



## **Supporting Information**

### **Supplementary methods, tables and results**

This appendix was part of the submitted manuscript and has been peer reviewed.  
It is posted as supplied by the authors.

Appendix to: Waller1 KMJ, De La Mata NL, Kelly PJ, et al. Residual risk of infection with blood-borne viruses in potential organ donors at increased risk of infection: systematic review and meta-analysis. *Med J Aust* 20179; doi: 10.5694/mja2.50315.

**Table 1. Search strategy for systematic review**

Part one:

1. Hepatitis B/ or hepatitis.mp.
2. Hepatitis B virus.mp. or Hepatitis B virus/
3. Hepatitis B Surface Antigens/ or HBV.mp.
4. 1 or 2 or 3
5. Hepatitis C/ or hepatitis c.mp.
6. Hepatitis C/ or hepatitis c.mp.
7. HCV.mp.
8. 5 or 6 or 7
9. HIV/ or hiv.mp. or HIV-2/ or HIV-1/
10. Human immunodeficiency virus.mp.
11. 9 or 10
12. Prevalence/ or prevalence.mp.
13. Incidence.mp. or Incidence/
14. Seroprevalence.mp. or Seroepidemiologic Studies/
15. exp Seroepidemiologic Studies/ or seroepidemiology.mp.
16. 4 or 8 or 11
17. America.mp. or exp Americas/
18. Exp Europe/ or Europe.mp.
19. Africa.mp. or exp Africa/
20. North America.mp. or exp North America/
21. South America.mp or exp South America/
22. Exp Antarctic Regions/ or Antarctica.mp.
23. Exp Arctic Regions/ or actic.mp
24. Caribbean region/ or exp central America/ or "Gulf of Mexico" or Latin America/ or exp Asia/ or historical geographic locations/ or exp Atlantic islands/ or Borneo/ or Greenland/ or Iceland/ or exp Indian Ocean islands/ or Indonesia/ or Ireland/ or Japan/ or Macau/ or Mediterranean islands/ or Philippines/ or prince Edward island/ or Svalbard/ or Taiwan/ or West Indies/ or exp "oceans and seas"/
25. 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24
26. 12 or 13 or 14 or 15
27. 16 and 26
28. Limit 27 to yr = "2000-Current"
29. Limit 28 to English language
30. 29 not 25
31. (letter or clinical trial or editorial or review or randomized controlled trial).pt.
32. 30 not 31
33. (animals not (humans and animals)).sh.
34. 32 not 33

Part two:

1. Hepatitis B/ or hepatitis.mp.
2. Hepatitis B virus.mp. or Hepatitis B virus/
3. Hepatitis B Surface Antigens/ or HBV.mp.
4. 1 or 2 or 3
5. Hepatitis C/ or hepatitis c.mp.
6. Hepatitis C/ or hepatitis c.mp.
7. HCV.mp.
8. 5 or 6 or 7
9. HIV/ or hiv.mp. or HIV-2/ or HIV-1/
10. Human immunodeficiency virus.mp.
11. 9 or 10
12. Prevalence/ or prevalence.mp.
13. Incidence.mp. or Incidence/
14. Seroprevalence.mp. or Seroepidemiologic Studies/
15. exp Seroepidemiologic Studies/ or seroepidemiology.mp.
16. 4 or 8 or 11
17. 12 or 13 or 14 or 15
18. 18 and 17
19. Limit 18 to year = "2000-Current"
20. Limit 19 to English language
21. (letter or clinical trial or editorial or review or randomized controlled trial).pt.
22. (animals not (humans and animals)).sh.
23. 20 not 21
24. 23 not 22
25. Australia\*.tw.
26. 24 and 25

**Table 2. Overview of the 75 eligible studies included in the systematic review**

| Study                                           | Years of recruitment | Setting                                                              | Study design                                            | Blood-borne virus | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                      |           |             |                       |
|-------------------------------------------------|----------------------|----------------------------------------------------------------------|---------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|-----------|-------------|-----------------------|
|                                                 |                      |                                                                      |                                                         |                   | Men who have sex with men                                                                 | Injecting drug users | Prisoners | Sex workers | Partners at high risk |
| ACCESS <sup>1</sup>                             | 2012–2016            | Up to 110 health services across Australia                           | Retrospective cohort with convenience sampling          | HIV               | 38 822 py                                                                                 |                      |           |             |                       |
| ACCESS <sup>2</sup>                             | 2011–2015            |                                                                      |                                                         | HIV               | 14 454 py                                                                                 |                      |           |             |                       |
| ACCESS <sup>3</sup>                             | 2011–2014            |                                                                      |                                                         | HIV               | 26 837                                                                                    |                      |           |             |                       |
| ACCESS <sup>4</sup>                             | 2015                 | 32 sexual health clinics in NSW                                      | Retrospective cohort with convenience sampling          | HIV               | 1103                                                                                      |                      |           |             |                       |
| VPCNSS <sup>5</sup>                             | 2006–2009            | 5 clinics with MSM focus; 4 metropolitan, 1 regional.                |                                                         | HIV               | 4837 py                                                                                   |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HIV               | 7857                                                                                      |                      |           |             |                       |
| Metropolitan Sexual Health Clinics <sup>6</sup> | 1993–1999            | Metropolitan sexual health clinics across Australia                  | Prospective cohort with convenience sampling            | HIV               | 2,673 py                                                                                  |                      |           |             |                       |
| Metropolitan Sexual Health Clinics <sup>7</sup> | 2003                 | Metropolitan sexual health clinics across Australia                  | Prospective cohort with convenience sampling            | HIV               | 1342                                                                                      |                      |           |             |                       |
|                                                 | 2004                 |                                                                      |                                                         | HCV               | 324                                                                                       | 160                  | 302       |             |                       |
| Metropolitan Sexual Health Clinics <sup>8</sup> | 2001–2010            | Metropolitan sexual health clinics across Australia                  | Prospective cohort with convenience sampling            | HIV               | 6197                                                                                      |                      |           |             |                       |
| Health in Men <sup>9</sup>                      | 2001–2004            | Sydney, largely gay community events (53%)                           | Prospective cohort with non-random convenience sampling | HIV               | 6794.9 py                                                                                 |                      |           |             |                       |
| Health in Men <sup>10</sup>                     |                      |                                                                      |                                                         | HCV               | 4412 py                                                                                   |                      |           |             |                       |
| Health in Men <sup>11</sup>                     |                      |                                                                      |                                                         | HCV               | 1,398                                                                                     |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HBsAg             | 1397                                                                                      |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HBcAb             | 1397                                                                                      |                      |           |             |                       |
| Read 2013 <sup>12</sup>                         | 2010–2011            | Melbourne sexual health clinic                                       | RCT with convenience sampling                           | HIV               | 566 py                                                                                    |                      |           |             |                       |
| Read 2017 <sup>13</sup>                         | 2014–2015            | Melbourne sexual health clinic                                       | RCT with convenience sampling                           | HIV               | 409.6 py                                                                                  |                      |           |             |                       |
| Bradshaw 2005 <sup>14</sup>                     | 1999–2002            | Melbourne sexual health clinic outreach to known injecting locations | Prospective cohort with convenience sampling            | HBcAb             | 311                                                                                       |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HIV               | 309                                                                                       |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HCV               | 314                                                                                       |                      |           |             |                       |
|                                                 |                      |                                                                      |                                                         | HBsAg             | 311                                                                                       |                      |           |             |                       |

| Study                         | Years of recruitment | Setting                                            | Study design                                            | Blood-borne virus            | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                          |           |                    |                       |
|-------------------------------|----------------------|----------------------------------------------------|---------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------|--------------------------|-----------|--------------------|-----------------------|
|                               |                      |                                                    |                                                         |                              | Men who have sex with men                                                                 | Injecting drug users     | Prisoners | Sex workers        | Partners at high risk |
| Gamagedara 2014 <sup>15</sup> | 2002–2012            | Melbourne sexual health clinic                     | Retrospective cohort with convenience sampling          | HBsAg<br>HBcAb<br>HBcAb      | 2577<br>3540 py<br>7888                                                                   |                          |           |                    |                       |
| Lister 2005 <sup>16</sup>     | 2002                 | Four gay venues in Melbourne                       | Prospective cohort with convenience sampling            | HIV                          | 102                                                                                       |                          |           |                    |                       |
| COUNT <sup>17</sup>           | 2013–2014            | Several gay venues across Australia                | Prospective cohort with convenience sampling            | HIV                          | 3071                                                                                      |                          |           |                    |                       |
| Pedrana 2012 <sup>18</sup>    | 2008                 | Seven gay venues in Melbourne                      | Prospective cohort with convenience sampling            | HIV                          | 639                                                                                       |                          |           |                    |                       |
| Estcourt 2000 <sup>19</sup>   | 1991–1998            | Sexual health centre in Sydney                     | Retrospective cohort with convenience sampling          | HIV<br>HCV<br>HBcAb          | 1885<br>81<br>1750                                                                        |                          |           | 1174<br>54<br>1089 |                       |
| Coughlan 2001 <sup>20</sup>   | 1995–1997            | Sexual health centre in Sydney                     | Retrospective cohort with convenience sampling          | HIV<br>HCV<br>HBcAb          |                                                                                           |                          |           |                    | 522<br>50<br>471      |
| Lawrinson 2008 <sup>21</sup>  | 2003–2005            | Opioid substitution clinic in Adelaide             | Prospective cohort with convenience sampling            | HIV<br>HCV                   |                                                                                           | 38<br>40                 |           |                    |                       |
| Day 2010 <sup>22</sup>        | 2005                 | Methadone clinic in inner Sydney                   | Prospective cohort with convenience sampling            | HIV<br>HCV<br>HBcAb<br>HBsAg |                                                                                           | 209<br>209<br>203<br>203 |           |                    |                       |
| Networks II <sup>23</sup>     | 2005–2006            | Five street drug markets in metropolitan Melbourne | Prospective cohort with convenience + snowball sampling | HCV                          |                                                                                           | 148 py                   |           |                    |                       |
| Networks II <sup>24</sup>     | 2005–2007            | Five street drug markets in metropolitan Melbourne | Prospective cohort with convenience + snowball sampling | HIV<br>HCV                   |                                                                                           | 352<br>357               |           |                    |                       |
| Networks II <sup>25</sup>     | 2005–2008            | Five street drug markets in metropolitan Melbourne | Prospective cohort with targeted + snowball sampling    | HBsAg<br>HBcAb<br>HBcAb      |                                                                                           | 344<br>38.2 py<br>344    |           |                    |                       |

| Study                                    | Years of recruitment | Setting                                                  | Study design                                                 | Blood-borne virus   | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                         |           |             |                       |
|------------------------------------------|----------------------|----------------------------------------------------------|--------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-------------------------|-----------|-------------|-----------------------|
|                                          |                      |                                                          |                                                              |                     | Men who have sex with men                                                                 | Injecting drug users    | Prisoners | Sex workers | Partners at high risk |
| Vajdic 2015 <sup>26</sup>                | 1993–2007            | Pharmaceutical drugs of addiction scheme in NSW          | Retrospective data linkage with cross-sectional sampling     | HIV<br>HCV<br>HBsAg |                                                                                           | 29571<br>29571<br>29571 |           |             |                       |
| ANSPS <sup>27,28,*</sup>                 | 2000–2015            | Needle syringe program survey across Australia           | Deterministic data linkage of prospective convenience sample | HIV<br>HCV          |                                                                                           | 21 191 py<br>1245.5 py  |           |             |                       |
| ANSPS <sup>29</sup>                      | 2017                 | Needle syringe program survey across Australia           | Prospective cohort with convenience sampling                 | HIV<br>HCV          |                                                                                           | 2573<br>2380            |           |             |                       |
| Australian prison entrants <sup>30</sup> | 2009                 | All Australian prison entrants                           | Prospective cohort, uncertain sampling                       | HIV                 |                                                                                           |                         | 8471      |             |                       |
| NPEBBVS <sup>31</sup>                    | 2016                 | 19 reception prisons in 6 jurisdictions across Australia | Prospective cohort cross-sectional sampling                  | HIV                 |                                                                                           |                         | 289       |             |                       |
|                                          |                      |                                                          |                                                              | HCV                 |                                                                                           |                         | 288       |             |                       |
|                                          |                      |                                                          |                                                              | HBcAb               |                                                                                           |                         | 273       |             |                       |
|                                          |                      |                                                          |                                                              | HBsAg               |                                                                                           |                         | 260       |             |                       |
| Watkins 2009 <sup>32</sup>               | 2005–2006            | 13 Western Australian prisons                            | Retrospective audit with quota sampling                      | HIV                 |                                                                                           |                         | 314       |             |                       |
|                                          |                      |                                                          |                                                              | HCV                 |                                                                                           |                         | 330       |             |                       |
|                                          |                      |                                                          |                                                              | HBsAg               |                                                                                           |                         | 286       |             |                       |
| Gilles 2008 <sup>33</sup>                | 2006                 | Prison in Western Australia                              | Retrospective audit with convenience sampling                | HIV                 |                                                                                           |                         | 146       |             |                       |
|                                          |                      |                                                          |                                                              | HCV                 |                                                                                           |                         | 151       |             |                       |
|                                          |                      |                                                          |                                                              | HBsAg               |                                                                                           |                         | 154       |             |                       |
| Sturrock 2007 <sup>34</sup>              | 2002–2005            | Five sexual health clinic outreach locations in the ACT  | Prospective cohort with convenience sampling                 | HCV                 | 114                                                                                       |                         |           | 34          |                       |
| The Byrne Surgery <sup>35</sup>          | 1996–2003            | Opioid replacement clinic in Sydney                      | Retrospective audit with convenience sampling                | HCV                 |                                                                                           | 131.1 py                |           |             |                       |
|                                          |                      |                                                          |                                                              | HCV                 |                                                                                           | 288                     |           |             |                       |
| The Byrne Surgery <sup>36</sup>          | 2002–2004            | Opioid replacement clinic in Sydney                      | Retrospective audit with convenience sampling                | HBsAg               |                                                                                           | 171                     |           |             |                       |
|                                          |                      |                                                          |                                                              | HBcAb               |                                                                                           | 171                     |           |             |                       |

