PharmAus19
Presented by
Medicines Australia
WELCOME
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Tailoring technologies to enhance autonomy and improve health outcomes

With apologies to Leonardo
Health Autonomy

- Preventative measures
- Early detection
- Accurate diagnosis
- Comprehensive prognosis
- Access to reliable resources
- Informed decision making
- Clear reporting
- Access to support networks
- Promote independence
- Equal partner in healthcare
•Observed ‘over activity’ periods decreased from 2.5 to 0.25 ($p < 0.001$)
•Pain levels stabilised ($p < 0.001$)
•Extra 49 minutes of productive time on average
•5 (of 7) individuals ceased PRN medication
•Decreased opioid intake by 20% on average
•2 individuals went back to work fulfilling a planned goal
Could sensor data have saved a life?

The story of Mrs Elle
Smarter Safer Homes

[Diagram of a home layout with various devices placed throughout, including motion sensors, acoustic sensors, accelerometers, reed switches, power meters, and a blood pressure monitor.]
Absence of sensor data

Daily activities evident in all rooms

- Bathroom
- Kitchen
- Bedroom
- Laundry
- Lounge

Facility staff and family
Secrets in the Sensors

- Daily mobility prior to 25 Oct
- Daily mobility 25 Oct - 4 Nov

Meal preparation score

- 15-Aug to 31-Oct
- Pressure (mmHg)
  - Diastolic
  - Systolic
Physiological and Behavioural Changes

- reduced mobility
- reduced meal preparation and
- reduced attention to hygiene

- high blood pressure
- odd fluctuations in blood pressure
- low pulse rate
- high red blood cell count

- low body temperature
- losing weight
- missed weekend activities and
  intrastate drive

Indicative of fatigue

Recently visited GP with her concerns
and had medication changed
Harness information available from the sensors and devices to provide a predictive picture far more detailed than the glimpses currently seen by medical professionals.

**Challenge:**
to channel the accumulated information through a clinical portal to medical professionals to alert them and to inform clinical decisions based on everyday behaviour.

Coordinated action between the monitoring system, the response service and the medical health team.
Dear Mrs Elle

We would have alerted every specialist in town

Had our system known how to save a life.
Genomic Healthcare

Potential to revolutionise healthcare provision

- Better understanding of disease
- More accurate diagnosis
- Personalised therapeutics
  - Right drug first time
- Repository
- Patient portals

Implementation – consent, curation, reporting
Indigenous genomics
Health Literacy

Capacity for knowledge

Patient Journey
eDNA the trainee genetic chat bot

Edna

what does clinically actionable mean

This means that there are good screening programs, management, treatments or interventions available if someone is found to have a change in a particular set of genes.

Edna

Tell me about Rett syndrome

Please select a button for more information on Rett syndrome:

Description

Cause

Frequency

Edna

nan was diagnosed with bowel cancer

Thank you. How old was your GRANDMOTHER when that happened?

she was diagnosed on Anzac Day 2012

Thank you. What about your mother?

Edna

I do not know

It sounds like you're feeling a little bit unsure about having your genome reanalysed for additional findings. Would you like me to tell you about the advantages of having your genome reanalysed?

Yes

No
Potential to support mental health

Natural language processing
Detection of key words and phrases indicating mental health issues

Wearable activity tracking devices
Monitoring sleep and activity

Chat agents
Conversation tool

Avatars
Intervention programme delivery

Affective computing
Facial recognition
Speech rate
Intonation

And more..
Call records
Internet history
Music
Phone use
Do smartphones have a role as a ‘medical device’ and if so, where are the boundaries?
Infrastructure for Health Autonomy
App found to be user friendly, convenient and highly recommended
Improved the multidisciplinary care co-ordination
BGL clinical reviews significantly higher
Early intervention
Dietitians yarn about food plates

WIO clients made it clear that they would like to be able to track how many serves of vegetables, starches, etc they were eating a day.
A Stella* Story

* Pseudonym

Bradford, Basit et al. 2017  Cultural Knowledge and Technology: Developing Northern Australia Conference, Cairns
Do we have existing technologies that can be modified for new patient populations?...
Structural MRI to quantify lesion burden

- N=107 unilateral cerebral palsy; 18 healthy controls
- Accurate, validated method of automatic segmentation
- Significant correlations between lesion burden and clinical scores

*Highlighted the importance of quantifying GM lesions*


Grey matter (GM) lesion, white matter (WM) lesions and internal capsule (IC) lesions
N= 24 healthy adults (14 f; Age 18-40, M=28)
10min/day for 4 weeks manual training finger-thumb opposition LH

Sensors to Augment GMs Assessment

Wearable Sensors

Telehealth

Challenging Diagnosis

Movement Measurements

Neural Injury
What are we not measuring or monitoring, that is limiting our ability to provide best quality healthcare?
Choose the language for translation
You can change the selection at anytime from the top bar in the app

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Features and functions of CALD Assist

- Discipline Phrases
- Feedback
- Language
- Search

Translated phrase
Associated image
Menu Options

Bi sakal da vi postavam edno specifični informaci za site lekovi koji može da bidat prezemanje
Awards for CALD Assist

2015 Health Informatics Society Australia, Branko Cesnik Award for Best Academic/Scientific paper
2015 Gold ‘Improving health equality and closing the gap’ Victorian Public Healthcare Awards
2017 ‘Improving the Continuum of Care’ Health Round Table Innovations Award
2018 ‘Certificate of Merit’ Victorian iAwards
2018 ‘Pitchfest’ winner National iAwards

Available in the iPad App store for free download
• Health technology doesn’t have to be complex or expensive
  • Empower the consumer
• Include people with lived experience in development
• Role of family and carers in technology
• Uptake is improved by internal champions
• Autonomy is a coordinated effort

Tailoring technologies to the target population will enhance autonomy and improve health outcomes
Cerebral Palsy Researchers

Cerebral palsy imaging
- Lee Reid
- Alex Pagnozzi
- Susmita Saha

Kerstin Pannek

Sensors
- Christian Redd

Data management
- Julie Trinder
- Parnesh Raniga

Families
Clinicians
Therapists
Radiographers
Researchers
Med Students
Cerebral Palsy Alliance
QCPRRC
NHMRC
Further Acknowledgments

Mobile Health Platforms
Health Services Group – Mohan Karunanithi
Smarter Safer Homes – Qing Zhang
Cardiac Rehabilitation – Marlien Varnfield

Institute for Urban Indigenous Health
Woolloongabba and Goldie Mobs
Health psychologist - Tabs Basit

Metro North Hospital and Health Services
Pain ROADMAP - David Ireland

Genomics Healthcare
Melbourne Genomics – Clara Gaff
Chat bots – David Ireland
Patients from the Demonstration Projects

CALD Assist
Western Health – Sally Brinkmann
Speech Pathology – Courtney Pocock
HCI - Jill Freyne, David Silvera, Karen Harrap
Clinicians and Patients at WH
Thank you
Do smartphones have a role as a ‘medical device’ and if so, where are the boundaries?

Do we have existing technologies that can be modified for new patient populations?

What are we not measuring or monitoring, that is limiting our ability to provide best quality healthcare?