Assessing unmet rehabilitation needs and the feasibility of a novel telerehabilitation service for patients following road trauma

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Road-traffic related trauma in Australia

- Transport incidents are the second most common mechanism of trauma in Australia (~38%), after falls
- 38,945 Australian road users were hospitalised with injuries from road accidents in 2016
- Estimated annual cost of injuries alone in 2016 was >$33 billion (medical expenses, disability-related costs, loss of productivity)

Road Trauma Australia, 2017 Statistical Summary, BITRE, Canberra
Major Trauma in NSW 2016-17, NSW ITIM
The role of rehabilitation

20-30% of patients hospitalised with road-related injuries receive inpatient rehabilitation (Wu et al 2016; Dinh et al 2014)

More than 2/3rds are discharged from hospital without formal inpatient rehabilitation
The ongoing burden of trauma

- Trauma patients feel unsupported, uninformed, and unready for hospital discharge \( \text{(Goldsmith et al 2017; Kimmel et al 2016; Gabbe et al 2013)} \)

- Injuries and pain commonly incapacitate trauma survivors at home \( \text{(Goldsmith et al 2018; Rodrigue et al 2017)} \)

- 70-80\% of trauma survivors continue to report impairments, activity limitations and reduced quality of life >12 months post-injury \( \text{(Holbrook et al 1999; Gabbe et al 2012; Hours et al 2013)} \)
Room for improvement

- There may be a role for greater rehabilitation involvement in the acute trauma pathway
  - coordination of in-hospital services
  - discharge planning and management of transition home
  - community support and functional reintegration

- Service models need to be appropriate for a working age, independent and pre-morbidly high-functioning patient population
Research aims

- To identify and map unmet rehabilitation needs following hospital discharge for survivors of road-traffic related trauma

- To assess the feasibility and acceptability of delivering a rehabilitation follow-up service via telehealth, for survivors of road trauma
Study design

Longitudinal pilot cohort study

- Adult survivors of road trauma
- Admitted to hospital with injuries
- No inpatient rehabilitation

Clinical trial registration: ACTRN12618001545257
Study design

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Longitudinal pilot cohort study

- Multidisciplinary consultation, Rehabilitation Physician and Occupational Therapist
- *Pexip* Hospital Telehealth Platform
- Smartphone, tablet or computer

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Study design

Longitudinal pilot cohort study

- Hospital discharge
- Baseline assessment
- Telehealth consultation
- 1 month follow-up

• Qualitative feedback

Clinical trial registration: ACTRN12618001545257
Study design

Longitudinal pilot cohort study

- Qualitative feedback
- Outcome assessment - pain
  - mood
  - independence in activities of daily living
  - quality of life

Clinical trial registration: ACTRN12618001545257
Participant flow

n=635 screened  (8 months)

n=74 eligible  (11.3%)

n=34 declined to participate

n=38 recruited  (53%)

n=563 ineligible

Reasons for ineligibility:

- DC from ED/not admitted  n=498  88.5%
- Admission not MVA-related  n=25  4.4%
- NESB  n=12  2.1%
- Inpatient rehab  n=12  2.1%
- No internet  n=11  2.0%
- Died during admission  n=2  0.4%
- Severe TBI/SCI  n=2  0.4%
- Under 18 yrs  n=1  0.2%
Participant demographics

38 adult road-trauma survivors

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<thead>
<tr>
<th></th>
<th>Age</th>
<th>[range 22-89]</th>
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<tr>
<td></td>
<td>43.2 ± 14.6</td>
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Sex
- 28 male (74%)
- 10 female (26%)

Pre-morbid function
- Community-dwelling (100%)
- Independently mobile (100%)
- 37 working, 1 retired
- 34 regular (≥weekly) physical activity (89%)
Mode of accident

Car driver/passenger  n=3  8%
Motorbike           n=10  26%
Cyclist             n=15  40%
Pedestrian          n=10  26%
Compensable under CTP  n=27  71%
Injury profile

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>%</th>
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<tbody>
<tr>
<td>CHI/TBI</td>
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<td>42%</td>
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<tr>
<td>Pelvic</td>
<td>2</td>
<td>5%</td>
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<td>Pelvic #</td>
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<tr>
<td>Peripheral nerve injury</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Deep soft tissue injury</td>
<td>7</td>
<td>18%</td>
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<tr>
<td>Pneumo/haemotherax</td>
<td>5</td>
<td>13%</td>
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### Injury profile