| Study                                      | Years of recruitment | Setting                                                                                   | Study design                                                     | Blood-borne virus | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                      |           |             |                       |
|--------------------------------------------|----------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|-----------|-------------|-----------------------|
|                                            |                      |                                                                                           |                                                                  |                   | Men who have sex with men                                                                 | Injecting drug users | Prisoners | Sex workers | Partners at high risk |
| Maher 2007 <sup>37</sup>                   | 1999–2002            | Street-based outreach of methadone clinics and needle syringe programs in suburban Sydney | Prospective cohort with convenience sampling                     | HCV               |                                                                                           | 133.2 py             |           |             |                       |
| Maher 2004 <sup>38</sup>                   | 1999–2002            | Street-based outreach of methadone clinics and needle syringe programs in suburban Sydney | Prospective cohort with convenience and snowball sampling        | HBcAb             |                                                                                           | 372                  |           |             |                       |
|                                            |                      |                                                                                           |                                                                  | HBsAg             |                                                                                           | 370                  |           |             |                       |
| Maher 2006 <sup>39</sup>                   | 1999–2002            | 3 needle syringe programs in NSW (urban, regional and remote settings)                    | Prospective cohort with convenience sampling                     | HCV               |                                                                                           | 221 py               |           |             |                       |
| HITS-c <sup>40</sup>                       | 2008–2011            | 3 outreach recruitment sites across Sydney                                                | Prospective targeted and snowball convenience sampling           | HCV               |                                                                                           | 215.2 py             |           |             |                       |
| HITS-p <sup>41</sup>                       | 2005–2014            | 21 correctional centres in NSW                                                            | Prospective cohort with convenience sampling                     | HCV               |                                                                                           |                      | 815 py    |             |                       |
| Kirketon Road Centre <sup>2</sup>          | 2015                 | Health clinic in metropolitan Sydney                                                      | Prospective cohort with convenience sampling                     | HCV               |                                                                                           | 56.3 py              |           |             |                       |
| Comorbidity and Trauma Study <sup>42</sup> | 2005–2008            | Opioid substitution clinics in greater Sydney                                             | Prospective cohort with convenience sampling                     | HCV               |                                                                                           | 1484                 |           |             |                       |
| Aitken 2008 <sup>43</sup>                  | 2001–2002            | Street drug market in Melbourne                                                           | Prospective snowball sampling                                    | HCV               |                                                                                           | 199                  |           |             |                       |
| NSW Inmate Health Survey <sup>44</sup>     | 1996–2001            | NSW prisons                                                                               | Prospective stratified sample with follow up                     | HCV               |                                                                                           |                      | 225.35 py |             |                       |
| NSW Inmate Health Survey <sup>45</sup>     | 2015                 | NSW prisons                                                                               | Prospective cross-sectional, target random stratified sample     | HIV               |                                                                                           |                      | 510       |             |                       |
|                                            |                      |                                                                                           |                                                                  | HCV               |                                                                                           |                      | 509       |             |                       |
|                                            |                      |                                                                                           |                                                                  | HBcAb             |                                                                                           |                      | 510       |             |                       |
|                                            |                      |                                                                                           |                                                                  | HBsAg             |                                                                                           |                      | 510       |             |                       |
| Passports cohort <sup>46</sup>             | 2008–2010            | Released QLD prisoners with IDU                                                           | Prospective targeted and convenience sampling, with data linkage | HCV               |                                                                                           |                      | 266 py    |             |                       |
|                                            |                      |                                                                                           |                                                                  | HCV               |                                                                                           |                      | 403       |             |                       |

| Study                           | Years of recruitment | Setting                                                                   | Study design                                       | Blood-borne virus | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                      |           |             |                       |
|---------------------------------|----------------------|---------------------------------------------------------------------------|----------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|-----------|-------------|-----------------------|
|                                 |                      |                                                                           |                                                    |                   | Men who have sex with men                                                                 | Injecting drug users | Prisoners | Sex workers | Partners at high risk |
| Miller 2009 <sup>47</sup>       | 2004–2005            | Reception areas of 3 SA metropolitan prisons                              | Prospective cohort with convenience sampling       | HCV               |                                                                                           |                      | 63.8 py   |             |                       |
| Miller 2006 <sup>48</sup>       | 2005                 | 8 publicly operated SA prisons                                            | Retrospective audit with convenience sampling      | HCV               |                                                                                           |                      | 985       |             |                       |
| Su 2010 <sup>49</sup>           | 2003–2005            | Northern Territory prisons                                                | Retrospective audit with convenience sampling      | HCV               |                                                                                           |                      | 2985      |             |                       |
| Hellard 2004 <sup>50</sup>      | 2001                 | Five correctional centres in Victoria                                     | Prospective cohort with convenience sampling       | HCV               |                                                                                           |                      | 630       |             |                       |
| Awofeso 2000 <sup>51</sup>      | 1999                 | 22 NSW prisons                                                            | Retrospective audit with cross-sectional sampling  | HCV               |                                                                                           |                      | 4032      |             |                       |
| Larney 2013 <sup>52</sup>       | 2010                 | Seven prison reception centres in NSW                                     | Prospective cohort with cross-sectional sampling   | HBcAb             |                                                                                           |                      | 211       |             |                       |
| Opposites Attract <sup>53</sup> | 2012–2016            | 13 clinics in Australia, MSM with HIV positive partner virally suppressed | Prospective cohort study with convenience sampling | HIV               | 327 py                                                                                    |                      |           |             |                       |
| Islam 2013 <sup>54</sup>        | 2006–2011            | Sydney inner-city IDU targeted primary health care clinic within a NSP    | Retrospective cohort with convenience sampling     | HIV               |                                                                                           | 364                  |           |             |                       |
|                                 |                      |                                                                           |                                                    | HCV               |                                                                                           | 425                  |           |             |                       |
|                                 |                      |                                                                           |                                                    | HBcAb             |                                                                                           | 281                  |           |             |                       |
| HYPER <sup>55</sup>             | 2010–2012            | Community recruitment in Melbourne                                        | Prospective cohort with convenience sampling       | HIV               | 200                                                                                       |                      |           |             |                       |
|                                 |                      |                                                                           |                                                    | HBsAg             | 200                                                                                       |                      |           |             |                       |
| Aitken 2002 <sup>56</sup>       | 1999–2000            | Diverse community, clinic and program-based across Victoria               | Prospective cohort with convenience sampling       | HIV               |                                                                                           | 63                   |           |             |                       |
|                                 |                      |                                                                           |                                                    | HCV               |                                                                                           | 63                   |           |             |                       |
|                                 |                      |                                                                           |                                                    | HBcAb             |                                                                                           | 50                   |           |             |                       |
| Richardson 2001 <sup>57</sup>   | 1995–1999            | Audit at Lismore Base Hospital                                            | Retrospective cohort with convenience sampling     | HIV               |                                                                                           | 10                   |           |             |                       |
|                                 |                      |                                                                           |                                                    | HCV               |                                                                                           | 46                   |           |             |                       |
|                                 |                      |                                                                           |                                                    | HBsAg             |                                                                                           | 41                   |           |             |                       |

| Study                                         | Years of recruitment | Setting                                                             | Study design                                                                           | Blood-borne virus | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                      |           |             |                       |
|-----------------------------------------------|----------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|-----------|-------------|-----------------------|
|                                               |                      |                                                                     |                                                                                        |                   | Men who have sex with men                                                                 | Injecting drug users | Prisoners | Sex workers | Partners at high risk |
| MIX <sup>58</sup>                             | 2008–2010            | Three street drug markets in Melbourne, community agencies          | Prospective cohort study with respondent-driven, street outreach and snowball sampling | HCV               |                                                                                           | 564.7 py             |           |             |                       |
| MIX <sup>59</sup>                             |                      |                                                                     |                                                                                        | HCV               |                                                                                           | 262                  |           |             |                       |
| APPLES <sup>60</sup>                          | 2014–2015            | Recruitment from clinics and hospitals across Australia             | Prospective cohort with convenience sampling                                           | HCV               | 104                                                                                       |                      |           |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBsAg             | 113                                                                                       |                      |           |             |                       |
| SHANTUSI <sup>61</sup>                        | 2009–2010            | St Kilda street-based and online recruitment                        | Prospective cohort with convenience and target-driven sampling                         | HIV               |                                                                                           |                      |           | 100         |                       |
| ACT Inmate Health Survey <sup>62</sup>        | 2010                 | Single ACT prison                                                   | Prospective cross-section with random, quota-driven sampling                           | HIV               |                                                                                           |                      | 132       |             |                       |
|                                               |                      |                                                                     |                                                                                        | HCV               |                                                                                           |                      | 132       |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBsAg             |                                                                                           |                      | 132       |             |                       |
| Victorian Prisoner Health Study <sup>63</sup> | 2002                 | All Victorian prisons                                               | Prospective cross-section with stratified random sampling                              | HIV               |                                                                                           |                      | 298       |             |                       |
|                                               |                      |                                                                     |                                                                                        | HCV               |                                                                                           |                      | 442       |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBcAb             |                                                                                           |                      | 440       |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBsAg             |                                                                                           |                      | 157       |             |                       |
| STOP-C <sup>64</sup>                          | 2014–2017            | Four prisons in NSW                                                 | Prospective cohort                                                                     | HCV               |                                                                                           |                      | 388 py    |             |                       |
|                                               |                      |                                                                     |                                                                                        | HCV               |                                                                                           |                      | 1569      |             |                       |
| EPIC-NSW <sup>65</sup>                        | 2015                 | NSW-wide network of 21 clinics                                      | Prospective cohort with convenience sampling                                           | HIV               | 4100 py                                                                                   |                      |           |             |                       |
| Davies 2018 <sup>66</sup>                     | 2018                 | Darwin prison/s                                                     | Retrospective cohort with convenience sampling                                         | HBsAg             |                                                                                           |                      | 1100      |             |                       |
| O'Flynn 2018 <sup>67</sup>                    | 2018                 | Single Brisbane prison                                              | Prospective cohort with convenience sampling                                           | HCV               |                                                                                           |                      | 15        |             |                       |
| Peach 2018 <sup>68</sup>                      | 2014                 | Community outreach from community health centre or NSP in Melbourne | Prospective cohort with convenience sampling                                           | HIV               |                                                                                           | 128                  |           |             |                       |
|                                               |                      |                                                                     |                                                                                        | HCV               |                                                                                           | 127                  |           |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBcAb             |                                                                                           | 127                  |           |             |                       |
|                                               |                      |                                                                     |                                                                                        | HBsAg             |                                                                                           | 127                  |           |             |                       |

