Exploring the costs and effectiveness of the Drug and Alcohol Withdrawal Network: a home-based alcohol and other drug withdrawal service

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Abstract. The Drug and Alcohol Withdrawal Network (DAWN) is a home-based withdrawal service based in Perth, Western Australia. Literature on outcomes, costs and client attitudes towards this type of home-based detoxification in Australia is sparse. Therefore, this study assessed these factors for clients enrolled over a 5-year period (July 2011–June 2016). Client experience was explored through semi-structured interviews with 10 clients. Over the study period, 1800 clients (54\% male, mean age 38 years) were assessed, and there were 2045 episodes of care. Although most first-episode clients (52\%) listed alcohol as the primary drug of concern, the proportion listing methamphetamine increased from 4\% in 2011–12 to 23\% in 2015–16. In 94\% (\(n=639\)) of withdrawal detoxification episodes with completed surveys, clients used their ‘drug of primary concern’ most days or more often at baseline; this had reduced to 23\% (\(n=149\)) at the conclusion of detoxification. Five-year direct costs were A$4.8 million. Clients valued the person-centred holistic approach to care, including linking with other health providers. Barriers included low awareness of the program and difficulties finding an appropriate support person. Further exploration of cost-effectiveness would substantiate the apparently lower per client cost, assuming medical suitability for both programs, for home-based relative to inpatient withdrawal.

Additional keywords: alcoholism, community health services, home care services, street drugs, substance-related disorders, substance withdrawal syndrome.

Introduction

Increased demand for alcohol and other drug services in Australia has been underpinned by changes in community-level drug use patterns. For example, recent estimates of methamphetamine use between 2002 and 2014 for Australians aged 15–54 years indicated that both regular (at least monthly) and dependent use was highest in 2013–14 (Deggenhardt \textit{et al.} 2016). In Western Australia (WA), demand for treatment is outstripping supply. The current strategic plan for mental health, alcohol and other drugs (Government of Western Australia 2014) highlights reconfiguration away from hospital-based treatment for alcohol or other drug detoxification. Home-based withdrawal is one out-of-hospital treatment option.

There is an evidence base showing home-based alcohol detoxification is safe and likely cost-effective, if appropriately targeted (reviewed by Fleeman 1997). This includes some data from WA, though the quality of the evidence is reduced by a small sample size (Bartu and Saunders 1994). More recent work from Brazil compared outpatient alcohol withdrawal to outpatient withdrawal with home visits, but is not directly applicable to Australia (Moraes \textit{et al.} 2010). For other drugs, there is little literature specific to home-based withdrawal. Authors of a Cochrane review comparing outcomes of inpatient opioid detoxification with other settings (Day \textit{et al.} 2005) found only one, small randomised study to include (Wilson \textit{et al.} 1975). The outpatient component of this study was clinic, rather than home-based. The limited number of studies is consistent with recent commentary that data to guide alcohol and other drug withdrawal service planning in Australia are sparse (Ritter and Stoove 2016).

The Drug and Alcohol Withdrawal Network (DAWN) was developed in 2001. DAWN is now funded through the WA...
What is known about the topic?
- There has been increased demand for alcohol and other drug withdrawal services in recent years. Although home-based detoxification seems intuitively appealing, there are weaknesses in the existing evidence base.

What does this paper add?
- A home-based withdrawal program reduced drug use and was valued by clients. Further exploration of cost-effectiveness may strengthen the argument of greater 'value for money' from home- compared to inpatient-detoxification approaches.

Government, Mental Health Commission. It provides services in the Perth metropolitan area. Although DAWN is the sole provider of home-based withdrawal in WA, there are similar services operating in Victoria (Uniting Care Regen, see http://www.regen.org.au/, accessed 14 July 2017) and New South Wales (Mary Healthcare Ltd, see https://www.calvarycare.org.au/riverrina-private-hospital/services-and-clinics/drug-and-alcohol-centre/, accessed 14 July 2017). Clients must have no physical or psychiatric contra-indications to withdrawal (e.g. history of seizure in previous withdrawals, high risk of suicide), have a 'safe alcohol/drug free environment' and a lay support person to monitor progress (Drug and Alcohol Withdrawal Network 2013). Following referral (including self-referral) and telephone triage, clients are assessed for eligibility in-person by a clinical nurse specialist. A start date is then arranged for the detoxification. The length and nature of detoxification is client- and drug-specific. There is no program out-of-pocket cost to clients at the point-of-care.