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<td><strong>Hospital LOS</strong></td>
<td>6.0 ± 5.3 days</td>
<td>[range 1-22]</td>
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<td><strong>ICU</strong></td>
<td>4 patients (11%)</td>
<td></td>
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<tr>
<td><strong>Acute intervention</strong></td>
<td>27 required surgery (71%)</td>
<td>5 required multiple operations (13%)</td>
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Trial progress

Baseline n=38

Telehealth consult n=37

1 month follow-up n=32

3 month follow-up n=22

n=1 withdrawal

n=1 lost to FU
n=4 upcoming

n=14 upcoming
At baseline

- 36 patients (95%) reported pain: BPI Severity 3.0 ± 1.9, Interference 4.5 ± 2.8
- 33 (87%) required assistance with ADLs: Lawtons 23.3 ± 5.1
- 32 (84%) had impaired mobility
- 26 (68%) met criteria for at least mild anxiety: GAD-7 7.4 ± 4.9
- 29 (76%) met criteria for at least mild depression: PHQ-9 8.4 ± 5.2
- 4 (11%) met criteria for PTSD: PC-PTSD ≥3
Information provision in hospital

- **24 patients (63%)** reported receiving **no information or minimal information** about their injury, expected recovery, safety and/or required precautions prior to discharge.

- **19 (51%)** were **not satisfied** with the information that was provided to them prior to hospital discharge.
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- **24 patients (63%)** reported receiving **no information or minimal information** about their injury, expected recovery, safety and/or required precautions prior to discharge.

- **19 (51%)** were **not satisfied** with the information that was provided to them prior to hospital discharge.

**5 patients (13%)** had already **re-presented to ED**
- pain (2), wound infection, bowel perforation, ?DVT, haematoma requiring drainage

**6 more (16%)** had **contacted the trial team in crisis**
- pain, psychological distress, housebound, not coping at home, concerns re injury, unaware of FU, needing referrals/hospital documentation
Telehealth consultations

Conducted 13.3 ± 5.2 days post-discharge

- **37 patients (100%)** required **education**
  - safety, precautions, wound care, equipment use, exercises, pain management, recovery trajectory, follow-up processes, community access, community services, financial assistance, CTP scheme, return to work, driving, usual activities, managing mood, sleep and fatigue, nutrition

- **32 patients (86%)** had **rehabilitation needs identified,**
  - and **required a rehabilitation plan**
Unmet rehabilitation needs

- **Referral to rehabilitation services**
  - n=27 (73%)

  - Physiotherapy  n=20
  - Hydrotherapy  n=4
  - Occupational therapy  n=4
  - Psychology  n=9
  - Rehabilitation Medicine Physician  n=6
  - Other medical specialist  n=3

  n=1 required inpatient rehabilitation admission (15 days)
  n=2 required ambulatory/day-hospital rehabilitation
Unmet rehabilitation needs

- Equipment prescription/recommendation
  - shower stool, bath-board, over-toilet aid n=4 (11%)

- Review/revise pharmacological management
  - pain medication n=12
  - psychotropic medication n=4 n=16 (43%)

- Further diagnostic imaging n=8 (22%)

- Return to work liaison n=8 (22%)

- Assistance with CTP claim n=14 (38%)

- Ongoing assistance with follow-up, appointment bookings, care coordination n=20 (54%)
Clinical case - Mr JE

Scenario: 43 yr old male, fall from pushbike
R #NOF (ORIF) -> touch weight bearing 6 weeks
R #proximal humerus -> non-weight bearing 6 weeks
Lives multi-story terrace – access via stairs, bedroom upstairs
Wife and 2 young children

Identified: Housebound on bottom level of house (wife unable to lift down front steps)
Could not reach bedroom – sleeping on couch
Attempting to self-propel wheelchair inside using one foot
Unable to transfer to toilet unassisted (unaccompanied during the day)
Severe pain – unable to get to GP or pharmacy for analgesia
Financial concerns – non-compensable, unable to work, childcare
Relationship strain, carer stress, low mood
Clinical case - Mr JE