| Study                      | Years of recruitment | Setting                                                                                             | Study design                                 | Blood-borne virus | Sample size (prevalence studies)<br>or person-years [py] of follow-up (incidence studies) |                      |           |             |                       |
|----------------------------|----------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|-----------|-------------|-----------------------|
|                            |                      |                                                                                                     |                                              |                   | Men who have sex with men                                                                 | Injecting drug users | Prisoners | Sex workers | Partners at high risk |
| LiveRLife <sup>69</sup>    | 2016–2018            | 17 sites in Australia (most in NSW) including clinics, NSP                                          | Prospective cohort with convenience sampling | HCV               |                                                                                           | 565                  |           |             |                       |
| PrELUDE <sup>70</sup>      | 2014–2016            | 8 clinics in Sydney                                                                                 | Prospective cohort with convenience sampling | HIV               | 395.8 py                                                                                  |                      |           |             |                       |
| FORTH <sup>71</sup>        | 2013–2014            | 3 clinics and 2 community centres across Australia                                                  | Prospective RCT with convenience sampling    | HIV               | 333 py                                                                                    |                      |           |             |                       |
| Birrell 2010 <sup>72</sup> | 2007                 | Community gay venues in Brisbane and Toowoomba                                                      | Prospective cohort with convenience sampling | HIV               | 465                                                                                       |                      |           |             |                       |
| PATH <sup>73</sup>         | 2014–2016            | 3 male prisons in Victoria                                                                          | Prospective cohort with convenience sampling | HCV               |                                                                                           |                      | 400       |             |                       |
| ATAHC <sup>74</sup>        | 2004–2008            | 16 Australian hospitals and clinics                                                                 | Prospective cohort with convenience sampling | HCV               |                                                                                           | 56 py                |           |             |                       |
| Pierce 2011 <sup>75</sup>  | 2001–2008            | Victorian non-occupational post-exposure prophylaxis linkage to Victorian HIV Surveillance Registry | Retrospective cohort with data linkage       | HIV<br>HIV        | 3553 py<br>1420                                                                           |                      |           |             |                       |

ACCESS = Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance.

VPCNSS = Victorian Primary Care Network for Sentinel Surveillance.

COUNT = Community-Based Study of Undiagnosed HIV and Testing.

ANSPS = Australian Needle Syringe Program Survey.

NPEBBVS = National Prison-Entrants Blood Borne Virus Survey.

HITS-c = Hepatitis C Incidence and Transmission Study – community

HITS-p = Hepatitis C Incidence and Transmission in Prisons Study.

HYPER = Papillomavirus in Young People Epidemiological Research.

MIX = Melbourne injecting drug user cohort study.

APPLES = Australian Positive and Peers Longevity Evaluation Study.

SHANTUSI = Surveying HIV and Need in the Unregulated Sex Industry.

STOP-C = Surveillance and Treatment of Prisoners with hepatitis C.

EPIC-NSW = Expanded PrEP Implementation in Communities – New South Wales.

FORTH = Frequency of Oral Rapid Testing at Home.

PATH = Prison and Transition Health.

ATAHC = Australian Trial in Acute Hepatitis C

HIV = human Immunodeficiency Virus; HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen; HCV = hepatitis C virus.

IDU = injecting drug users; MSM = men who have sex with men; NSP = needle and syringe program; py = person-years; RCT = randomised controlled trial.

\* Supplemented: J. Iversen, Kirby Institute personal communication, 6 October 2017.

**Table 3. Characteristics of the 89 study samples of people at increased risk of infection with blood-borne viruses**

|                                    | Men who<br>have sex<br>with men | Injecting<br>drug users | Prisoners | Sex<br>workers | Partners at<br>high risk | Total |
|------------------------------------|---------------------------------|-------------------------|-----------|----------------|--------------------------|-------|
| Total numbers of samples           | 28                              | 32                      | 22        | 6              | 1                        | 89    |
| Blood-borne virus*                 |                                 |                         |           |                |                          |       |
| HIV                                | 20                              | 12                      | 7         | 5              | 1                        | 45    |
| HCV                                | 6                               | 25                      | 19        | 3              | 1                        | 54    |
| HBcAb                              | 4                               | 9                       | 4         | 1              | 1                        | 19    |
| HBsAg                              | 4                               | 8                       | 7         | 0              | 0                        | 19    |
| Study type                         |                                 |                         |           |                |                          |       |
| Incidence                          | 13                              | 11                      | 5         | 1              | 0                        | 30    |
| Prevalence                         | 15                              | 21                      | 17        | 5              | 1                        | 59    |
| Study design                       |                                 |                         |           |                |                          |       |
| Prospective                        | 18                              | 23                      | 16        | 2              | 0                        | 59    |
| Retrospective                      | 10                              | 9                       | 6         | 4              | 1                        | 30    |
| Recruitment*                       |                                 |                         |           |                |                          |       |
| Convenience                        | 26                              | 32                      | 11        | 5              | 1                        | 75    |
| Cross-sectional                    | 1                               | 0                       | 8         | 0              | 0                        | 9     |
| Quota                              | 0                               | 0                       | 7         | 0              | 0                        | 7     |
| Snowball                           | 0                               | 10                      | 0         | 0              | 0                        | 10    |
| Setting*                           |                                 |                         |           |                |                          |       |
| Health centre or clinic            | 18                              | 16                      | 0         | 5              | 1                        | 40    |
| Community                          | 11                              | 19                      | 1         | 2              | 0                        | 33    |
| Prisons                            | 0                               | 0                       | 22        | 0              | 0                        | 22    |
| Database linkage                   | 2                               | 3                       | 2         | 0              | 0                        | 7     |
| Number of centres                  |                                 |                         |           |                |                          |       |
| 1                                  | 5                               | 11                      | 4         | 1              | 1                        | 22    |
| 2–5                                | 5                               | 8                       | 6         | 1              | 0                        | 20    |
| 6–20                               | 6                               | 4                       | 6         | 1              | 0                        | 17    |
| 21–50                              | 2                               | 0                       | 4         | 2              | 0                        | 8     |
| > 50                               | 1                               | 4                       | 0         | 0              | 0                        | 5     |
| Unspecified                        | 9                               | 5                       | 2         | 1              | 0                        | 17    |
| State                              |                                 |                         |           |                |                          |       |
| NSW/ACT                            | 8                               | 13                      | 8         | 3              | 1                        | 33    |
| Victoria                           | 11                              | 10                      | 3         | 1              | 0                        | 25    |
| Queensland                         | 1                               | 0                       | 3         | 0              | 0                        | 4     |
| South Australia/Northern Territory | 0                               | 1                       | 4         | 0              | 0                        | 5     |
| Western Australia                  | 0                               | 0                       | 2         | 0              | 0                        | 2     |
| Multiple states                    | 8                               | 8                       | 2         | 2              | 1                        | 20    |
| Location                           |                                 |                         |           |                |                          |       |
| Metropolitan                       | 19                              | 22                      | 4         | 4              | 1                        | 50    |
| Regional                           | 0                               | 1                       | 1         | 0              | 0                        | 2     |
| Mixed settings                     | 8                               | 8                       | 15        | 2              | 0                        | 33    |
| Unknown                            | 1                               | 1                       | 2         | 0              | 0                        | 4     |

|                                          | Men who<br>have sex<br>with men | Injecting<br>drug users | Prisoners | Sex<br>workers | Partners at<br>high risk | Total |
|------------------------------------------|---------------------------------|-------------------------|-----------|----------------|--------------------------|-------|
| Cohort era <sup>†</sup>                  |                                 |                         |           |                |                          |       |
| Before 2000                              | 2                               | 9                       | 2         | 1              | 1                        | 15    |
| 2000–2004                                | 11                              | 8                       | 4         | 2              | 0                        | 25    |
| 2005–2009                                | 3                               | 10                      | 7         | 1              | 0                        | 21    |
| 2010–2014                                | 11                              | 1                       | 5         | 1              | 0                        | 18    |
| 2015–2018                                | 1                               | 4                       | 4         | 1              | 0                        | 10    |
| Sample size or person-years <sup>‡</sup> |                                 |                         |           |                |                          |       |
| 1–99                                     | 0                               | 6                       | 2         | 1              | 0                        | 9     |
| 100–999                                  | 11                              | 19                      | 15        | 1              | 1                        | 47    |
| 1000–9999                                | 15                              | 5                       | 5         | 3              | 0                        | 28    |
| ≥ 10 000                                 | 2                               | 2                       | 0         | 1              | 0                        | 5     |
| Age of participants (years) <sup>§</sup> |                                 |                         |           |                |                          |       |
| Not stated                               | 1                               | 3                       | 5         | 1              | 0                        | 10    |
| < 20                                     | 1                               | 0                       | 0         | 0              | 0                        | 1     |
| 20–24                                    | 0                               | 5                       | 0         | 0              | 0                        | 5     |
| 25–29                                    | 6                               | 11                      | 5         | 3              | 0                        | 25    |
| 30–34                                    | 6                               | 6                       | 6         | 2              | 1                        | 21    |
| 35–39                                    | 12                              | 4                       | 6         | 0              | 0                        | 22    |
| ≥ 40                                     | 2                               | 3                       | 0         | 0              | 0                        | 5     |
| Sex (women)                              |                                 |                         |           |                |                          |       |
| Not stated                               | 0                               | 3                       | 2         | 2              | 0                        | 7     |
| < 10%                                    | 28                              | 0                       | 7         | 0              | 1                        | 36    |
| 10–24.9%                                 | 0                               | 3                       | 9         | 0              | 0                        | 12    |
| 25–74.9%                                 | 0                               | 25                      | 4         | 0              | 0                        | 29    |
| 75–89.9%                                 | 0                               | 0                       | 0         | 2              | 0                        | 2     |
| ≥ 90%                                    | 0                               | 1                       | 0         | 2              | 0                        | 3     |
| Aboriginal/Torres Strait<br>Islanders    |                                 |                         |           |                |                          |       |
| Not stated                               | 22                              | 18                      | 6         | 3              | 1                        | 50    |
| < 10%                                    | 6                               | 7                       | 0         | 3              | 0                        | 16    |
| 10–24.9%                                 | 0                               | 6                       | 8         | 0              | 0                        | 14    |
| 25–74.9%                                 | 0                               | 1                       | 6         | 0              | 0                        | 7     |
| 75–89.9%                                 | 0                               | 0                       | 2         | 0              | 0                        | 2     |
| ≥ 90%                                    | 0                               | 0                       | 0         | 0              | 0                        | 0     |
| Timing of risk behaviour                 |                                 |                         |           |                |                          |       |
| Active                                   | 7                               | 14                      | 22        | 1              | 0                        | 44    |
| < 1 year                                 | 8                               | 8                       | 0         | 4              | 1                        | 21    |
| < 5 years                                | 6                               | 0                       | 0         | 0              | 0                        | 6     |
| Any                                      | 3                               | 6                       | 0         | 0              | 0                        | 9     |
| Not stated                               | 4                               | 4                       | 0         | 1              | 0                        | 9     |
| Other risk behaviours*                   |                                 |                         |           |                |                          |       |
| None stated                              | 9                               | 14                      | 7         | 3              | 0                        | 33    |

|                                            | Men who<br>have sex<br>with men | Injecting<br>drug users | Prisoners | Sex<br>workers | Partners at<br>high risk | Total |
|--------------------------------------------|---------------------------------|-------------------------|-----------|----------------|--------------------------|-------|
| Sexual identity other than<br>heterosexual |                                 |                         |           |                |                          |       |
| < 10%                                      | -                               | 5                       | 0         | 0              | 0                        | 5     |
| 10–24.9%                                   | -                               | 0                       | 1         | 0              | 0                        | 1     |
| 25–49.9%                                   | -                               | 1                       | 0         | 0              | 0                        | 1     |
| Sex work                                   |                                 |                         |           |                |                          |       |
| < 10%                                      | 1                               | 0                       | 0         | —              | 0                        | 1     |
| 10–24.9%                                   | 2                               | 2                       | 0         | —              | 0                        | 4     |
| 25–49.9%                                   | 0                               | 1                       | 0         | —              | 0                        | 1     |
| Known HIV-positive partner                 |                                 |                         |           |                |                          |       |
| < 10%                                      | 8                               | 0                       | 0         | 0              | —                        | 8     |
| 10–24.9%                                   | 1                               | 0                       | 0         | 0              | —                        | 1     |
| 25–74.9%                                   | 2                               | 0                       | 0         | 0              | —                        | 2     |
| 75–89.9%                                   | 0                               | 0                       | 0         | 0              | —                        | 0     |
| ≥ 90%                                      | 1                               | 0                       | 0         | 0              | —                        | 1     |
| Injecting drug use                         |                                 |                         |           |                |                          |       |
| < 10%                                      | 8                               | —                       | 0         | 2              | 1                        | 11    |
| 10–24.9%                                   | 2                               | —                       | 0         | 1              | 0                        | 3     |
| 25–74.9%                                   | 0                               | —                       | 10        | 0              | 0                        | 10    |
| 75–89.9%                                   | 0                               | —                       | 0         | 0              | 0                        | 0     |
| ≥ 90%                                      | 0                               | —                       | 4         | 0              | 0                        | 4     |
| Imprisonment                               |                                 |                         |           |                |                          |       |
| < 10%                                      | 0                               | 0                       | —         | 0              | 0                        | 0     |
| 10–24.9%                                   | 0                               | 6                       | —         | 0              | 0                        | 6     |
| 25–74.9%                                   | 0                               | 8                       | —         | 0              | 0                        | 8     |

HIV = human Immunodeficiency Virus; HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen; HCV = hepatitis C virus.