As there are limitations to the Australian literature on home-based alcohol and other drug withdrawal services, we aimed to explore the costs and effectiveness of DAWN. A mixed-methods approach was chosen to highlight outcomes from a home-based withdrawal approach, to frame a commentary of the marginal financial gain or loss relative to inpatient care and to provide policy, practice and research recommendations.

Methods
This study was approved by the Curtin University Human Research Ethics Committee (RDHS-03–16) and the St John of God Hospital Human Research Ethics Committee (Ref # 1000). We performed a cost-consequence analysis (Kaufman and Watkins 1996). Unlike a cost-effectiveness or cost-utility analysis, this type of study aims not to report a quotient of costs versus benefits, relative to a comparator, but instead to report both costs and outcomes of a single program. This provides a more comprehensive picture of the two components, and is also appropriate as DAWN was not compared to an alternate model of care.

Quantitative outcomes
We included clients enrolled from 1 July 2011 and discharged by 30 June 2016. We extracted all routinely reported data, including client demographics and, where applicable, time to service re-engagement. Time from phone triage to face-to-face assessment, discharge or transfer (not included in routinely generated reports) was extracted for the most recent financial year (2015–16). For clients undergoing the full detoxification and withdrawal program (as opposed to counselling, case management or assessment only), the responses to a before- and after-survey were analysed. This survey is administered as part of the DAWN service’s routine data collection process, and covers regularity of primary and other drug use, physical, mental health, emotional health, quality of relationships, perceived ability to stop or reduce drug use and satisfaction with the service. Previously, follow up was undertaken at 6 weeks, 3, 6 and 12 months post-detoxification. However, this was ceased from June 2012 because of resource limitations. Thus, survey data analysed were at triage (baseline) and discharge (follow up). Changes in responses between baseline and follow up for survey parameters (except for service satisfaction, which is only a useful measure at follow up) were compared using a Chi-Square test for trend. All analyses were performed using Stata SE Version 14 (College Station, TX, USA).

Client interviews
We conducted semi-structured interviews with current or recently discharged clients in early 2017. Clients were selected by nurses, to ensure that they were clinically suitable for interview, as discussion of the withdrawal process was considered to carry some psychological risk to the client. Written informed consent was obtained from clients by DAWN nurses after they had explained the study, including the option to withdraw from the study at any time. Interviews were conducted by telephone. The interview questions aimed to explore the client’s understanding of and experiences with the DAWN program, and of their opinion of program strengths and weaknesses. The specific questions were adapted to suit the flow of discussion and to explore additional themes that emerged with each interview. Recorded interviews were transcribed verbatim and thematically analysed using an inductive content analysis approach that coded frequent themes (Saladaña 2012). Data were coded into segments and the themes synthesised in combination with review of the quantitative findings.

Costs
Direct cost data were provided by DAWN. Nurses reported travel, client and administration time, and the supportive medications in use for the weeks commencing 30 January 2017 and 27 March 2017.

Results
Client characteristics
There were 2045 episodes of triage ± care during the study period. During 2015–16, the median time from phone triage to face-to-face assessment or discharge or transfer was 6 days. There were 1800 unique service users. The remaining 245 episodes of care were subsequent services provided to 193 clients. Of the unique service users, 978 (54%) were male and the mean age at first episode was 38 years (s.d., 12.5 years). Just over 5% were Aboriginal, and just under half (44%) reported secondary schooling as their highest level of education. At the
first interaction, more than half (52%, n = 941) had alcohol as a primary drug of concern, followed by cannabis (15%, n = 276) and methamphetamines (13%, n = 242). The pattern of drug use changed over the study period. The proportion listing methamphetamine increased from 4% in 2011–12 to 23% by 2015–16. Summary demographic data for unique users, at the first episode, are provided in Table 1.

Considering all episodes of care, 695 (34%) received an assessment only (meaning a decision was made not continue at triage, possibly with referral to another service), 649 (32%) received support and case management only (meaning a decision was made not to continue at or shortly after face-to-face assessment, possibly with referral to another service) and 700 (34%) underwent home-based detoxification. For all withdrawal management and detoxification episodes, there was a median of 44 days from triage to discharge (range, by financial year, 37–50 days).