Actions:
- Urgent analgesia prescription/delivery
- Education re precautions, restrictions
- Counselling
- Community services, online shopping
- Ongoing phone support
- Telehealth physiotherapy -> transition to outpatient hospital physiotherapy
Clinical case - Mr GL

Scenario: 48 yr old male, struck by car while crossing road at approx. 50km/hr SAH, cerebral contusions, skull #s, # ribs 3-10 with flail segment (plated), haemothorax In hospital 13 days (6 days in ICU) Financial executive, living with wife

Identified: Severe pain – affecting mood, concentration and ADLs Marked cognitive and personality change post-TBI, lack of insight Sensory, perceptual and visual disturbances Dizziness, fatigue Significant safety risks re driving and community access No TBI follow-up arranged
Clinical case - Mr GL

Actions:

Safety education & counselling – refrain from driving, drinking, return to work
Revise analgesia
Urgent review by Rehabilitation Physician
  ➢ Admission to Day Hospital (OT, physio, neuropsychology) - ongoing therapy
  ➢ Neuropsych and formal driving assessments
  ➢ RTW liaison with employer
Ophthalmology review
Liaison with GP
Qualitative feedback  (n=32)

- 91% of patients were satisfied or highly satisfied with the service
- 100% felt it was helpful  
  84% very or extremely helpful
- 100% felt it was convenient 
  91% very or extremely convenient
- 81% felt it was easy to use the technology 
  n=2 found it difficult
- 100% felt safe using the telehealth platform
- 88% felt it directly assisted their recovery
- 100% agreed they would like to receive a similar service in future
Participant testimonials

“Convenience is a big plus. The emotional and psychological support during my recovery was very helpful.”

“I was lost when I was discharged from hospital and had no one to talk to. I got so much guidance from the team – I’m very happy, I never realised this would help me so much.”

“This service is amazing - I am very lucky. The staff always had time to help me, and I didn't have to sit around waiting for hours like when I came to hospital for appointments. This was very important to me.”
Clinical implications

- Acute medical/surgical management of injuries is done well, but limited focus on the functioning of individuals who sustain those injuries.
- **Rehabilitation expertise is needed in the acute trauma setting**

- Lessons for acute care/trauma teams - to recognise where rehab is needed.
- Lessons for rehabilitation teams – to be innovative and responsive.
- Care co-ordination and information provision are key areas for improvement.
Conclusions

- A high proportion of trauma survivors have unmet rehabilitation needs and ongoing activity limitations following hospital discharge.

- Delivering a rehabilitation follow-up service via telehealth is feasible:
  - perceived as convenient, useful, safe and beneficial by patients
  - can identify those in need of more intensive intervention & follow-up

- Rehabilitation Medicine has a role to play in improving care co-ordination for survivors of trauma, across the recovery continuum.
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  Karon McDonnel

Clinical Research Unit for Anxiety and Depression
  Dr Alison Mahoney

Physiotherapy
  Sarah Sweeney

Telehealth
  Majid Shahi

We thank all study participants

Keep up to date with our research:

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@CurtoVratsistas
@sfaux1
@SVHSydney
Outcomes at follow-up (in progress)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>1 month (n=32)</th>
<th>3 months (n=22)</th>
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<tbody>
<tr>
<td>Require mobility aid</td>
<td>9 (28%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Require assistance with self-care</td>
<td>3 (9%)</td>
<td>2 (9%)</td>
</tr>
<tr>
<td>Ongoing pain</td>
<td>27 (84%)</td>
<td>16 (72%)</td>
</tr>
<tr>
<td>Mood disturbance</td>
<td>17 (53%)</td>
<td>10 (45%)</td>
</tr>
<tr>
<td>Return to work</td>
<td></td>
<td></td>
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<tr>
<td>Full duties</td>
<td>5 (16%)</td>
<td>11 (50%)</td>
</tr>
<tr>
<td>Modified duties/reduced hours</td>
<td>10 (31%)</td>
<td>4 (18%)</td>
</tr>
<tr>
<td>Return to driving</td>
<td>13 (41%)</td>
<td>14 (64%)</td>
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Severity (1.9) and interference (1.7) reduced
- GAD-7 & PHQ-9 scores reduced
- Engaged with psychologist