\* As more than one response possible for each sample, totals sum to more than 89.

† Based on earliest year of recruitment.

‡ Sample size for prevalence studies, or person-years of follow-up for incidence studies.

§ Age was not reported consistently; median preferred if multiple measures of age provided.

**Table 4. Assessment of study quality, by estimate of incidence or prevalence\***

| Study                                           | BBV | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-------------------------------------------------|-----|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| ACCESS <sup>1</sup>                             | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Health in Men <sup>9</sup>                      | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Read 2013 <sup>12</sup>                         | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Read 2017 <sup>13</sup>                         | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Metropolitan Sexual Health Clinics <sup>6</sup> | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| VPCNSS <sup>5</sup>                             | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| EPIC-NSW <sup>65</sup>                          | HIV | Inc      | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| PrELUDE <sup>70</sup>                           | HIV | Inc      | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| FORTH <sup>71</sup>                             | HIV | Inc      | MSM        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Opposites Attract <sup>53</sup>                 | HIV | Inc      | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | ?                         |
| Pierce 2011 <sup>75</sup>                       | HIV | Inc      | MSM        | ?                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| ANSPS <sup>28,†</sup>                           | HIV | Inc      | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| ACCESS <sup>2</sup>                             | HIV | Inc      | CSW        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Lister 2005 <sup>16</sup>                       | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| ACCESS <sup>3</sup>                             | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| COUNT <sup>17</sup>                             | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Pedrana 2012 <sup>18</sup>                      | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | ?                       | +                         | —                         |
| Estcourt 2000 <sup>19</sup>                     | HIV | Prev     | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| VPCNSS <sup>5</sup>                             | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | ?                        | +                       | +                         | +                         |
| HYPER <sup>55</sup>                             | HIV | Prev     | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Birrell 2010 <sup>72</sup>                      | HIV | Prev     | MSM        | +                                   | +              | +              | +                                  | +                            | +                        | ?                       | +                         | —                         |
| Pierce 2011 <sup>75</sup>                       | HIV | Prev     | MSM        | ?                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Lawrinson 2008 <sup>21</sup>                    | HIV | Prev     | IDU        | +                                   | +              | —              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| ANSPS <sup>29</sup>                             | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Day 2010 <sup>22</sup>                          | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Bradshaw 2005 <sup>14</sup>                     | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |

| Study                                           | BBV | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-------------------------------------------------|-----|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| Metropolitan Sexual Health Clinics <sup>8</sup> | HIV | Prev     | IDU        | ?                                   | ?              | +              | ?                                  | ?                            | +                        | +                       | +                         | ?                         |
| Networks II <sup>24</sup>                       | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Vajdic 2015 <sup>26</sup>                       | HIV | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Islam 2013 <sup>54</sup>                        | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Aitken 2002 <sup>56</sup>                       | HIV | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Richardson 2001 <sup>57</sup>                   | HIV | Prev     | IDU        | ?                                   | +              | —              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Peach 2018 <sup>68</sup>                        | HIV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Gilles 2008 <sup>33</sup>                       | HIV | Prev     | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Australian Prison Entrants <sup>30</sup>        | HIV | Prev     | Prisoner   | +                                   | +              | +              | ?                                  | ?                            | +                        | +                       | +                         | +                         |
| NSW Inmate Health Survey <sup>45</sup>          | HIV | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | ?                         |
| NPEBBVS <sup>31</sup>                           | HIV | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Watkins 2009 <sup>32</sup>                      | HIV | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| ACT Inmate Health Survey <sup>62</sup>          | HIV | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Victorian Prisoners Health Study <sup>63</sup>  | HIV | Prev     | Prisoner   | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| ACCESS <sup>4</sup>                             | HIV | Prev     | CSW        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Metropolitan Sexual Health Clinics <sup>7</sup> | HIV | Prev     | CSW        | ?                                   | ?              | +              | ?                                  | ?                            | +                        | +                       | +                         | ?                         |
| Estcourt 2000 <sup>19</sup>                     | HIV | Prev     | CSW        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| SHANTUSI <sup>51</sup>                          | HIV | Prev     | CSW        | +                                   | +              | +              | +                                  | +                            | +                        | ?                       | +                         | —                         |
| Coughlan 2001 <sup>20</sup>                     | HIV | Prev     | HRP        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Health in Men <sup>10</sup>                     | HCV | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| ANSPS <sup>27,†</sup>                           | HCV | Inc      | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| HITS-c <sup>40</sup>                            | HCV | Inc      | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Kirketon Road Centre <sup>2</sup>               | HCV | Inc      | IDU        | +                                   | +              | —              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Maier 2007 <sup>37</sup>                        | HCV | Inc      | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |

| Study                                           | BBV | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-------------------------------------------------|-----|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| Maier 2006 <sup>39</sup>                        | HCV | Inc      | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Networks II <sup>23</sup>                       | HCV | Inc      | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| The Byrne Surgery <sup>35</sup>                 | HCV | Inc      | IDU        | +                                   | +              | +              | ?                                  | ?                            | +                        | +                       | +                         | —                         |
| MIX <sup>58</sup>                               | HCV | Inc      | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| ATAHC <sup>74</sup>                             | HCV | Inc      | IDU        | +                                   | +              | —              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| HITS-p <sup>41</sup>                            | HCV | Inc      | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| NSW Inmate Health Survey <sup>44</sup>          | HCV | Inc      | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Passports cohort <sup>46</sup>                  | HCV | Inc      | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Miller 2009 <sup>47</sup>                       | HCV | Inc      | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| STOP-C <sup>64</sup>                            | HCV | Inc      | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Health in Men <sup>10</sup>                     | HCV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Metropolitan Sexual Health Clinics <sup>7</sup> | HCV | Prev     | MSM        | ?                                   | ?              | +              | ?                                  | ?                            | +                        | +                       | +                         | ?                         |
| Estcourt 2000 <sup>19</sup>                     | HCV | Prev     | MSM        | ?                                   | +              | +              | +                                  | —                            | +                        | +                       | +                         | +                         |
| Sturrock 2007 <sup>34</sup>                     | HCV | Prev     | MSM        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| APPLES <sup>60</sup>                            | HCV | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Lawrinson 2008 <sup>21</sup>                    | HCV | Prev     | IDU        | +                                   | +              | —              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| ANSPS <sup>29</sup>                             | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Comorbidity and Trauma Study <sup>42</sup>      | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Day 2010 <sup>22</sup>                          | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Bradshaw 2005 <sup>14</sup>                     | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Metropolitan Sexual Health Clinics <sup>7</sup> | HCV | Prev     | IDU        | ?                                   | ?              | +              | ?                                  | ?                            | +                        | +                       | +                         | ?                         |
| Networks II <sup>24</sup>                       | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Vajdic 2015 <sup>26</sup>                       | HCV | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Aitken 2008 <sup>43</sup>                       | HCV | Prev     | IDU        | ?                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| The Byrne Surgery <sup>35</sup>                 | HCV | Prev     | IDU        | +                                   | +              | +              | ?                                  | +                            | +                        | +                       | +                         | —                         |
| Islam 2013 <sup>54</sup>                        | HCV | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |

| Study                                           | BBV   | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-------------------------------------------------|-------|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| Aitken 2002 <sup>56</sup>                       | HCV   | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Richardson 2001 <sup>57</sup>                   | HCV   | Prev     | IDU        | ?                                   | +              | —              | +                                  | +                            | +                        | +                       | +                         | —                         |
| MIX <sup>59</sup>                               | HCV   | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Peach 2018 <sup>68</sup>                        | HCV   | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| LiveRLife <sup>69</sup>                         | HCV   | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Hellard 2004 <sup>50</sup>                      | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Gilles 2008 <sup>33</sup>                       | HCV   | Prev     | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Awofeso 2000 <sup>51</sup>                      | HCV   | Prev     | Prisoner   | +                                   | +              | +              | ?                                  | ?                            | +                        | +                       | +                         | —                         |
| NSW Inmate Health Survey <sup>45</sup>          | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | ?                         |
| NPEBBVS <sup>31</sup>                           | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Su 2010 <sup>49</sup>                           | HCV   | Prev     | Prisoner   | ?                                   | +              | +              | ?                                  | +                            | +                        | +                       | +                         | —                         |
| Miller 2006 <sup>48</sup>                       | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Watkins 2009 <sup>32</sup>                      | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Passports cohort <sup>46</sup>                  | HCV   | Prev     | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| STOP-C <sup>64</sup>                            | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| ACT Inmate Health Survey <sup>62</sup>          | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Victorian Prisoner Health Study <sup>63</sup>   | HCV   | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| O'Flynn 2018 <sup>67</sup>                      | HCV   | Prev     | Prisoner   | ?                                   | ?              | —              | ?                                  | ?                            | +                        | +                       | +                         | —                         |
| PATH <sup>73</sup>                              | HCV   | Prev     | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Coughlan 2001 <sup>20</sup>                     | HCV   | Prev     | HRP        | +                                   | +              | +              | +                                  | —                            | +                        | +                       | +                         | +                         |
| Metropolitan Sexual Health Clinics <sup>7</sup> | HCV   | Prev     | CSW        | ?                                   | ?              | +              | ?                                  | ?                            | +                        | +                       | +                         | ?                         |
| Estcourt 2000 <sup>19</sup>                     | HCV   | Prev     | CSW        | ?                                   | +              | +              | +                                  | —                            | +                        | +                       | +                         | +                         |
| Sturrock 2007 <sup>34</sup>                     | HCV   | Prev     | CSW        | +                                   | +              | —              | +                                  | —                            | +                        | +                       | +                         | +                         |
| Gamagedara 2014 <sup>15</sup>                   | HBcAb | Inc      | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Networks II <sup>25</sup>                       | HBcAb | Inc      | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Health in Men <sup>11</sup>                     | HBcAb | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |

| Study                                         | BBV   | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-----------------------------------------------|-------|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| Gamagedara 2014 <sup>15</sup>                 | HBcAb | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Estcourt 2000 <sup>19</sup>                   | HBcAb | Prev     | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Bradshaw 2005 <sup>14</sup>                   | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Networks II <sup>25</sup>                     | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Day 2010 <sup>22</sup>                        | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| The Byrne Surgery <sup>36</sup>               | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Maier 2004 <sup>38</sup>                      | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Islam 2013 <sup>54</sup>                      | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Aitken 2002 <sup>56</sup>                     | HBcAb | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Peach 2018 <sup>68</sup>                      | HBcAb | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| NPEBBVS <sup>31</sup>                         | HBcAb | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Larney 2013 <sup>52</sup>                     | HBcAb | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| NSW Inmate Health Survey <sup>45</sup>        | HBcAb | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | ?                         |
| Victorian Prisoner Health Study <sup>63</sup> | HBcAb | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Coughlan 2001 <sup>20</sup>                   | HBcAb | Prev     | HRP        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Estcourt 2000 <sup>19</sup>                   | HBcAb | Prev     | CSW        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Health in Men <sup>11</sup>                   | HBsAg | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | —                         |
| Gamagedara 2014 <sup>15</sup>                 | HBsAg | Prev     | MSM        | +                                   | +              | +              | +                                  | —                            | +                        | +                       | +                         | —                         |
| HYPER <sup>55</sup>                           | HBsAg | Prev     | MSM        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| APPLES <sup>60</sup>                          | HBsAg | Prev     | MSM        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| Bradshaw 2005 <sup>14</sup>                   | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Day 2010 <sup>22</sup>                        | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Networks II <sup>25</sup>                     | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Vajdic 2015 <sup>26</sup>                     | HBsAg | Prev     | IDU        | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| The Byrne Surgery <sup>36</sup>               | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Maier 2004 <sup>38</sup>                      | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Richardson 2001 <sup>57</sup>                 | HBsAg | Prev     | IDU        | ?                                   | +              | —              | +                                  | +                            | +                        | +                       | +                         | —                         |