**Self-reported outcome measures**

Of 700 client episodes undergoing the full withdrawal detoxification program, 680 (97%) completed a survey at baseline and 637 (91%) at the end of treatment. There was an improvement in all survey domains above that expected, solely due to chance (P for trend < 0.001). In 94% (n = 639) of withdrawal detoxification episodes, clients used their ‘drug of primary concern’ most days or more often at baseline; this had reduced to 23% (n = 149) at the conclusion of detoxification (Fig. 1). A total of 24% used another drug of concern most days or more often at baseline, reducing to 11.6% at follow up.

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<td>38.0 (12.5)</td>
<td>38.1 (12.7)</td>
<td>38.1 (12.0)</td>
<td>37.6 (12.0)</td>
<td>37.5 (12.5)</td>
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<tr>
<td>Male</td>
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<td>191</td>
<td>53.7</td>
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<td>30.1</td>
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<td>35.7</td>
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<td>36</td>
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<td>34.9</td>
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<td>102</td>
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<td>Aboriginal</td>
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<td>4.6</td>
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<td>Alcohol</td>
<td>207</td>
<td>52.8</td>
<td>198</td>
<td>55.6</td>
<td>180</td>
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<tr>
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<td>20.9</td>
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<td>16.9</td>
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<td>Methamphetamine</td>
<td>15</td>
<td>3.8</td>
<td>32</td>
<td>9</td>
<td>37</td>
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<td>Total unique patients</td>
<td>392</td>
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<td>356</td>
<td>100</td>
<td>347</td>
<td>100</td>
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^Three most prevalent drug groups are listed, thus the percentages do not add to 100%. Cell counts with less than five cases are shown as <5 to preserve anonymity.

![Fig. 1](https://example.com)  
**Fig. 1.** Self-reported primary drug use in the past week for detoxification withdrawal clients at baseline (n = 680 of 700 (97%)) and follow-up (n = 637 of 700 (91%)).
Satisfaction with the service was high, with 87% of respondents ‘extremely’ satisfied.

Time to service re-engagement
For the 193 clients who had more than one treatment episode during the time period, at second presentation, alcohol remained the most prevalent primary drug (70%), followed by cannabis (11%) and methamphetamine (8%). Considering only clients undergoing multiple withdrawal detoxification (n=73 episodes), the median time to re-engagement with the DAWN service (i.e. discharge date to subsequent service start date) was 246 days.

Client interviews
Ten clients were interviewed, six of whom were female. The mean age was 50 years (range 29 – 70 years). Clients had used methamphetamines (n=2), benzodiazepines (n=2), cannabis (n=1) or alcohol (n=5). Few new themes were emerging towards the end of client interviews, suggesting saturation had been reached (Saladaña 2012).

Generally, clients had a good understanding of DAWN as a withdrawal program through which they would receive intense support within their home environment, with additional phone-based support. They understood that to receive the service they needed to adhere to certain guidelines, including the requirement for a live-in support person. Some clients struggled with this concept and found it a barrier to treatment access:

But if I couldn’t have a support person, yeah it was frustrating I suppose. I just tried to manage it as best I could I guess. But it didn’t stop [Former DAWN client, 2017].

In general, clients could see the benefit of the support person. DAWN nurses were perceived as professional, non-judgmental and compassionate:

You don’t feel judged and that’s really important [Former DAWN client, 2017].

There was a strong sense of trust for the nurses and one client articulated the importance of the ‘genuine belief’ in them. This helped build increased self-control and self-management in clients. By managing comorbidities, such as depression or anxiety, clients felt they received physical and psychological support. The service workforce takes the time to understand each client’s personal circumstances and other factors affecting their life. Linkage with clients’ GPs, and providing support for the support person, were also valued.

Clients knew what to expect and were given tools, including other medication, to help them cope:

[I] wouldn’t be where I am today without DAWN [Former DAWN client, 2017].

Clients manage their own medications, which are prescribed by their GP, with guidance from the support person and DAWN nurse where appropriate. They also understood that relapses are a normal and acceptable part of drug withdrawal, which reduces clients’ stress. For some, the home environment was where they needed assistance most, as this is where they participate in their drug-taking behaviours (e.g. excessive alcohol consumption):

[In rehab]... I won’t drink in there, I won’t feel like drinking in there. But as soon as I come home, it’s handling it at home. The management of the problem can be where the triggers are kicking in. And for me that was at home [Former DAWN client, 2017].

