self-Determination-Theory to address this question by transferring the concept of perceived supportiveness, which is used for humans, to apps. We investigated whether perceived app support correlates with need-satisfaction for the physical activity, which is an indicator for maintained behaviour. Furthermore, we examined how well the apps currently do.

We conducted three online surveys: a pre-screening survey to identify current app users (n=788), the main survey (n=437) asking current app users for their app usage, perceived app support and need satisfaction, and a follow-up (n=326) three months later to investigate whether the concepts and connections between them changed due to COVID-19.

Our sample consisted of a surprisingly large number of long-term users with a majority using the app for one year or more (60%). Overall, the perceived app supportiveness was positive, and it correlated with need-satisfaction for the activity ($p < 0.001$). The internal consistency of the perceived app support scale was good (Cronbach α 's > 0.75). 86% stated that they were extremely likely to continue using the app and most of them did in the follow-up study (73%). All constructs experienced a drop during COVID19 but the correlations between the concepts remained. The results are promising for apps as supporters and perceived app support as a measure.

Apps as Supporters for Long-Term Physical Activity

Wendy Wlasak
University of Otago

Apps yield many advantages over traditional intervention approaches like a wide reach, high scalability, and lasting support. However, their supportiveness for maintained physical activity has been questioned. But how can we measure this supportiveness? We are using Self-Determination-Theory to address this question by transferring the concept of perceived supportiveness, which is used for humans, to apps. We investigated whether perceived app support correlates with need-satisfaction for the physical activity, which is an indicator for maintained behaviour. Furthermore, we examined how well the apps currently do.

We conducted three online surveys: a pre-screening survey to identify current app users (n=788), the main survey (n=437) asking current app users for their app usage, perceived app support and need satisfaction, and a follow-up (n=326) three months later to investigate whether the concepts and connections between them changed due to COVID-19.

Our sample consisted of a surprisingly large number of long-term users with a majority using the app for one year or more (60%). Overall, the perceived app supportiveness was positive, and it correlated with need-satisfaction for the activity ($p < 0.001$). The internal consistency of the perceived app support scale was good (Cronbach α 's > 0.75). 86% stated that they were extremely likely to continue using the app and most of them did in the follow-up study (73%). All constructs experienced a drop during COVID19 but the correlations between the concepts remained. The results are promising for apps as supporters and perceived app support as a measure.

3D Models from Radiographs

Hamza Bennani
University of Otago

This work investigates an accurate method for three dimensional (3D) reconstruction of the human spine from bi-planar radiographs with comparable results to CT scans or MRI. In this research, we generated a publicly available dataset which corresponds to the training data used. We subsequently solved the problem of correspondences using a landmark-free algorithm applied on the vertebrae. Finally, we developed a semi-automatic method based on simulated radiographs for the reconstruction of the human lumbar spine in 3D from bi-planar radiographs.

We validated the results in vitro on radiographs of dried vertebrae with models constructed from a laser-scanner, then in vivo on radiographs of living patients with models extracted from CT scans or MRI.

The results show the feasibility of generating personalised models of patients from bi-planar radiographs.

The main contributions of this work are:

- Evaluation of the methods for creating 3D models of vertebrae and estimation of the errors in comparison with ground truth data. These methods are applicable to other free-form shapes;
- Creation of landmark free ASMs of lumbar vertebrae;
- Definition and evaluation of a process for estimating the shape and position of lumbar spine from uncalibrated bi-planar radiographs.

Data-Driven Primary Care: Interactive Prescribing Reports for New Zealand Prescribers

Alesha Smith¹, Noni Richards², Benoit Auvray², Greg Peyroux²

1: University of Otago

2: Airmed

Airmed is a data science company that specialises in health data projects, holding various contracts with DHBs, PHOs and NGOs. Airmed was recently awarded (in conjunction with The Health Media) the responsible use of medicines contract with PHARMAC. Airmed will prepare prescribing reports for New Zealand prescribers based on dispensing and other health data, with the central goal of eliminating inequities in access to medicines.

Using the Ministry of Health datasets, linked by encrypted NHI, we will investigate different variables that contribute to health outcomes and medicine use for an individual, across time and location. At the national/DHB/PHO/practice/GP levels, medicine-utilisation analysis will be undertaken for PHARMAC's priority conditions using a variety of data analytics, including statistical and machine learning techniques. National level gap analysis will enable the team and equity partners to identify priority areas to integrate and synergise resources and efforts, to enhance quality and reduce disparities in treatment and care across our health system.