| Study                                         | BBV   | Estimate | Risk group | 1. Target population representative | 2. Recruitment | 3. Sample size | 4. Subject and setting description | 5. Data analysis appropriate | 6. Objective measurement | 7. Reliable measurement | 8. Statistics appropriate | 9. Confounders identified |
|-----------------------------------------------|-------|----------|------------|-------------------------------------|----------------|----------------|------------------------------------|------------------------------|--------------------------|-------------------------|---------------------------|---------------------------|
| Peach 2018 <sup>68</sup>                      | HBsAg | Prev     | IDU        | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | ?                         |
| NPEBBVS <sup>31</sup>                         | HBsAg | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Watkins 2009 <sup>32</sup>                    | HBsAg | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | —                         |
| Gilles 2008 <sup>33</sup>                     | HBsAg | Prev     | Prisoner   | ?                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| NSW Inmate Health Survey <sup>45</sup>        | HBsAg | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | ?                         |
| ACT Inmate Health Survey <sup>62</sup>        | HBsAg | Prev     | Prisoner   | +                                   | +              | +              | +                                  | +                            | +                        | +                       | +                         | +                         |
| Victorian Prisoner Health Study <sup>63</sup> | HBsAg | Prev     | Prisoner   | +                                   | +              | +              | +                                  | ?                            | +                        | +                       | +                         | +                         |
| Davies 2018 <sup>66</sup>                     | HBsAg | Prev     | Prisoner   | ?                                   | ?              | — <sup>+</sup> | —                                  | ?                            | +                        | +                       | +                         | —                         |

\* + = low risk of bias; ? = unclear risk of bias; — = high risk of bias. † Supplemented: J. Iversen, Kirby Institute, personal communication, 6 October 2017.

ACCESS = Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance.

VPCNSS = Victorian Primary Care Network for Sentinel Surveillance.

COUNT = Community-Based Study of Undiagnosed HIV and Testing.

ANSPS = Australian Needle Syringe Program Survey.

NPEBBVS = National Prison-Entrants Blood Borne Virus Survey.

HITS-c = Hepatitis C Incidence and Transmission Study – community

HITS-p = Hepatitis C Incidence and Transmission in Prisons Study.

HYPER = Papillomavirus in Young People Epidemiological Research.

MIX = Melbourne injecting drug user cohort study.

APPLES = Australian Positive and Peers Longevity Evaluation Study.

SHANTUSI = Surveying HIV and Need in the Unregulated Sex Industry.

STOP-C = Surveillance and Treatment of Prisoners with hepatitis C.

EPIC-NSW = Expanded PrEP Implementation in Communities – New South Wales.

FORTH = Frequency of Oral Rapid Testing at Home.

PATH = Prison and Transition Health.

ATAHC = Australian Trial in Acute Hepatitis C

HIV = human Immunodeficiency Virus; HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen; HCV = hepatitis C virus.

CSW = commercial sex workers; HRP = high risk partners; IDU = injecting drug users; MSM = men who have sex with men.

Inc = incidence; Prev = prevalence.

**Table 5. Summary of tests for publication bias among for combination of blood-borne virus and high risk group (funnel plots)**

| Study type | BBV   | High risk group | <i>P</i> |
|------------|-------|-----------------|----------|
| Prevalence | HIV   | MSM             | 0.61     |
| Prevalence | HIV   | IDU             | 0.18     |
| Prevalence | HIV   | CSW             | 0.59     |
| Prevalence | HIV   | Prisoners       | 0.30     |
| Prevalence | HCV   | MSM             | 0.34     |
| Prevalence | HCV   | IDU             | 0.084    |
| Prevalence | HCV   | CSW             | 0.56     |
| Prevalence | HCV   | Prisoners       | 0.48     |
| Prevalence | HBcAb | MSM             | 0.97     |
| Prevalence | HBcAb | IDU             | 0.82     |
| Prevalence | HBcAb | Prisoners       | 0.95     |
| Prevalence | HBsAg | MSM             | 0.63     |
| Prevalence | HBsAg | IDU             | 0.13     |
| Prevalence | HBsAg | Prisoners       | 0.22     |
| Incidence  | HIV   | MSM             | 0.12     |
| Incidence  | HCV   | IDU             | 0.33     |
| Incidence  | HCV   | Prisoners       | 0.36     |

---

HIV = human Immunodeficiency Virus; HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen; HCV = hepatitis C virus. CSW = commercial sex workers; HRP = high risk partners; IDU = injecting drug users; MSM = men who have sex with men.

**Table 6. Residual infection risk estimates by virus and risk group: sensitivity analyses**

| Increased risk group      | Persons*                 | Infections<br>*      | Person-<br>years (py) <sup>†</sup> | Pooled prevalence<br>(95% CI) <sup>‡</sup> | Pooled incidence<br>per 100 py (95% CI) | Residual risk per 10 000 persons |                  |
|---------------------------|--------------------------|----------------------|------------------------------------|--------------------------------------------|-----------------------------------------|----------------------------------|------------------|
|                           |                          |                      |                                    |                                            |                                         | ELISA <sup>§</sup>               | NAT <sup>¶</sup> |
| HIV                       |                          |                      |                                    |                                            |                                         |                                  |                  |
| Baseline**                | 24 127 200               | 1013                 | —                                  | NC                                         | 0.004 (0.004–0.004)                     | 0.03 (0.02–0.03)                 | 0.01 (0.01–0.01) |
| Men who have sex with men | 5877 <sup>††,‡‡</sup>    | 424 <sup>‡‡</sup>    | 51 763                             | 6.8% (5.3–8.5%)                            | 0.83 (0.64–1.03)                        | 5.0 (3.8–6.2)                    | 1.6 (1.2–2.0)    |
| Sex workers               | 2545                     | 3                    | —                                  | 0.0% (0.0–0.3%)                            | 0.00 (0.00–0.74) <sup>§§</sup>          | 0.0 (0.0–4.5)                    | 0.0 (0.0–1.4)    |
| HCV                       |                          |                      |                                    |                                            |                                         |                                  |                  |
| Baseline**                | 24 127 200 <sup>‡‡</sup> | 11 949 <sup>‡‡</sup> | —                                  | NC                                         | 0.05 (0.05–0.05)                        | 0.9 (0.9–1.0)                    | 0.1 (0.1–0.1)    |
| Men who have sex with men | 1940                     | 28                   | —                                  | 1.2% (0.2–3.0%)                            | 0.2 (0.0–1.1) <sup>§§</sup>             | 4.0 (0.2–21.6)                   | 0.3 (0.0–1.5)    |
| Sex workers               | 336                      | 20                   | —                                  | 5.5% (3.1–8.3%)                            | 1.0 (0.3–2.3) <sup>§§</sup>             | 18.3 (5.7–43.4)                  | 1.3 (0.4–3.1)    |
| Injecting drug users      | 1934 <sup>‡‡,¶¶</sup>    | 375 <sup>‡‡</sup>    | 2638                               | 71.9% (63.4–79.6%)                         | 12.5 (8.0–17.1)                         | 237 (152–322)                    | 17.1 (10.9–23.3) |
| Prisoners                 | 720 <sup>‡‡</sup>        | 50 <sup>‡‡</sup>     | 677                                | 41% (36–47%)                               | 7.3 (5.1–9.4)                           | 138 (96.8–179)                   | 9.9 (6.9–12.9)   |
| HBcAb                     |                          |                      |                                    |                                            |                                         |                                  |                  |
| Men who have sex with men | 9285                     | 1107                 | —                                  | 11.8% (11.1–12.4%)                         | 2.4 (0.9–5.3) <sup>§§</sup>             | 29.4 (10.8–63.8)                 | 14.7 (5.4–31.9)  |
| Injecting drug users      | 1809                     | 677                  | —                                  | 39.5% (30.8–48.6%)                         | 8.2 (3.0–17.8) <sup>§§</sup>            | 98.1 (36.2–212)                  | 49.2 (18.1–107)  |
| HBsAg                     |                          |                      |                                    |                                            |                                         |                                  |                  |
| Baseline**                | 24 127 200 <sup>‡‡</sup> | 6555 <sup>‡‡</sup>   | —                                  | NC                                         | 0.03 (0.03–0.03)                        | 0.3 (0.3–0.3)                    | 0.2 (0.2–0.2)    |
| Men who have sex with men | 1710                     | 11                   | —                                  | 0.7% (0.0–1.9%)                            | 0.2 (0.0–1.0)                           | 1.9 (0.0–12.5)                   | 1.0 (0.0–6.3)    |
| Prisoners                 | 1499                     | 51                   | —                                  | 3.5% (2.3–4.9%)                            | 0.8 (0.2–2.0)                           | 9.6 (2.5–24.5)                   | 4.8 (1.3–12.3)   |

CI = confidence interval; ELISA = enzyme-linked immunosorbent assay; HIV = human Immunodeficiency Virus; HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen; HCV = hepatitis C virus; NAT = nucleic acid testing; NC = not calculated.

\* Reported data are from prevalence estimate reports (insufficient incidence studies), unless otherwise indicated.

† Only when the number of studies reporting incidence was inadequate.

‡ Reported data are from are from prevalence studies.

§ Window periods: HIV, 22 days; HBV, 44 days; HCV, 70 days.<sup>76</sup>

¶ Window periods: HIV, 7 days; HBV, 22 days; HCV, 5 days.<sup>76</sup>

\*\* Baseline risk for the general population: number of notifications in one year and total population in Australia at 30 June 2016 (24 127 200). Person-years at risk is assumed to be equivalent to the total population for one year.

†† One study missing data on total number of patients for incidence estimate.

‡‡ Reported data from pooled incidence estimate studies.

§§ Incidence estimates derived from prevalence data.

¶¶ One study missing data on total number of patients for incidence estimate.

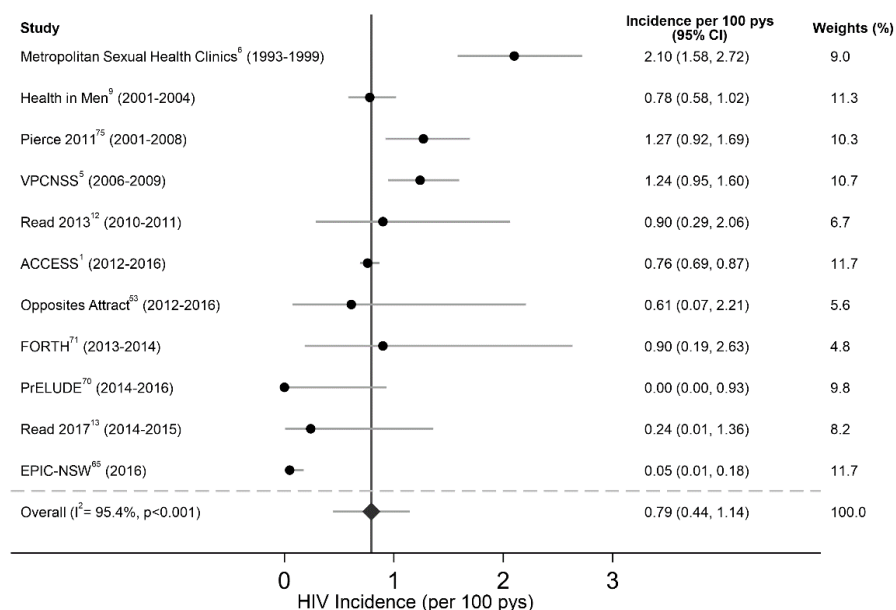
**Table 7. Study heterogeneity in each meta-analysis, by virus and risk group**