Perhaps the most important element to the success for clients of DAWN is that clients need to be at the right stage of change. Using the transtheoretical model of health behaviour change (Prochaska and Diclemente 1984), clients need to have moved – or be ready to move – from the contemplation stage to the preparation and action stage to succeed long term with drug withdrawal and maintenance. Many clients acknowledged that they were not previously ready but truly believed this time they would succeed long term:

It does rely on the alcohol [or drug] dependent person having recognition of the problem and wanting to do something about it [Former DAWN client, 2017].

Some barriers were identified. Client feedback indicated a low level of understanding of the DAWN service among GPs. Some expressed frustration that they were not referred into the service sooner, or had heard about DAWN largely by chance. Once they had ceased the intensive, home-based care, some clients would travel to visit the nurses for continued low-intensity support. Some clients felt that they would like more intensive home visits – ‘I wish I could see her more often’ [Former DAWN client, 2017]. Furthermore, there was a level of uncertainty about what, if any, ongoing support DAWN can provide following detoxification.

### Table 2. Summary of expenses for 2011–12 to 2015–16 financial years

Note that prices are not inflated to current value (total expenses just over A$5 million in costs expressed as at December 2015; Australian Bureau of Statistics 2017)

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<td>DAWN salaries</td>
<td>763,695</td>
<td>841,472</td>
<td>799,899</td>
<td>923,911</td>
<td>979,887</td>
<td>4,308,864</td>
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<td>Other staff and service costs</td>
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<td>38,351</td>
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<td>30,572</td>
<td>54,079</td>
<td>182,441</td>
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<td>16,500</td>
<td>16,500</td>
<td>16,500</td>
<td>16,500</td>
<td>82,500</td>
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<tr>
<td>Vehicles</td>
<td>25,730</td>
<td>31,806</td>
<td>31,325</td>
<td>26,916</td>
<td>21,875</td>
<td>137,653</td>
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<tr>
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<td>14,029</td>
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<td>19,875</td>
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<td>4315</td>
<td>15,858</td>
<td>7830</td>
<td>44,692</td>
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<tr>
<td>Other</td>
<td>2491</td>
<td>4492</td>
<td>2365</td>
<td>3642</td>
<td>6422</td>
<td>19,412</td>
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<td>Total</td>
<td>867,730</td>
<td>956,129</td>
<td>887,734</td>
<td>1,037,274</td>
<td>1,093,447</td>
<td>4,842,314</td>
<td>100</td>
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</table>
Costs

Over the study period, total uninflated expenditure was A$4 842 314 (Table 2). The majority (89%) of expenditure was on staff. DAWN has a clinical nurse manager at 0.94 full-time equivalent (FTE), 6.54 FTE clinical nurse specialists, which includes six community and one triage nurse and 1.21 FTE of administrative support. Six clinical nurse specialists completed a log of activity in the week commencing 30 January 2017. Two (of the original six) clinical nurse specialists also completed logs in the week commencing 27 March 2017. For the total nurse hours logged, an estimated 24% of logged time was spent travelling to and from clients’ homes, 40% face-to-face liaising with clients, and 36% was spent on administration, meetings or referrals. Staff listed diazepam, thiamine and naltrexone as supportive medication, where this was used. Although rent costs were stable at $A16 500 per year (subsidised by St John of God Health Care), this did not include pro bono space-sharing arrangements at several drug and alcohol facilities in Perth.

Discussion

In this uncontrolled study, we explored the costs and effectiveness of home-based detoxification provided by DAWN. We found that DAWN reduced the use of the ‘drug of primary concern’ and was well accepted by its clients. In particular, the clinical care provided by nurses, including a lack of judgment, was highly valued. Some clients expressed a concern that there was low community awareness of the DAWN service and that finding an appropriate support person can present an access barrier.

