Does exposure to opioid substitution treatment in prison reduce the risk of death after release?

Matt Hickman, John Marsden & Michael Farrell
Acknowledgements

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- **IDTS Steering Group:** Dr Mary Piper (English Department of Health); Nino Maddalena (PHE); David Sheehan (PHE); Christine Kelly (NHS); Dave Marteau (English Department of Health); Caroline Turley (NATCEN); Michael Wheatley (National Offender Management Service); Caroline Bonds (National Offender Management Service); Kieran Lynch (PHE); John McCracken (English Department of Health)
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- **The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health**
**Prisons and substance use**

- Globally >10 million imprisoned annually

- In most countries one quarter to half of prisoners have drug dependence problems

- High risk of death in period immediate post-release
Post-release mortality: 1-2 wks v 5-12 wks

Merrall EL *Addiction* 2010; 105(9): 1545-54
Integrated Drug Treatment System (IDTS)

- Introduced in the UK in 2006
  - Rolled out across the whole prison estate from 2010

- A program to increase the volume and quality of treatment available to prisoners, and reinforce continuity of care between prison and community

- Offers enhanced clinical management of drug dependence
  - Substitute prescribing
  - Enhanced psychosocial support

- Multidisciplinary health care team

Evaluation of the IDTS

• **Aim:** Compare impact of in-prison OST on risk of death following release

• **Design:** Prospective Clinical Cohort Study.
  - *Intervention:* OST delivered as a continuing treatment on release
  - *Control:* detoxification in which inmate is released with a zero or minimal level of OST

• **Participants:** Adult prisoners (18+) opioid dependent upon entry into prison (sentenced or remand) and in receipt of treatment at entry.

• **Hypothesis:** Intervention reduces risk of death by 4-5 fold in 1st month and 50% by 3-4 months.

• **Null Ho:** there is no difference in mortality between intervention & control

• **Sample:** ~ 20,000 (10,000 exposed/ 10,000 unexposed)
Quarterly recruitment rate at active prisons (09/10 to 08/13)
Record Linkage Methods

- 43 prisons approached (~95% IDTS throughput in 2009)
- 4 refused

**Linkage:**
- MOJ/Justice Statistics Analytical Services – prison and date of release (09/10 – 10/14)
- Clinical Records/Prison of release – Exposure: OST on release
- ONS/NHS – Outcome: death record (-06/16)
- NDTMS – Covariate/Outcome: Drug treatment after release
Prisons of Recruitment (light blue n=39) and additional prisons of release (dark blue n=84) Total=123
Sample & Risk Set

- 22,623 incarcerations sent by prisons
  - 56 Opt out (dissents)
  - 567 duplicate reports
  - 3469 missing prison of release
  - 2527 missing OST exposure data
  - 770 unlinked to NHS register/death data
- 15,141 incarcerations/ 12,260 people

Total cases: 22,623

Cohort recruited: 22,000 cases
  (16,270 individuals)

Sample after prison matching: 18,446

Final sample in risk set: 15,141
  (12,260 individuals)

Removed:
- Administrative duplicates: 567
- Prisoners electing to opt out: 56
- No match on release database: 2,186
- Not released from prison: 1,368
- Not matched for deaths register: 770
- OST prescribing data not available: 2,527
- Died in prison: 8
Sample

• **15,141 cases / 12,260 individuals**
  - 10,061 released once
  - 1697 twice

• **9569 (78%) individuals & 11,752 (78%) incarcerations were men**

• Median age at release: **34 years**

• Median time from recruitment to release: **60 days**

• Exposure: **8645 (57%)** of cases released on **methadone** (median dose 40mg) or **buprenorphine** (median dose 8mg)
Outcome

- **401 deaths (from prison release to February 2016)**
- **160 (102 DRP) occurred within 1 year of prison release**
  - 143 men, 16 women
  - 1.2 per 100 person years (py)/ DRP 0.77 py
- **64 (42 DRP) of these occurred in the first 4 months**
  - 61 men, 3 women
  - 1.38 py / DRP 0.9 py
- **24 (18 DRP) of these occurred in the first 4 weeks**
  - 24 men, 0 women
  - 2.12 py/ DRP 1.58 py
Survival plot for opioid dependent people released from prison.

- Survival probability vs. Days since prison discharge.
- Two lines represent different exposure statuses.
  - Solid line: Not OST exposed.
  - Dotted line: OST exposed.
- Key points: 4 weeks and 4 months.
DRP survival plot for opioid dependent people released from prison

Number at risk
Not OST exposed: 6496 6168 5959 5848 5775 5735 5701 5683
OST exposed: 8645 7874 7445 7177 7049 6960 6916 6868

Survival probability
28 days 122 days (4 months)

Days since prison discharge

0.985 0.990 0.995 1.000
Plot shows that the hazards get closer to each other over time.
Mortality risk leaving prison: OST vs leaving drug free

<table>
<thead>
<tr>
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<td>PY at risk (n deaths)</td>
<td>Rate per 100 PY (95% CI)</td>
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<td>0 – 4 weeks</td>
<td>643 (6)</td>
<td>0.93 (0.42-2.08)</td>
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<td>4 weeks – 4 months</td>
<td>1,966 (23)</td>
<td>1.17 (0.78-1.76)</td>
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<td>4 months – 1 year</td>
<td>4,654 (52)</td>
<td>1.12 (0.85-1.47)</td>
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Drug Related Poisoning Mortality risk leaving prison: OST vs leaving drug free

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<td>0 – 4 weeks</td>
<td>643 (3)</td>
<td>0.47 (0.15-1.45)</td>
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<td>1,966 (13)</td>
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Leaving prison on OST & entering community drug treatment: independent effects

- 6295 (42%) people entered drug treatment in 1st 4 weeks after prison release
- Leaving on OST more likely to enter community Rx:
  - HR 2.13, (95%CI 2.01-2.25)
  - Community Rx reduces DRP:
    - HR 0.39 (95% CI 0.1-1.4)
  - Mutually beneficial – no evidence of an interaction/or mediation

no evidence on an interaction between OST Rx on prison release and community Rx (Ratio of hazard ratios risk (ratio of HR 1.26 (95% CI 0.07-21.29), LRT p-value 0.86)
Intervention effect of leaving prison on OST vs leaving drug free on mortality risk at 4 weeks: adjusted analyses

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Multiply imputed analysis
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Multiply imputed analysis; community treatment within 4 weeks post-release – time varying covariate.
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Implications

• 75% reduction in 4 week mortality if released on OST

• 85% reduction in drug related poisoning
  • Removed excess risk of death post prison

• Increase (> 2*) in drug treatment in the community
  • Entering treatment in first 4 weeks independent beneficial effect

• Underscores the importance of providing (maintenance) OST in prison to bridge the transition to the community

• Decision to withdraw prisoners from OST must be made with care

• Needs replication – Scotland?
Strengths and Limitations

- RCT not feasible/ethical
  - Large observational studies/record linkage/objective outcomes
  - Prospective cohort – low likelihood of selection bias in relation to outcome
- BUT confounding key problem/issue
  - No IV for leaving on OST in prison
  - Key factors not captured (addiction severity, recovery resilience, treatment engagement)
- And missing data – especially if moved prison
Does exposure to opioid substitution treatment in prison reduce the risk of death after release? A national prospective observational study in England

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