| Risk group (number of studies) | Outcome measure | Overall               |          | Sensitivity           |          |
|--------------------------------|-----------------|-----------------------|----------|-----------------------|----------|
|                                |                 | <i>I</i> <sup>2</sup> | <i>P</i> | <i>I</i> <sup>2</sup> | <i>P</i> |
| HIV                            |                 |                       |          |                       |          |
| Men who have sex with men (11) | Incidence       | 95.4%                 | < 0.001  | 52.0%                 | 0.06     |
| Men who have sex with men (9)  | Prevalence      | 99.2%                 | < 0.001  | 86.8%                 | < 0.001  |
| Sex workers (4)                | Prevalence      | 70.2%                 | 0.018    | 30.6%                 | 0.24     |
| High risk partners (1)         | Prevalence      | *                     | *        | NA                    | NA       |
| Injecting drug users (11)      | Prevalence      | 91.6%                 | < 0.001  | NA                    | NA       |
| Prisoners (7)                  | Prevalence      | 40.0%                 | 0.12     | NA                    | NA       |
| HCV                            |                 |                       |          |                       |          |
| Men who have sex with men (5)  | Prevalence      | 95.3%                 | < 0.001  | 73.7%                 | 0.010    |
| Sex workers (3)                | Prevalence      | 96.1%                 | < 0.001  | *                     | *        |
| High risk partners (1)         | Prevalence      | *                     | *        | NA                    | NA       |
| Injecting drug users (9)       | Incidence       | 91.1%                 | < 0.001  | 88.1%                 | < 0.001  |
| Injecting drug users (16)      | Prevalence      | 99.0%                 | < 0.001  | 99.0%                 | < 0.001  |
| Prisoners (5)                  | Incidence       | 66.9%                 | 0.017    | 0.0                   | 0.67     |
| Prisoners (14)                 | Prevalence      | 99.6%                 | < 0.001  | 95.1%                 | < 0.001  |
| HBcAb                          |                 |                       |          |                       |          |
| Men who have sex with men (3)  | Prevalence      | 99.3%                 | < 0.001  | *                     | *        |
| Sex workers (1)                | Prevalence      | *                     | *        | NA                    | NA       |
| High risk partners (1)         | Prevalence      | *                     | *        | NA                    | NA       |
| Injecting drug users (8)       | Prevalence      | 93.6%                 | < 0.001  | 93.5%                 | < 0.001  |
| Prisoners (4)                  | Prevalence      | 95.8%                 | < 0.001  | NA                    | NA       |
| HBsAg                          |                 |                       |          |                       |          |
| Men who have sex with men (4)  | Prevalence      | 94.7%                 | < 0.001  | 54.7%                 | 0.11     |
| Injecting drug users (8)       | Prevalence      | 21.5%                 | 0.26     | NA                    | NA       |
| Prisoners (7)                  | Prevalence      | 80.1%                 | < 0.001  | 42.1%                 | 0.12     |

\* Too few studies to test for study heterogeneity.

HIV = human immunodeficiency virus; HbcAb = hepatitis B core antibody; HbsAg = hepatitis B surface antigen; HCV = hepatitis C virus; NA = not applicable (sensitivity meta-analysis not performed).

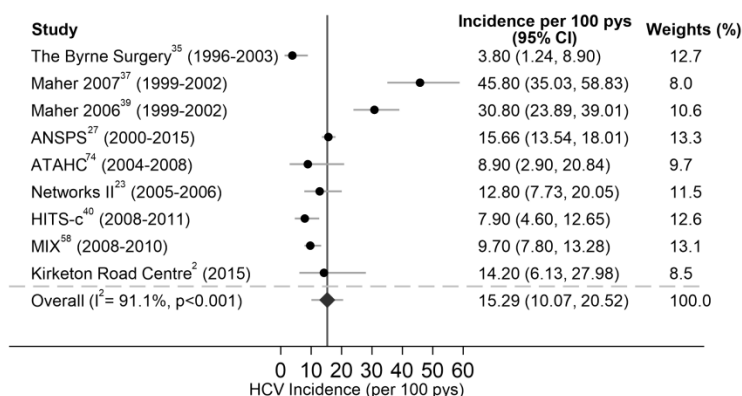
**Figure 1. Pooled HIV incidence (per 100 person-years) in men who have sex with men**



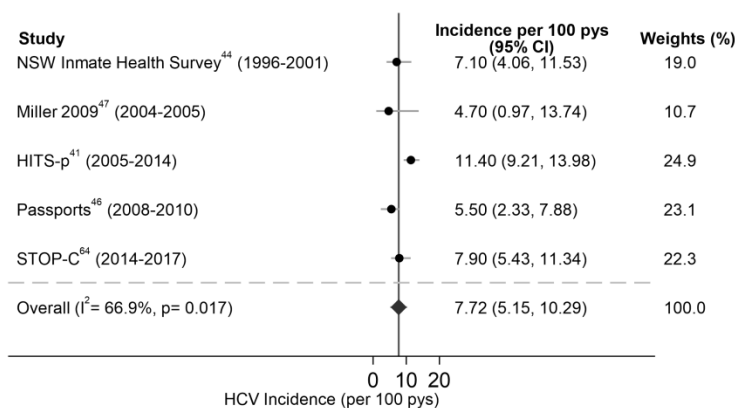
HIV = human immunodeficiency virus; py = person-years.

**Figure 2. Pooled HCV incidence (per 100 person-years) in A. injecting drug users; B. prisoners**

*(A) Injecting Drug Users (IDU)*



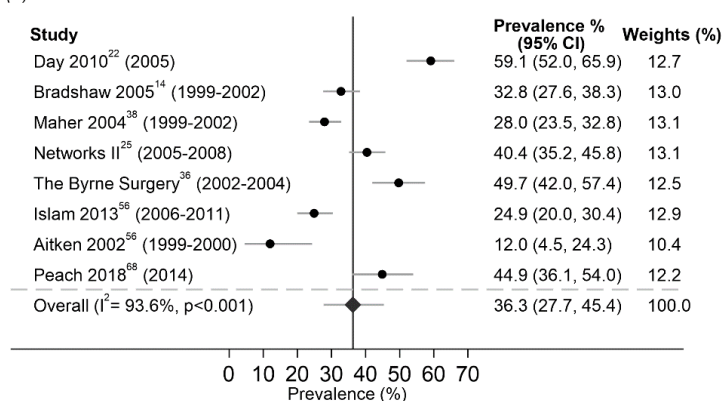
*(B) Prisoners*



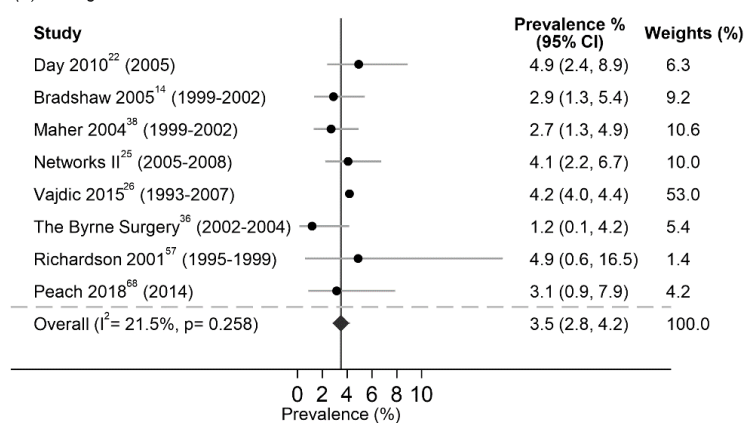
HCV = hepatitis C virus; py = person-years.

**Figure 3. Pooled prevalence of A. HBcAb; B. HBsAg in injecting drug users**

(A) HBcAb



(B) HBsAg



HBcAb = hepatitis B core antibody; HBsAg = hepatitis B surface antigen.

## Supplementary methods

As incidence studies for some permutation of virus and increased risk group were not available, we derived incidence estimates for some residual risk estimates; the method has been previously described and applied in similar studies.<sup>77-</sup>

<sup>79</sup> This method may overstate precision because it relies on the precision of the known pooled incidence. For instance, incidence estimates in some cases derived using the reference method assumed 100 000 person-years of follow-up. In the studies included in our systematic review, the follow-up period ranged from 38 person-years to 38 000 person-years, with a median of about 500 person-years. We therefore modified the reference method<sup>78</sup> to assume a maximum 500 person-years follow-up when calculating 95% confidence intervals for derived incidence estimates. We consequently obtained confidence intervals which of the same size or wider than those obtained with the reference method. This modification does not affect the incidence estimate itself.

## Supplementary results

### HIV

We used the ratio of pooled incidence to pooled prevalence in the men who have sex with men (MSM) group to estimate unknown pooled incidence in all other increased risk groups. The ratio was 0.152 in the overall results and 0.123 after the MSM sensitivity analysis described below.

For the nine studies on HIV prevalence in MSM, the pooled prevalence was 5.2% (95% CI, 2.5–8.8%), but the studies were heterogeneous ( $I^2 = 99.2\%$ ). We conducted a sensitivity analysis excluding one older study cohort,<sup>19</sup> two studies with populations thought to be unrepresentative (low median age,<sup>55</sup> high number of HIV-positive partners<sup>75</sup>), and one study with unclear validity of test reporting.<sup>5</sup> In the sensitivity analysis, prevalence was higher (6.8%; 95% CI, 5.3–8.5%) and heterogeneity non-significant ( $I^2 = 52.0\%$ ).

For the 11 studies of HIV in MSM, the pooled incidence was 0.79 per 100 person-years, but the studies were heterogeneous ( $I^2 = 95.4\%$ ). We conducted a sensitivity analysis, removing one study from an older recruitment period,<sup>6</sup> two studies which included people using pre-exposure prophylaxis,<sup>65,70</sup> and two studies with high numbers of HIV-positive sexual partners.<sup>53,75</sup> In the sensitivity analysis, the pooled incidence was 0.83 per 100 person-years (95% CI, 0.64–1.03; Table 6), similar to the reported incidence, and heterogeneity non-significant ( $I^2 = 52.0\%$ ).

Only one study reported HIV incidence in (injecting drug users (IDUs; 0.08 infections per 100 person-years; 95% CI, 0.05–0.13 per person-years). We derived a more conservative estimate of HIV incidence in IDUs from 11 studies reporting HIV prevalence. These studies were highly heterogeneous ( $I^2 = 91.6\%$ ), probably because of diversity in the studied populations at risk. The derived incidence estimate (0.11 per 100 person-years; 95% CI, 0.00–0.95 per 100 person-years) was nonetheless similar to the observed incidence.

For one cohort of sex workers, reported HIV incidence was 0.03 per 100 person-years (95% CI, 0.01–0.07 person-years). Four studies reported HIV prevalence. Derived pooled incidence was similar to directly observed incidence (0.03 per 100 person-years; 95% CI, 0.00–0.80 person-years), but heterogeneity was high ( $I^2 = 70.2\%$ ). In a sensitivity analysis excluding one older study,<sup>19</sup> heterogeneity was no longer significant ( $I^2 = 30.6\%$ ) and the derived incidence was lower (0.0 per 100 person-years; 95% CI, 0.00–0.74 person-years).

### HCV

For HCV we used the ratio of pooled incidence to pooled prevalence in the IDU group to estimate unknown pooled incidence in MSM, sex workers and high risk partners. This ratio was 0.232 in the final results, and 0.174 after the sensitivity analysis described below.

Sixteen studies estimated HCV prevalence in IDUs, with pooled prevalence 66.0% (95% CI, 57.0–73.8%). Heterogeneity was high ( $I^2 = 99.0\%$ ). A sensitivity analysis excluded two studies unlikely to be have representative samples (one subpopulation of steroid injectors,<sup>56</sup> one mixed study cohort in which one-quarter of the sample did not meet injecting drug use criteria<sup>69</sup>). In the sensitivity analysis, prevalence increased slightly to 71.9% (95% CI, 63.4–79.6%) but heterogeneity remained high ( $I^2 = 99.0\%$ ).

Nine studies reported HCV incidence in IDUs, with overall pooled incidence 15.3 (95% CI, 10.1–20.5) per 100 person-years. Heterogeneity was significant ( $I^2 = 91.1\%$ ). In a sensitivity analysis excluding one study<sup>39</sup> (non-representative subgroup of new IDUs), incidence was lower (12.5 per 100 person-years; 95% CI, 8.0–17.1 per 100 person-years); heterogeneity was still significant ( $I^2 = 88.1\%$ ).