We did not have access to inpatient detoxification data. According to budget estimates (Government of Western Australia 2016, p. 856), inpatient detoxification cost $A1429 per day in 2015–16. Multiplying this by an estimated length of treatment of 7 days yields a cost to the WA Government of ~A$10 000 per episode (Government of Western Australia, Mental Health Commission 2017). This cost does not take into account the cost of pre-admission supports or other services (including those provided by DAWN). Division of total DAWN expenses by 700 detoxification episodes yields a lower per-episode cost. However, aggregate data makes such costing difficult, especially given the large number of episodes classified as case management, assessment or counselling, with varying resource requirements. The cost to the WA Government omits the client opportunity cost (e.g. through missed work, during 47% of withdrawal episodes, clients were in some form of paid employment), the support person opportunity cost and the cost of supportive medications supplied and primary care subsidised through the federally funded Pharmaceutical Benefits Scheme (PBS) and by Medicare respectively. The client opportunity cost is likely to be similar for home-based and inpatient detoxification, assuming time is taken off work for both. However, the opportunity cost is likely to be higher for the support person for home-based detoxification. The cost of supportive medication(s) is arguably similar for like clients (though inpatient medications will be paid for by the WA Government, and outside of hospital potentially PBS-subsidised by the Commonwealth with a patient co-payment) and similar for before- and after-primary care. However, if inpatients have higher co-morbidity, these costs may be higher.

The eligibility criteria for home-based care mean that clients who are higher risk will likely be referred for inpatient detoxification, even if the costs of 24-h staffing are higher. This complicates cost comparisons between treatment sites, especially because there are various levels of inpatient care intensity depending on clinical need (Government of Western Australia 2016, p. 856). Some sub-populations, such as the homeless, may reasonably express a preference for inpatient detoxification (Sillis et al. 2008). If inappropriately targeted, the cost-effectiveness of out-of-hospital care may be undermined by lower effectiveness, as in a British study comparing outpatient to inpatient opioid withdrawal care (Gossop and Strang 2000). The largely positive feedback by the interviewed clients is consistent with previous findings from interviews with 35 clients, family members and staff working in alcohol home-based detoxification in the United Kingdom (Carlebach et al. 2011). There was particular congruence with clients needing to be at, or capable of reaching, the right stage of change.

The strengths of this study are: a mixed-methods approach, a high survey response rate and involvement of the DAWN staff in the study. This study does have some limitations. First, as discussed above, there is no comparator. Second, family members, other organisation stakeholders, health professionals or DAWN staff were not interviewed. A recent consultancy commissioned by DAWN included surveys and interviews with these stakeholders (Kadmos 2015). Although we considered there to be limited value in replicating this, we have considered these findings when interpreting our study data. Third, the time to re-engagement may be well beyond relapse, and we were also unable to capture engagement between episodes with other services. Finally, there may have been some bias in clients’ responses because of their willingness to participate. Interviews involved clients sharing some highly personal details and, as such, involvement of nurses in referring patients reduced risks to participants, justifying the approach introducing some risk of bias. These data add to a sparse literature documenting client experience through a home-based withdrawal program.

Conclusions

Where home-based and inpatient detoxification are both medically appropriate, home-based detoxification seems to present an acceptable and less expensive option, especially if spending time away from home is likely to be disruptive or if the substance abuse problem is most problematic when at home. This supports existing Australian data (Bartu and Saunders 1994), but an updated comparative analysis adjusting for differences in home-based client and inpatient characteristics would help validate this conclusion. Measurement of drug use at the conclusion of treatment is likely to give a falsely elevated estimate of treatment effectiveness, and some follow-up after detoxification would be helpful. A research gap in follow-up care following outpatient alcohol detoxification has been highlighted by authors from the United Kingdom, who plan to investigate this (Cheng et al. 2017). It is important to maintain a high-service quality, through continuing professional development and appropriate retention and succession planning. Given a high level
of expertise, there is likely utility in DAWN nurses providing training to expand the service, including outside of the Perth metropolitan area. DAWN should continue to share its progress with others, especially through raising awareness of referral pathways with primary care providers, as involving GPs in home-based withdrawal is important for its success (Roche et al. 2001).

Conflicts of interest
Elizabeth Wilson-Taylor was the Clinical Nurse Manager of the Drug and Alcohol Withdrawal Network (DAWN, now a Clinical Nurse Specialist). Justin Dorigo was a Clinical Nurse Specialist at the DAWN at the time of study implementation, and at the time of submission, Staff Development Educator and Senior Registered Nurse at Next Step Drug and Alcohol Service.

Acknowledgements
We thank the clinical nurse specialists and administrative staff at the Drug and Alcohol Withdrawal Network, particularly Ann Annetts, Colleen Mountaut and Linda Turner, for their assistance with this study. We also thank the clients who gave their time to provide insights for the qualitative part of this study and St John of God Healthcare for funding.

References


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