Prescribing reports will be presented as interactive dashboards allowing users to apply various filters, for example: date, location, age group, ethnicity or medicine, to show specific data points. GPs will be benchmarked with other GPs that are most like them, providing national and local context for clinicians. Education modules will be linked to the prescribing report. The service effectiveness will be measured using various key impact evaluations, including: awareness, CPD/CME points obtained, prescriber knowledge, data analytics and trend analysis of target medicines.

Development of an Online Group Pain Management Programme In Aotearoa: iSelf-Help

Hemakumar Devan¹, Meredith Perry¹, Cheryl Davies¹, Sarah Dean², Anthony Dowell¹, Rebecca Grainger¹, Andrew Gray¹, Dagmar Hempel³, Tristram Ingham¹, Bernadette Jones¹, Barbara Saipe³ and Leigh Hale¹

1: University of Otago

2: University of Exeter

3: Capital and Coast District Health Board

Persistent non-cancer pain affects one in five New Zealanders. This study aimed to co-create a culturally-responsive online-delivered pain management programme (iSelf-help) for people with persistent pain.

A modified participatory action research (PAR) framework was used to co-create contents and delivery of iSelf-help. The PAR team included: (1) end-users living with persistent pain, (2) pain management service clinicians, (3) health researchers and (4) digital health experts. Five meetings were held with the PAR group and a Nominal Group Technique was used to rank order the features of content delivery. To ensure cultural appropriateness of iSelf-help, three focus groups (N=10) were held with Māori living with persistent pain in collaboration with Tu Kotahi Māori Asthma and Research Trust. All contents were reviewed by a Health literacy expert and some key contents were translated in Te Reo. All contents were finalised by iterative discussion among the PAR team and consultation with Māori stakeholders. The preliminary version of iSelf-help was tested with the PAR group and Maori participants.

The finalised version of iSelf-help included 12 online modules. Each module included: short explanatory videos, animations, patient stories, written blurbs, illustrated texts and evidence-summaries. A dedicated welcoming page to the programme was created for the study.

This is the first on-line delivered group pain management programme for people with persistent pain which is co-developed in Aotearoa and is culturally-tailored to Māori. The next step is to evaluate the clinical and cost-effectiveness of iSelf-help as compared to in-person delivered pain management programme.

Blockchain Enabled Traceability for Sustainable Healthcare Supply Chain Under Covid-19

Bill Wang

Auckland University of Technology

Covid-19 has swept across the whole world quickly since December 2019, straining public healthcare crisis dramatically (Armani et al., 2020) in 216 countries, areas and territories (WHO, 2020). Since the surging humanitarian demand prioritizes the quick response of the supply and availability of the healthcare products, some critical requirements such as the quality of the products, social and environmental sustainability in the normal supply chain management may be ignored. For example, Spain, India, the Netherlands, Czech Republic, Canada and Turkey were forced to recall hundreds of thousands of shoddy masks and pieces of protective gear imported from China. Some Asian sweatshops are making coronavirus masks by using child labor in surgical instruments production in Pakistan. Furthermore, these workers must work overtime to complete the urgent customer orders on time while earning less than minimum wage in bad working conditions. These kinds of cases make it significant to explore how to assure the social and environmental sustainability in the public health crisis, especially when the situation under-Covid 19 has been regarded as a new normality (Tesar, 2020).

Because of its decentralised, distributed ledger system, blockchain technology can maintain the integrity, speed, accuracy, transparency of data transactions, enhance the traceability, and reduce the risks and cost of data transmission (Venkatesh et al., 2020). Thus, blockchain technology can be employed to track the healthcare production to assure the manufacturers to follow environmental sustainability requirements in the materials procurement processes, and to follow social sustainability criteria on their workers during production processes. Based on comprehensive literature review, this research aims to build a theoretic architecture of blockchain-enabled tracking system to achieve sustainable healthcare supply chain management.