Prevalence of HCV among prisoners was reported in fourteen heterogeneous studies ( $I^2 = 99.6\%$ ), with pooled prevalence of 38.9% (95% CI, 25.4–53.3%). In a sensitivity analysis excluding two prisoner-IDU subpopulations,<sup>46,73</sup> and two studies with very high Indigenous Australian populations,<sup>33,49</sup> prevalence was similar (41.3%; 95% CI, 36.0–46.8%), as was heterogeneity ( $I^2 = 95.1\%$ ).

For five studies of HCV incidence among prisoners, the pooled incidence was 7.7 (95% CI, 5.2–10.3) per 100 person-years. Studies were heterogeneous ( $I^2 = 66.9\%$ ). In a sensitivity analysis excluding two studies of a subgroup of prisoners with complete histories of injecting drug use,<sup>41,46</sup> the incidence was similar (7.3 per 100 person-years; 95% CI, 5.1–9.4 per 100 person-years), but heterogeneity was low ( $I^2 = 0.0\%$ ).

For three heterogeneous studies ( $I^2 = 96.1\%$ ) of the prevalence of HCV among sex workers, the derived pooled incidence was 4.1 (95% CI, 2.5–6.3) per 100 person-years. For the sensitivity analysis, one study<sup>19</sup> was removed for the sensitivity analysis because of poor coverage of the identified sample (fewer than 10% of sex workers were tested for HCV); the derived pooled incidence was substantially lower (1.0 per 100 person-years; 95% CI, 0.3–2.3 per 100 person-years); there were too few studies to calculate heterogeneity.

One study of HCV incidence in MSM reported an incidence of 0.11 per 100 person-years (95% CI, 0.03–0.26 per 100 person-years). A more conservative estimate of pooled incidence was derived from five studies reporting HCV prevalence in MSM: 0.9 per 100 person-years (95% CI, 0.3–2.2 per 100 person-years), higher than the directly observed incidence. These studies were heterogeneous ( $I^2 = 95.3\%$ ). When one prevalence study<sup>19</sup> was excluded for the sensitivity analysis (very poor representation of the identified sample: only 10% of were MSM tested for HCV), heterogeneity was non-significant ( $I^2 = 73.7\%$ ), and the pooled incidence was 0.2 per 100 person-years (95% CI, 0.0–1.1 per 100 person-years), close to the directly observed incidence.

## HBV

There were no studies of HBsAg incidence in Australian increased risk cohorts.

Only two studies reported HBcAb incidence in Australian increased risk cohorts (MSM and IDU). We used an average of the ratio of pooled incidence to pooled prevalence in the IDUs and MSM group in HBcAb to estimate unknown pooled incidence in all other increased risk groups for HBcAb and all increased risk groups for HBsAg. We used the mean ratio (0.227) because there was only incidence study each for IDUs and MSM and the ratios were different (0.021 for MSM and 0.433 for IDUs). The average ratio reduced slightly in sensitivity analyses (0.207).

The estimated incidence of HBcAb in 40 IDU from 2005–2008 was 15.7 per 100 person-years (95% CI, 7.1–35.1 per 100 person-years). Eight heterogeneous studies ( $I^2 = 93.6\%$ ) examined HBcAb prevalence in IDUs. The derived pooled incidence of HBcAb was 8.2 (95% CI, 3.0–17.9) per 100 person-years, lower than the directly observed incidence. When one study was excluded from the sensitivity analysis (steroid injectors only),<sup>56</sup> the incidence was 8.2 per 100 person-years (95% CI: 3.0–17.8 per 100 person-years), but heterogeneous was high ( $I^2 = 93.5\%$ ). Eight studies reported HBsAg prevalence in IDUs; study heterogeneity was low ( $I^2 = 21.5\%$ ). The derived incidence of HBsAg or active HBV infection was 0.8 per 100 person-years (95% CI, 0.2–2.0 per 100 person-years).

The incidence of HBcAb in 4097 MSM was 0.20 per 100 person-years (95% CI, 0.08–0.41 per 100 person-years). Prevalence of HBcAb was reported for three groups of MSM; heterogeneity was high ( $I^2 = 99.3\%$ ). The derived pooled incidence of HBcAb in MSM was 2.2 (95% CI, 0.8–4.7) per 100 person-years, much higher than the directly observed incidence. In a sensitivity analysis excluding one older study,<sup>19</sup> the incidence was 2.4 per 100 person-years (95% CI, 0.9–5.3 per 100 person-years); heterogeneity could not be assessed. Prevalence of HBsAg was reported for four groups of MSM; heterogeneity was high ( $I^2 = 94.7\%$ ). The derived incidence of active HBV infection was 0.3 per 100 person-years (95% CI, 0.0–1.4 per 100 person-years). When one study was excluded from the sensitivity analysis (poor testing coverage of all MSM for HBsAg),<sup>15</sup> heterogeneity was non-significant ( $I^2 = 54.7\%$ ), and pooled incidence was 0.2 per 100 person-years (95% CI, 0.0–1.0 per 100 person-years).

Four studies examined HBcAb prevalence in prisoners; heterogeneity was high ( $I^2 = 95.8\%$ ). The derived incidence of HBcAb in prisoners was 4.4 (95% CI, 1.6–9.6) per 100 person-years. Seven studies examined HBsAg prevalence in prisoners; heterogeneity was high ( $I^2 = 80.1\%$ ). The derived incidence of HBsAg was 1.0 per 100 person-years (95% CI, 0.3–2.3 per 100 person-years). In a sensitivity analysis excluding one Northern Territory-based study, with an expected difference in hepatitis B epidemiology,<sup>66</sup> the incidence was similar: 0.8 per 100 person-years (95% CI, 0.2–2.0 per 100 person-years), and heterogeneity was non-significant ( $I^2 = 42.1\%$ ).

## References

1. Kirby Institute. HIV, viral hepatitis and sexually transmissible infection in Australia: annual surveillance report 2017. Sydney: Kirby Institute, UNSW, 2017. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP\\_Annual-Surveillance-Report-2017\\_compressed.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP_Annual-Surveillance-Report-2017_compressed.pdf) (viewed May 2019).
2. Kirby Institute. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2016. Sydney: Kirby Institute, UNSW, 2016. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP\\_Annual-Surveillance-Report-2016\\_UPD170627.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP_Annual-Surveillance-Report-2016_UPD170627.pdf) (viewed May 2019).
3. Callander D, Read P, Prestage G, et al. A cross-sectional study of HIV and STIs among male sex workers attending Australian sexual health clinics. *Sex Transm Infect* 2017; 93: 299-302.
4. Callander D, Cox C, Schmidt H-M, Donovan B. *Sex worker health surveillance: a report to the New South Wales Ministry of Health*. Sydney: Kirby Institute; NSW Ministry of Health; Sex Worker Outreach Project NSW (SWOP); BRISSE Program, 2016. <http://www.brise.com.au/sites/default/files/documents/SurveillanceReport2016.pdf> (viewed May 2019).
5. Guy RJ, Spelman T, Stooze M, et al. Risk factors for HIV seroconversion in men who have sex with men in Victoria, Australia: results from a sentinel surveillance system. *Sex Health* 2011; 8: 319-329.
6. McDonald A, Donovan B, O'Connor C, et al. Time trends in HIV incidence among homosexually active men seen at sexual health clinics in Australia, 1993–1999. *J Clin Virol* 2001; 22: 297-303.
7. National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia annual surveillance report 2005. Sydney: National Centre in HIV Epidemiology and Clinical Research; University of New South Wales, 2005. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP\\_2005-Annual-Surveillance-Report.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP_2005-Annual-Surveillance-Report.pdf) (viewed May 2019).
8. Kirby Institute. HIV, viral hepatitis and sexually transmissible infections in Australia. Annual surveillance report 2011. Sydney: Kirby Institute; University of New South Wales, 2011. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP\\_2011-Annual-Surveillance-Report.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP_2011-Annual-Surveillance-Report.pdf) (viewed May 2019).
9. Guy RJ, Wand H, Wilson DP, et al. Using population attributable risk to choose HIV prevention strategies in men who have sex with men. *BMC Public Health* 2011; 11: 247.
10. Jin F, Prestage GP, Matthews G, et al. Prevalence, incidence and risk factors for hepatitis C in homosexual men: data from two cohorts of HIV-negative and HIV-positive men in Sydney, Australia. *Sex Transm Infect* 2010;86(1):25-28.
11. Jin F, Prestage GP, Zablotska I, et al. High rates of sexually transmitted infections in HIV positive homosexual men: data from two community based cohorts. *Sex Transm Infect* 2007; 83: 397-399.
12. Read TRH, Hocking JS, Bradshaw CS, et al. Provision of rapid HIV tests within a health service and frequency of HIV testing among men who have sex with men: randomised controlled trial. *BMJ* 2013; 347: f5086.
13. Read TR, Walker S, Chow EP, et al. Frequency of HIV testing with and without a clinical consultation among men who have sex with men (MSM): a randomised controlled trial. STI & HIV World Congress, Rio de Janeiro, 9–12 July 2017. *Sex Transm Infect* 2017; 93: A229-A230. [https://sti.bmj.com/content/93/Suppl\\_2/A229.2.info](https://sti.bmj.com/content/93/Suppl_2/A229.2.info) (viewed May 2019).
14. Bradshaw CS, Pierce LI, Tabrizi SN, et al. Screening injecting drug users for sexually transmitted infections and blood borne viruses using street outreach and self collected sampling. *Sex Transm Infect* 2005; 81: 53-58.
15. Gamagedara N, Weerakoon AP, Zou H, et al. Cross-sectional study of hepatitis B immunity in MSM between 2002 and 2012. *Sex Transm Infect* 2014; 90: 41-45.
16. Lister NA, Smith A, Tabrizi SN, et al. Comprehensive clinical care on-site in men-only saunas: confidential STI/HIV screening outreach clinic. *Int J STD AIDS* 2005; 16: 794-798.
17. Holt M, Lea T, Asselin J, et al. The prevalence and correlates of undiagnosed HIV among Australian gay and bisexual men: results of a national, community-based, bio-behavioural survey. *J Int AIDS Soc* 2015; 18: 20526.
18. Pedrana AE, Hellard ME, Guy R, et al. The difference in self-reported and biological measured HIV prevalence: implications for HIV prevention. *AIDS Behav* 2012; 16: 1454-1463.
19. Estcourt CS, Marks C, Rohrsheim R, et al. HIV, sexually transmitted infections, and risk behaviours in male commercial sex workers in Sydney. *Sex Transm Infect* 2000; 76: 294-298.
20. Coughlan E, Mindel A, Estcourt CS. Male clients of female commercial sex workers: HIV, STDs and risk behaviour. *Int J STD AIDS* 2001; 12: 665-669.
21. Lawrinson P, Ali R, Buavirat A, et al. Key findings from the WHO collaborative study on substitution therapy for opioid dependence and HIV/AIDS. *Addiction* 2008;103(9):1484-1492.
22. Day CA, White B, Dore GJ, et al. Hepatitis B virus among injecting drug users in Sydney, Australia: prevalence, vaccination and knowledge of status. *Drug Alcohol Depend* 2010; 108: 134-137.
23. Sacks-Davis R, Aitken CK, Higgs P, et al. High rates of hepatitis C virus reinfection and spontaneous clearance of reinfection in people who inject drugs: a prospective cohort study. *PloS One* 2013; 8: e80216.
24. Miller ER, Hellard ME, Bowden S, et al. Markers and risk factors for HCV, HBV and HIV in a network of injecting drug users in Melbourne, Australia. *J Infect* 2009; 58: 375-382.
25. Winter RJ, Dietze PM, Gouillou M, et al. Hepatitis B virus exposure and vaccination in a cohort of people who inject drugs: what has been the impact of targeted free vaccination? *J Gastroenterol Hepatol* 2013; 28: 314-322.
26. Vajdic CM, Marashi Pour S, Olivier J, et al. The impact of blood-borne viruses on cause-specific mortality among opioid dependent people: An Australian population-based cohort study. *Drug Alcohol Depend* 2015; 152: 264-271.
27. Iversen J, Wand H, Topp L, et al. Reduction in HCV incidence among injection drug users attending needle and syringe programs in Australia: a linkage study. *Am J Public Health* 2013; 103: 1436-1444.
28. Iversen J, Wand H, Topp L, et al. Extremely low and sustained HIV incidence among people who inject drugs in a setting of harm reduction. *AIDS* 2014; 28: 275-278.
29. Iversen J, Dore G, Catlett B, et al. Association between rapid utilisation of direct hepatitis C antivirals and decline in the prevalence of viremia among people who inject drugs in Australia. *J Hepatol* 2019; 70: 33-39.
30. National Centre in HIV Epidemiology and Clinical Research. HIV, viral hepatitis and sexually transmissible infections in Australia. Annual surveillance report 2010. Sydney: National Centre in HIV Epidemiology and Clinical Research, University of New South Wales, 2010. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP\\_2010-Annual-Surveillance-Report.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/SERP_2010-Annual-Surveillance-Report.pdf) (viewed May 2019).
31. Butler T, Simpson M. National prison entrants' blood-borne virus survey report: 2004, 2007, 2010, 2013, and 2016. Sydney: Kirby Institute; University of New South Wales, 2017. [https://kirby.unsw.edu.au/sites/default/files/kirby/report/JHP\\_National-Prison-Entrants-Report-2004-2007-2010-2013-2016.pdf](https://kirby.unsw.edu.au/sites/default/files/kirby/report/JHP_National-Prison-Entrants-Report-2004-2007-2010-2013-2016.pdf) (viewed May 2019).
32. Watkins RE, Mak DB, Connelly C. Testing for sexually transmitted infections and blood borne viruses on admission to Western Australian prisons. *BMC Public Health* 2009; 9: 385.
33. Gilles M, Swingle E, Craven C, Larson A. Prison health and public health responses at a regional prison in Western Australia. *Aust N Z J Public Health* 2008; 32: 549-553.
34. Sturrock CJ, Currie MJ, Vally H, et al. Community-based sexual health care works: a review of the ACT outreach program. *Sex Health* 2007; 4: 201-204.

