Determining the impact of opioid substitution therapy (OST) on mortality post-release

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Collaborators and funding sources

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- Pia Salmelainen, NSW Ministry of Health
- NSW Bureau of Crime Statistics and Research
- Australian Institute of Health and Welfare
- **NHMRC fellowships**: Louisa Degenhardt (#1041742), Sarah Larney (#1035149), Richard Mattick (#1045318)
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Mortality post-release

• High risk of death following release from prison
  • Compared to the general population, 3+ times greater for men, 7+ times greater for women
• Large proportion of deaths in the 2 weeks after release are drug-induced
  • Meta-analysis: 76% of deaths in the first 2 weeks were drug-related (Merrall et al. 2010)
  • Risk of overdose in the first 2 weeks is 3-11 times that in weeks 5-12 post-release
Mortality post-release

• Opioid substitution therapy (OST): maintenance pharmacotherapy with opioid agonists e.g. methadone, buprenorphine
• Reduces mortality of opioid-dependent people by more than one-half
• Does OST reduce risk of death among released opioid-dependent prisoners?
Method

• Setting:
  • New South Wales, Australia
  • Health care provided by unit of the Ministry of Health
  • Long-established OST program
  • Continuation of community treatment or commence treatment if clinically indicated
  • Pre-release planning to ensure continuity of care
Method

• Data sources:
  • Pharmaceutical Drugs of Addiction System (Ministry of Health) (from 1985 onwards)
    • Records all episodes of methadone and buprenorphine maintenance in NSW
  • Re-offending Database (Bureau of Crime Statistics and Research) (from 2000 onwards)
    • Records all court proceedings and incarcerations in NSW
  • National Death Index (Australian Institute of Health and Welfare)
    • Records dates and causes of death nationally.
Method

• Data from PHDAS probabilistically linked to the ROD and NDI:
  • Full name
  • DOB
  • Sex
  • Date and state of last known contact
• Linkage undertaken by data custodians
• De-identified linked data files provided to research team for analysis
Method: Post-release cohort definition

- Cohort: people with an episode of OST who had also been released from prison at least once
- Only those releases from prison during or after the first episode of OST were included
- Assumes chronic opioid dependence
  - Any resulting bias would produce more conservative results, as people no longer using opioids would have lower baseline mortality risk
Cohort definition

- All people seeking OST, 1985-2012
  - People seeking OST who were released from prison, 2000-2012
  - People seeking OST who died, 1985-2012
Method

• Crude mortality rates in and out of treatment
• Association between OST and mortality:
  • Extended Cox models that allowed for discontinuous risk intervals
  • Post-release OST exposure coded as time-dependent variable
Results: Post-release mortality, 2000-2012

- N=16,453
  - 79% (n=12,945) men
  - 30% (n=4,919) Indigenous
- 60,161 releases from prison
- OST was prescribed in 51% of releases (n=30,397)
- 1,050 deaths after a prison release
Mortality after release, first day (n=39)

N deaths

Days post-release

1 2 3 4 5 6 7

0 1 2 3 4 5 6 7 8 9 10
Mortality after release, first month (n=96)
Mortality after release, first year (n=411)
Number of deaths in the first 4 weeks post-release

<table>
<thead>
<tr>
<th></th>
<th>OST exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full</td>
</tr>
<tr>
<td>All-cause</td>
<td>16</td>
</tr>
<tr>
<td>Accidental drug-induced</td>
<td>6</td>
</tr>
<tr>
<td>Suicide</td>
<td>0</td>
</tr>
<tr>
<td>Accidental injury</td>
<td>2</td>
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<tr>
<td>Violence</td>
<td>2</td>
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</tbody>
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Crude mortality rates per 1000PY in the first 4 weeks post-release

<table>
<thead>
<tr>
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<th>OST exposure</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Full</td>
</tr>
<tr>
<td>All-cause</td>
<td>8.8</td>
</tr>
<tr>
<td>Accidental drug-induced</td>
<td>3.5</td>
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<tr>
<td>Suicide</td>
<td>1.0</td>
</tr>
<tr>
<td>Accidental injury</td>
<td>1.6</td>
</tr>
<tr>
<td>Violence</td>
<td>0.6</td>
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</tbody>
</table>
### Predictors of mortality 4 weeks post-release

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Unadjusted HR (95% CI)</th>
<th>Adjusted HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1.87 (1.00, 3.52)</td>
<td>1.33 (0.69, 2.55)</td>
</tr>
<tr>
<td>Indigenous</td>
<td>0.78 (0.50, 1.20)</td>
<td>0.81 (0.51, 1.28)</td>
</tr>
<tr>
<td>Age at prison release* ( \log(\text{time}) )</td>
<td></td>
<td>0.96 (0.95, 0.97)</td>
</tr>
<tr>
<td>Post-release exposure to OST(^1)</td>
<td>0.22 (0.13, 0.37)</td>
<td>0.25 (0.12, 0.53)</td>
</tr>
<tr>
<td>OST during most recent incarceration* ( \log(\text{time}) )</td>
<td></td>
<td>1.47 (1.16, 1.87)</td>
</tr>
<tr>
<td>Number of prior OST episodes(^2)</td>
<td>0.94 (0.85, 1.04)</td>
<td>0.97 (0.87, 1.07)</td>
</tr>
<tr>
<td>Juvenile offending history</td>
<td>0.93 (0.58, 1.47)</td>
<td>0.88 (0.48, 1.61)</td>
</tr>
<tr>
<td>Length of most recent incarceration(^2)</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>Less than 1 month</td>
<td>1.93 (1.17, 3.18)</td>
<td>2.65 (1.56, 4.51)</td>
</tr>
<tr>
<td>1-6 months</td>
<td>1.45 (0.78, 2.68)</td>
<td>1.93 (0.98, 3.78)</td>
</tr>
<tr>
<td>6-12 months</td>
<td>1.28 (0.61, 2.70)</td>
<td>1.79 (0.79, 4.04)</td>
</tr>
<tr>
<td>More than 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of prior incarcerations(^2)</td>
<td>1.00 (0.92, 1.08)</td>
<td>1.00 (0.92, 1.10)</td>
</tr>
<tr>
<td>Any property offence prior to release(^3)</td>
<td>1.28 (0.61, 2.68)</td>
<td>2.56 (0.99, 6.63)</td>
</tr>
<tr>
<td>Any violent offence prior to release(^3)</td>
<td>1.11 (0.70, 1.75)</td>
<td>1.07 (0.65, 1.77)</td>
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<tr>
<td>Any drug offence prior to release* ( \log(\text{time}) )</td>
<td></td>
<td>0.64 (0.53, 0.79)</td>
</tr>
</tbody>
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OST and mortality in the first 4 weeks post-release

• Time in OST associated with a 75% reduction in hazard of death (adj. HR 0.25; 95% CI: 0.12, 0.53)
Discussion

• OST is critical to minimising post-release mortality among opioid-dependent prisoners
• Also dramatically reduces deaths \textit{in} prison (see Larney et al. (2014), BMJ Open)
• Reduces injecting, drug charges in prison
• Higher rates of post-prison OST if someone is maintained on OST during incarceration