The Complex Quality Improvement Network (CQIN) Model

Bill Wilson

CDHB

Quality improvement (QI) is central to improving healthcare outcomes. The application of fit for purpose quality improvement methods is one explicit strategy for achieving improved healthcare outcomes in New Zealand. However, the effectiveness of QI methods in healthcare has been challenged in the academic literature. One explanation offered for inconsistent results is that healthcare systems are complex adaptive systems (CAS) and therefore unsuited to linear, deterministic improvement methods. This warrants a closer examination of how traditional QI methods such as PDSA cycles or statistical process control can be applied or modified within a CAS.

There is limited empirical research examining the mechanisms for achieving successful goal-oriented change within CAS. We have developed the CQIN conceptual model to facilitate empirical measurement of CAS in healthcare. The model is being used to collect CAS data from case studies and test explanatory propositions for achieving successful QI within CAS. For example, the suggestion that structural features of the agent network can facilitate problem solving. Alongside programme logic model analysis, we are also building an agent-based simulation model based on CQIN. Simulation allows extended 'what if' scenarios to be explored that are otherwise difficult to test or measure directly. The CQIN model provides a way to explain CAS within this general context of collaborative problem solving. Our overarching research goal is to progress towards a new generation of QI methods.

Reasons of Surgery Cancellation

Mona Koushan, Lincoln Wood, Richard Greatbanks
University of Otago

One of the critical challenges for healthcare systems has been the cancellation of elective surgeries. Surgical cancellations can lead to patient dissatisfaction and wasted resources, contributing to higher health care delivery costs. This study presents a systematic literature review (SLR) to investigate the reasons for surgery cancellation among different hospitals and countries. A total of 57 of existing literature reviews dated prior to November 2018 on elective surgery cancellation were obtained via Web of Science, Medline, and EMBASE. There are different reasons for surgery cancellation that vary between hospitals. This SLR demonstrates that hospital-related causes (e.g., unavailable operation room (OR) time, lack of beds) is the primary reason for surgery cancellation, followed by work-up related causes (e.g., medically unfit, changes in the treatment plan) and patient-related causes (e.g., absence of a patient, patient refusal).

Given that hospital-related causes are the most important reasons for surgical cancellation, resolving these causes can improve hospital productivity and the quality of healthcare services. To reduce the cancellation due to no OR time, two solutions are proposed: a) Surgical scheduling by considering a reasonable estimation of time and arrival uncertainties and b) cooperation between departments involved in the surgical process. Furthermore, solutions to address the issue of lack of beds are: adding more beds, separating the elective and emergency services, and better management of their resources with a good estimation of uncertainties. The outcomes of this systematic literature review provide beneficial information that can assist in decreasing elective surgery cancellation rates.

Blockchain Improves Supply Chain Visibility to Mitigate Supply Chain Uncertainty and Risk in the Pharmaceutical Supply Chain

Michael Wang
Auckland University of Technology

Covid-19 has severely impacted international supply chains and caused many supply chain uncertainties and risks in today's world. How to manage these supply chain uncertainties and risks in the today's Pharmaceutical supply chain? This question has become increasingly important for both researchers and practitioners in the healthcare sector. Exploiting resource-based view, socio-technical theory, and contingency theory as the underlying theoretical foundations and drawing on literature from multiple disciplines, supply chain visibility plays a vital role to manage the supply chain uncertainty and risk in a pharmaceutical supply chain (Wang and Jie, 2019). We develop a conceptual framework for demonstrating the role of the blockchain in supply chain risk mitigation. By incorporating blockchain technology into supply chain risk management, the goal of strategic alignment of blockchain with supply chain visibility is achieved to enable an effective supply chain risk mitigation in the pharmaceutical supply chain (Wang and Jie, 2019; Wang et al., 2015). This study offers propositions to support the development of emerging technologies in pharmaceutical supply chain research. The blockchain technology can be used to improve the collaborative relationships, sharing of information and trust among the supply chain partners and remove the barriers such as joint planning, customer integrations, supplier integrations, demand response, and inventory levels, also facilitate the supply chain risk mitigation in an international pharmaceutical supply chain network. This may provide insights into pharmaceutical supply chain management, also the framework may help researchers, health practitioners and health service managers to have a better understanding of the application of emerging technologies, such as blockchain technology in the pharmaceutical supply chain.

Can Pull Demand be applied within Health Systems Pathways?

Richard Greatbanks, Adeel Akmal, Jeff Foote, Lincoln Wood
and Natasha Podgorodnichenko
University of Otago

Many health systems are interested in the potential advantages of Lean Thinking as an approach which addresses the issues of excessive process waiting time, improved capacity utilization and patient flow through the health system.