35. Hallinan R, Byrne A, Amin J, Dore GJ. Hepatitis C virus incidence among injecting drug users on opioid replacement therapy. *Aust N Z J Public Health* 2004; 28: 576-578.
36. Hallinan R, Byrne A, Amin J, Dore GJ. Hepatitis C virus prevalence and outcomes among injecting drug users on opioid replacement therapy. *J Gastroenterol Hepatol* 2005; 20: 1082-1086.
37. Maher L, Li J, Jalaludin B, et al. High hepatitis C incidence in new injecting drug users: a policy failure? *Aust N Z J Public Health* 2007; 31: 30-35.
38. Maher L, Chant K, Jalaludin B, Sargent P. Risk behaviors and antibody hepatitis B and C prevalence among injecting drug users in south-western Sydney, Australia. *J Gastroenterol Hepatol* 2004; 19: 1114-1120.
39. Maher L, Jalaludin B, Chant KG, et al. Incidence and risk factors for hepatitis C seroconversion in injecting drug users in Australia. *Addiction* 2006; 101: 1499-1508.
40. White B, Madden A, Prins M, et al. Assessing the feasibility of hepatitis C virus vaccine trials: results from the Hepatitis C Incidence and Transmission Study-community (HITS-c) vaccine preparedness study. *Vaccine* 2014; 32: 5460-5467.
41. Cunningham EB, Hajarizadeh B, Bretana NA, et al. Ongoing incident hepatitis C virus infection among people with a history of injecting drug use in an Australian prison setting, 2005–2014: the HITS-p study. *J Viral Hepat* 2017; 24: 733-741.
42. Shand FL, Day C, Rawlinson W, et al. Hepatitis C testing and status among opioid substitution treatment clients in New South Wales. *Aust N Z J Public Health* 2014; 38: 160-164.
43. Aitken CK, Higgs P, Bowden S. Differences in the social networks of ethnic Vietnamese and non-Vietnamese injecting drug users and their implications for blood-borne virus transmission. *Epidemiol Infect* 2008; 136: 410-416.
44. Butler T, Kariminia A, Levy M, Kaldor J. Prisoners are at risk for hepatitis C transmission. *Eur J Epidemiol* 2004; 19: 1119-1122.
45. Justice Health and Forensic Mental Health Network. 2015 Network patient health survey. May 2017. [https://www.justicehealth.nsw.gov.au/publications/2015\\_NHPS\\_FINALREPORT.pdf](https://www.justicehealth.nsw.gov.au/publications/2015_NHPS_FINALREPORT.pdf) (viewed May 2019).
46. Snow KJ, Young JT, Preen DB, et al. Incidence and correlates of hepatitis C virus infection in a large cohort of prisoners who have injected drugs. *BMC Public Health* 2014; 14: 830.
47. Miller ER, Bi P, Ryan P. Hepatitis C virus infection in South Australian prisoners: seroprevalence, seroconversion, and risk factors. *Int J Infect Dis* 2009; 13: 201-208.
48. Miller ER, Bi P, Ryan P. The prevalence of HCV antibody in South Australian prisoners. *J Infect* 2006; 53: 125-130.
49. Su J-Y, Broadfoot J. Seroprevalence of hepatitis C infection in Northern Territory prisoners [poster]. 7th Australasian Viral Hepatitis conference, Melbourne, 6–8 Sept 2010; p. 144. <https://ashm.blob.core.windows.net/ashmpublic/2010VHHHandbook.pdf> (viewed May 2019).
50. Hellard ME, Hocking JS, Crofts N. The prevalence and the risk behaviours associated with the transmission of hepatitis C virus in Australian correctional facilities. *Epidemiol Infect* 2004; 132: 409-415.
51. Awofeso N, Harper SE, Levy MH. Prevalence of exposure to hepatitis C virus among prison inmates, 1999 [letter]. *Med J Aust* 2000; 172: 94.
52. Larney S, Monkley DL, Indig D, Hampton SE. A cross-sectional study of susceptibility to vaccine-preventable diseases among prison entrants in New South Wales. *Med J Aust* 2013; 198: 376-379. <https://www.mja.com.au/journal/2013/198/7/cross-sectional-study-susceptibility-vaccine-preventable-diseases-among-prison>
53. Bavinton BR, Pinto AN, Phanuphak N, et al. Viral suppression and HIV transmission in serodiscordant male couples: an international, prospective, observational, cohort study. *Lancet HIV* 2018; 5: e438-e447.
54. Islam MM, Topp L, Conigrave KM, et al. Sexually transmitted infections, sexual risk behaviours and perceived barriers to safe sex among drug users. *Aust N Z J Public Health* 2013; 37: 311-315.
55. Zou H, Prestage G, Fairley CK, et al. Sexual behaviors and risk for sexually transmitted infections among teenage men who have sex with men. *J Adolesc Health* 2014; 55: 247-253.
56. Aitken C, Delalande C, Stanton K. Pumping iron, risking infection? Exposure to hepatitis C, hepatitis B and HIV among anabolic-androgenic steroid injectors in Victoria, Australia. *Drug Alcohol Depend* 2002; 65: 303-308.
57. Richardson R, Bolisetty S, Ingall C. The profile of substance-using pregnant mothers and their newborns at a regional rural hospital in New South Wales. *Aust N Z J Obstet Gynaecol* 2001; 41: 415-419.
58. Aitken CK, Agius PA, Higgs PG, et al. The effects of needle-sharing and opioid substitution therapy on incidence of hepatitis C virus infection and reinfection in people who inject drugs. *Epidemiol Infect* 2017; 145: 796-801.
59. O'Keefe D, Aitken C, Higgs P, Dietze P. Concordance between self-reported and actual hepatitis C virus infection status in a cohort of people who inject drugs. *Drug Alcohol Rev* 2013; 32: 208-210.
60. Petoumenos K, Huang R, Hoy J, et al. Prevalence of self-reported comorbidities in HIV positive and HIV negative men who have sex with men over 55 years. The Australian Positive and Peers Longevity Evaluation Study (APPLES). *PLoS ONE* 2017; 12: e0184583.
61. Rowe J. SHANTUSI: Surveying HIV and need in the unregulated sex industry. Melbourne: Inner South Community Health Service/RMIT University. 2011. <https://researchbank.mit.edu.au/eserv/mit:42343/n2006048840.pdf> (viewed May 2019).
62. Epidemiology Branch, ACT Government Health Directorate. 2010 ACT inmate health survey: summary results (Health series no. 55). July 2011. <https://stats.health.act.gov.au/sites/default/files/Number%2055%20-%202010%20ACT%20Inmate%20Health%20Survey%20-%20Summary%20results%20July%202011.pdf> (viewed May 2019).
63. Department of Justice (Victoria). Victorian Prisoner Health Survey. Feb 2003. <https://www.corrections.vic.gov.au/victorian-prisoner-health-study> (viewed May 2019).
64. Hajarizadeh B, Grebely J, Byrne M, et al. Incidence of hepatitis C virus in four prisons in New South Wales, Australia: the SToP-C study [abstract]. *J Hepatol* 2018;68 (Suppl 1): S187-S188.
65. Grulich AE, Guy R, Amin J, et al. Population-level effectiveness of rapid, targeted, high-coverage roll-out of HIV pre-exposure prophylaxis in men who have sex with men: the EPIC-NSW prospective cohort study. *Lancet HIV* 2018; 5: e629-e637.
66. Davies J, Marshall C. Hepatitis B in corrections: the Top End of the Northern Territory. 11th Australasian Viral Hepatitis Conference, Adelaide, 13–15 Aug 2018. <https://az659834.vo.msecnd.net/eventsairaeuprod/production-ashm-public/527efe6cb4234fda89a826ff9222527> (viewed May 2019).
67. O'Flynn M, White S, Kudell M. The narrowest point: hepatitis C in remand [poster]. 11th Australasian Viral Hepatitis Conference, Adelaide, 13–15 Aug 2018. <https://az659834.vo.msecnd.net/eventsairaeuprod/production-ashm-public/148dd3b3987c42dca1c5b1b1b69e2a66> (viewed May 2019).
68. Peach E, Cogger S, Byron K, et al. Blood-borne virus transmission in an urban, culturally diverse neighbourhood: results from a cross-sectional bio-behavioural survey using innovative outreach methods in a hard-to-reach population. *Sex Health* 2018; 15: 54-60.
69. Bajis S, Maher L, Treloar C, et al. Acceptability and preferences of point-of-care finger-stick whole-blood and venepuncture hepatitis C virus testing among people who inject drugs in Australia. *Int J Drug Policy* 2018; 61: 23-30.
70. Zablotska IB, Vaccher SJ, Bloch M, et al. High adherence to HIV pre-exposure prophylaxis and no HIV seroconversions despite high levels of risk behaviour and stis: the Australian Demonstration Study PrELUDE. *Aids Behav* 2018; 23: 1780-1789.
71. Jamil MS, Prestage G, Fairley CK, et al. Effect of availability of HIV self-testing on HIV testing frequency in gay and bisexual men at high risk of infection (FORTH): a waiting-list randomised controlled trial. *Lancet HIV* 2017; 4: e241-e250.
72. Birrell F, Staunton S, Debattista J, et al. Pilot of non-invasive (oral fluid) testing for HIV within a community setting. *Sex Health* 2010; 7: 11-16.
73. Kirwan A, Curtis M, Dietze P, et al. The Prison and Transition Health (PATH) cohort study: study protocol and baseline characteristics of a

- cohort of men with a history of injecting drug use leaving prison in Australia. *J Urban Health* 2019; 96: 400-410.
74. Grebely J, Pham ST, Matthews GV, et al. Hepatitis C virus reinfection and superinfection among treated and untreated participants with recent infection. *Hepatology* 2012; 55: 1058-1069.
  75. Pierce AB, Yohannes K, Guy R, et al. HIV seroconversions among male non-occupational post-exposure prophylaxis service users: a data linkage study. *Sex Health* 2011; 8: 179-183.
  76. Humar A, Morris M, Blumberg E, et al. Nucleic acid testing (NAT) of organ donors: is the 'best' test the right test? A consensus conference report. *Am J Transplant* 2010; 10: 889-899.
  77. Kucirka LM, Sarathy H, Govindan P, et al. Risk of window period HIV infection in high infectious risk donors: systematic review and meta-analysis. *Am J Transplant* 2011; 11: 1176-1187.
  78. Kucirka LM, Sarathy H, Govindan P, et al. Risk of window period hepatitis-C infection in high infectious risk donors: systematic review and meta-analysis. *Am J Transplant* 2011; 11: 1188-1200.
  79. The CST/CNTRP increased risk donor working group. Guidance on the use of increased infectious risk donors for organ transplantation *Transplantation* 2014; 98: 365-369.