Within a Lean manufacturing context one of the fundamental building blocks is the use of pull demand—the placing of the external customer demand at the end of the manufacturing process. Customer demand is then used to synchronize the entire manufacturing system through a series of feedback control loops, usually referred to as Kanban. In this way the manufacturing system produces exactly what is demanded by the external customer, in the appropriate volumes and to the appropriate timing.

If pull demand is an essential component of lean then examining if, and how, pull demand can work in a health system context is an important and legitimate question. When considering the use of pull demand in a health systems, there appear to be several potential issues and barriers which require detailed examination. This presentation will consider the ramifications of using pull demand in a health system context, and attempt to address the question ‘Can pull demand be applied with health systems pathways?’

Using Gamification to Support Positive Health Behaviour Change: A Kaupapa Māori Approach

Dannie Jefferies
University of Waikato

This research explores using gamification to support positive health behaviour change; it takes a Kaupapa Māori approach to design a mobile health application that meets the needs of Māori users.

To date, there is little information on the efficacy of gamification in health behaviour change interventions, and no studies which look at persuasive design in the context of health behaviour change interventions for Indigenous people.

This study uses both design-science research (DSR) and Kaupapa Māori methodologies. This duality is appropriate because the aim of the study is to design a mobile-health artefact specifically within the framework of a culturally respectful approach. This study found that the degree of personal connection with other application users has a significant impact on the socially oriented persuasive strategy preference. This has significant implications for design, suggesting that competition at the whānau level is demotivating, and that cooperation at the individual level may be ineffective. This study also found that real-world social connection is a driver for engagement and may affect continued use intentions, and therefore, specific strategies need to be implemented to leverage social orientation. Outcomes of this phase will inform the development and trials of a mobile health application.

Private Choices, Public Costs: Evaluating Cost-Shifting Between Private and Public Health Sectors in New Zealand

Erin Penno, Trudy Sullivan, Robin Gauld and Dave Barson
University of Otago

New Zealand's dual public-private health system allows individuals to purchase health services from the private sector rather than relying solely upon publicly-funded services. However, financial boundaries between the public and private sectors are not well defined and patients receiving privately-funded care may subsequently seek follow-up care within the public health system, in effect shifting costs to the public sector. This study evaluated this phenomenon, examining whether cost-shifting between the private and public hospital systems are a significant issue in New Zealand.

We used inpatient discharge data from 2013/14 to identify private events with a subsequent admission to a public hospital within seven days of discharge. We examined the frequency of subsequent public admissions, the demographic and clinical characteristics of the patients and estimated the direct costs of inpatient care incurred by the public health system. Approximately 2% of private inpatient events had a subsequent admission to a public hospital. Overall, the costs to the public system amounted to NZ\$11.5 million, with a median cost of NZ\$2800. At least a third of subsequent admissions were related to complications of a medical procedure.

Although only a small proportion of private events had a subsequent public admission, the public health system incurred significant costs. As New Zealand considers the future of its health system, these findings highlight the need for greater understanding and discussion around the interface between the public and private health systems, as well as how we can better use available data to understand health system dynamics.

Access to Primary Health Care and Ambulatory Care Sensitive Hospitalisations in the Maldives.

Fazeela Mohamed, Arindam Basu and Wendy Maddocks
University of Canterbury

Hospitalisations due to diseases that can otherwise be managed in the outpatients and community setting is a growing problem. These diseases are called ambulatory care sensitive hospitalisations (ACSH). This is a set of preventable or avoidable hospitalisations where the setting of avoidance is in the primary health care (PHC). ACSH is a failure of people's access to PHC services in the community. These diseases include asthma, COPD, diabetes, CHF, and hypertension. High ACSH rates indicate lack of PHC access. ACSH accounts for higher levels of hospitalisations in the Maldives 36%, compared with other island nations with about 24-25% in New Zealand, the United Kingdom, and Singapore. PHC based interventions are effective in reducing ACSH; while PHC in the Maldives continue to provide these interventions, it remains to be explained relatively higher rates of ACSH in the Maldives. Island nations such as the Maldives have physical access barriers to healthcare services. Besides, in the Maldives, people also do not trust PHC providers. As a result, in the Maldives and likely in similar island countries, transportation, travel time, and trust in provider are factors that possibly explain the variation in PHC access. The goal of this research is to study the association between transportation, travel time, and trust in the provider and access to PHC services; and assess the association between access to PHC and risk of ACSH. The association between transportation, travel time, and trust and self-reported access to PHC services in the Maldives will be tested by cross-sectional survey. Following the cross-sectional survey, a measurement will be constructed as to how people were able to access PHC. This measurement will be used to assess the association between self-reported access to PHC services in the Maldives and risk of ACSH. This will be done on the basis of a case-control study.

Development and Implementation of a Clinical Operational Framework Based on the Viable System Model

Sharen Paine
University of Otago

The aim of the research will be to improve performance in the New Zealand public health system by developing a readily implementable, standardized, integrated, data-driven framework for the efficient and effective management and operation of clinical services. The initial focus would be on high-volume outpatient services (e.g. ophthalmology, otolaryngology). Implementation and use of the framework is expected to result in health care service delivery which is safer for patients, more resource-efficient, more satisfying for staff, and more responsive to change, all of which supports sustainability over the long term. The vision can be stated as: "satisfied patients, satisfied staff, sustainable over the long term". The Viable System Model (VSM) states that any system, to remain viable, must incorporate five sub-systems addressing operations, co-ordination, control (including audit and monitoring), intelligence and identity, incorporating regulatory, learning and adaptive qualities. Building on work already underway, the VSM would provide the overall system structure and a guide to the key elements of the content and information flows required. It would be applied horizontally and vertically through clinical and support services and up to senior management. The Clinical Operational Framework provides the tools and mechanisms to achieve clinical service viability, incorporating concepts of clinical governance. The specific research question is yet to be formulated but would likely incorporate issues of usefulness / applicability of the VSM, impact on performance, and barriers to implementation.

People Centred Design – Examples from UK/Europe and Their Application to the New Zealand Health Debate.

John Cooney

Our research shows:

Over half of the demand into the health systems studied are caused by the failure to treat effectively at the first point, and this 'failure demand' is rising as a proportion of all demand. The causes of this 'failure demand' are (predominantly but not exclusively) targets and funding design, system drivers that disable Health workers from doing the right thing for each person they treat. Eliminating the influence of the system drivers frees practitioners to do the right thing for those in their care; the consequence of this better people-centred care is counter-intuitively reduced demand and cost.

Evaluation of NZ funding and targets for Health Boards show the same features that cause the problems shown in this research. Without changing the system design that influences People-Centred Health, service such as Whanau Ora will be constrained from doing the right thing reducing health outcomes immediately and driving costs up in the long term.

The views of New Zealand General Practitioners and patients on a proposed risk assessment and communication tool: a qualitative study using Normalisation Process theory

Sharon Leitch, Alesha Smith, Sue Crengle And Tim Stokes.

University of Otago

Communicating risks of medication harm and obtaining informed consent is difficult due to structural barriers, language and cultural practices, bias, and a lack of resources appropriately tailored for the health literacy of most patients. Health inequity based on ethnicity and socioeconomic disadvantage is widespread in Aotearoa New Zealand (NZ). A decision support tool was proposed to alert prescribers of risk and provide tailored information for patients. It aims to facilitate discussion and support informed decision-making with patients and their whānau (family) around medication use. Patient and prescriber co-design was used to ensure the tool was designed to best meet the needs of end-users and avoid increasing health inequity. This paper describes the first stage of the co-design process.

Normalisation Process Theory (NPT) was used to prospectively evaluate the tool. Semi-structured interviews were held with fifteen patients (five Māori, five Pasifika and five NZ European) and nine prescribers (general practitioners) (two Māori and seven European).

Three themes were identified. Theme 1 explored participants' understanding of prescribing safety, medication harm and risk, which is based on experience. Patients want as much information as possible about their medications and risk, but doctors find it difficult to communicate that information. Theme 2 explored what participants thought about a prescribing decision support tool; they were cautiously optimistic, but worried about potential harm arising from its use. Participants identified requirements for the tool and features to avoid. Theme 3 describes the collective action required for successful implementation of the tool; namely, culturally safe and trustworthy doctor-patient relationships.

We rely on your feedback and suggestions to improve. Please scan or click on the QR code and complete a short survey.



UNIVERSITY
of
OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND