

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

3 Running title: The Drug and Alcohol Withdrawal Network, Western Australia.

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18 **Competing interests:** Elizabeth Wilson-Taylor, was the Clinical Nurse Manager of the Drug
19 and Alcohol Withdrawal Network (DAWN, now a Clinical Nurse Specialist). Justin Dorigo
20 was Clinical Nurse Specialist at the DAWN at the time of study implementation and at the time
21 of submission Staff Development Educator and Senior Registered Nurse at Next Step Drug and
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28

29 Abstract: The Drug and Alcohol Withdrawal Network (DAWN) is a home-based withdrawal
30 service based in Perth, Western Australia. Literature on outcomes, costs and client attitudes
31 toward this kind of home-based detoxification in Australia is sparse. We therefore assessed
32 these for clients enrolled over a five-year period (July 2011 - June 2016). Client experience
33 was explored through semi-structured interviews with ten clients. Over the study period, 1,800
34 clients (54% male, mean age 38 years) were assessed, with 2,045 episodes of care. While most
35 first-episode clients (52%) listed alcohol as the primary drug of concern, the proportion listing
36 methamphetamine increased from 4% in 2011-12, to 23% in 2015-16. In 94% (n=639) of
37 withdrawal detoxification episodes with completed surveys, clients used their 'drug of primary
38 concern' most days or more often at baseline; this had reduced to 23% (n=149) at the
39 conclusion of detoxification. Five year direct costs were \$4.8 million. Clients valued the
40 person-centred holistic approach to care, including linking with other health providers. Barriers
41 included low awareness of the program and difficulties finding an appropriate support person.
42 Further exploration of cost-effectiveness would substantiate the apparently lower per client
43 cost, assuming medical suitability for both programs, for home-based relative to inpatient
44 withdrawal.

45 Key words: substance-related disorders, alcoholism, community health services, home care
46 services, substance withdrawal syndrome, street drugs.

47

48 What is known about the topic?

- 49 • There has been increased demand for alcohol and other drug withdrawal services in
50 recent years. While home-based detoxification seems intuitively appealing, there are
51 weaknesses in the existing evidence base.

52 What does this paper add?

- 53 • A home-based withdrawal program reduced drug use, and was valued by clients.
54 Further exploration of cost-effectiveness may strengthen the argument of greater ‘value
55 for money’ from home- compared to inpatient-detoxification.

56

57 **Introduction**

58 Increased demand for alcohol and other drug services in Australia has been underpinned by
59 changes in community-level drug use patterns. For example, recent estimates of
60 methamphetamine use between 2002 and 2014 for Australians aged 15 to 54 years indicated
61 that both regular (at least monthly) and dependent use was highest in 2013-14 (Degenhardt *et*
62 *al.* 2016). In Western Australia (WA) demand for treatment is outstripping supply. The current
63 strategic plan for mental health, alcohol and other drugs (Government of Western Australia
64 2014) highlights reconfiguration away from hospital-based treatment as one policy tool to
65 address this. Home-based withdrawal is one out-of-hospital treatment option.

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

77 The Drug and Alcohol Withdrawal Network (DAWN) was developed in 2001. DAWN is now
78 funded through the WA Government's Mental Health Commission. It provides services in the
79 Perth metropolitan area. While DAWN is the sole-provider of home-based withdrawal in WA,
80 there are similar services operating in Victoria (Uniting Care Regen 2015) and New South
81 Wales (Mary Healthcare Ltd 2017). Clients must have no physical or psychiatric contra-
82 indications to withdrawal (e.g. history of seizure in previous withdrawals, high risk of suicide),
83 have a 'safe alcohol/drug free environment' and a lay support person to monitor progress (Drug
84 and Alcohol Withdrawal Network 2013). Following referral (including self-referral) and
85 telephone triage, clients are assessed for eligibility in-person by a clinical nurse specialist. A
86 start date is then arranged for the detoxification. The length and nature of detoxification is
87 client- and drug-specific. There is no program out of pocket cost to clients at the point-of-care.

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

93 **Methods**

94 This study was approved by the Curtin University Human Research Ethics Committee (RDHS-
95 03-16) and the St John of God Hospital Human Research Ethics Committee (Ref # 1000). We
96 performed a cost-consequence analysis (Kaufman and Watkins 1996). Unlike a cost-
97 effectiveness/utility analysis, this type of study aims not to report a quotient of costs versus
98 benefits, relative to a comparator, but instead to report both costs and outcomes of a single
99 program. This provides a more comprehensive picture of the two components, and is also
100 appropriate as DAWN was not compared to an alternate model of care.

101 Quantitative outcomes

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

118 Client interviews

119 We conducted semi-structured interviews with current or recently discharged clients in early
120 2017. Clients were selected by nurses, to ensure that they were clinically suitable for interview,
121 as discussion of the withdrawal process was considered to carry some psychological risk to the
122 client. Written informed consent was obtained from clients by DAWN nurses after they had
123 explained the study, including the option to withdraw from the study at any time. Interviews
124 were conducted via telephone. The interview questions aimed to explore the client's
125 understanding of and experiences with the DAWN program, and of their opinion of program
126 strengths and weaknesses. The specific questions were adapted to suit the flow of discussion
127 and to explore additional themes that emerged with each interview. Recorded interviews were
128 transcribed verbatim and thematically analysed using an inductive content analysis approach
129 that coded frequent themes (Saladana 2012). Data were coded into segments and the themes
130 synthesised in combination with review of the quantitative findings.

131 Costs

132 Direct costs were provided by DAWN. Nurses reported travel/client/administration time and
133 the supportive medications in use for the weeks commencing 30 January 2017 and 27 March
134 2017.

135 **Results**

136 Client characteristics

137 There were 2,045 episodes of triage +/- care during the study period. During 2015-16, the
138 median time from phone triage to face-to-face assessment or discharge/transfer was six days.
139 There were 1,800 unique service users. The remaining 245 episodes of care were subsequent
140 services provided to 193 clients. Of the unique service users, 978 (54%) were male, the mean
141 age at first episode was 38 years (standard deviation, 12.5 years). Just over 5% were Aboriginal,
142 and just under half (44%) reported secondary schooling as their highest level of education. At
143 the first interaction, more than half (52%, n = 941) had alcohol as a primary drug of concern,
144 followed by cannabis (15%, n = 276) and methamphetamines (13%, n=242). The pattern of
145 drug use changed over the study period. The proportion listing methamphetamine increased
146 from 4% in 2011-12, to 23% by 2015-16. Summary demographic data for unique users, at the
147 first episode, are provided in Table 1.

148 Considering all episodes of care, 695 (34%) received an assessment only (meaning a decision
149 was made to refer/not continue at triage), 649 (32%) support and case management only

150 (meaning a decision was made to refer/not continue at or shortly after face-to-face assessment)
151 and 700 (34%) underwent home-based detoxification. For all withdrawal management and
152 detoxification episodes, there was a median of 44 days from triage to discharge (range, by
153 financial year, 37 to 50 days)

154 Self-reported outcome measures

155 Of 700 client episodes undergoing the full withdrawal detoxification program, 97% completed
156 a survey at baseline, and 91% at the end of treatment. There was an improvement in all survey
157 domains above that expected solely due to chance (p for trend <0.001). In 94% (n=639) of
158 withdrawal detoxification episodes, clients used their ‘drug of primary concern’ most days or
159 more often at baseline; this had reduced to 23% (n=149) at the conclusion of detoxification
160 (Figure 1). Twenty-four percent used another drug of concern most days or more often at
161 baseline, reducing to 11.6% at follow-up. Satisfaction with the service was high, with 87% of
162 respondents ‘extremely’ satisfied.

163 Time to service re-engagement

164 For the 193 clients who had more than one treatment episode during the time period. At second
165 presentation, alcohol remained the most prevalent primary drug (70%), followed by cannabis
166 (11%) and methamphetamine (8%). Considering only clients undergoing multiple withdrawal
167 detoxification (n = 73 episodes), the median time to re-engagement with the DAWN service
168 (i.e. discharge date to subsequent service start date) was 246 days.

169 Client interviews

170 Ten clients were interviewed, six of whom were female. The mean age was 50 years (range 29
171 – 70 years). Clients had used methamphetamines (n=2), benzodiazepines (n=2), cannabis (n=1)
172 or alcohol (n=5). Few new themes were emerging toward the end of client interviews,
173 suggesting saturation had been reached (Saladana 2012).

174 Generally, clients had a good understanding of DAWN as a withdrawal program through which
175 they would receive intense support within their home environment, with additional phone-
176 based support. They understood that to receive the service they needed to adhere to certain
177 guidelines, including the requirement for a live-in support person. Some clients struggled with
178 this concept and found it a barrier to treatment access: *“But if I couldn’t have a support person,
179 yeah it was frustrating I suppose. I just tried to manage it as best I could I guess. But it didn’t
180 stop.”* (Former DAWN client, 2017). In general, clients could see the benefit of the support
181 person. DAWN nurses were perceived as professional, non-judgmental and compassionate:

182 “*You don’t feel judged and that’s really important*” (Former DAWN client, 2017). There was
183 a strong sense of trust for the nurses and one client articulated the importance of the “genuine
184 belief” in them. This helped build increased self-control and self-management in clients. By
185 managing comorbidities, such as depression or anxiety, clients felt they received physical and
186 psychological support. The service workforce takes the time to understand each client’s
187 personal circumstances and other factors affecting their life. Linkage with clients’ general
188 practitioners (GPs), and providing support for the support person, were also valued.

189 Clients knew what to expect and were given tools, including other medication, to help them
190 cope: “[I] wouldn’t be where I am today without DAWN.” (Former DAWN client, 2017).
191 Clients manage their own medications, which are prescribed by their GP, with guidance from
192 the support person and DAWN nurse where appropriate. They also understood that relapses
193 are a normal and acceptable part of drug withdrawal, which reduces clients’ stress. For some,
194 the home environment was where they needed assistance most, as this is where they participate
195 in their drug taking behaviours (e.g. excessive alcohol consumption): “[In rehab]...I won’t
196 drink in there, I won’t feel like drinking in there. But as soon as I come home, it’s handling it
197 at home.” “The management of the problem can be where the triggers are kicking in. And for
198 me that was at home.” (Former DAWN client, 2017).

199 Perhaps the most important element to the success for clients of DAWN is that clients need to
200 be at the right stage of change. Using the transtheoretical model of health behaviour change
201 (Prochaska and Diclemente 1984), clients need to have moved – or be ready to move – from
202 the contemplation stage to the preparation and action stage to succeed long-term with drug
203 withdrawal and maintenance. Many clients acknowledged that they were not previously ready
204 but truly believed this time they would succeed long-term: “It does rely on the alcohol [or
205 drug] dependent person having recognition of the problem and wanting to do something about
206 it” (Former DAWN client, 2017).

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

214 Costs

215 Over the study period total expenditure was \$4, 842, 314 (see Table 2). The majority (89%) of
216 expenditure was on staff. DAWN has a clinical nurse manager at 0.94 full-time equivalent
217 (FTE), 6.54 FTE clinical nurse specialists which includes 6 community and 1 triage nurse and
218 1.21 FTE of administrative support. Six clinical nurse specialists completed a log of activity in
219 the week commencing 30 January 2017. Two (of the original six) clinical nurse specialists also
220 completed logs in the week commencing 27 March 2017. For the total nurse hours logged, an
221 estimated 24% of logged time was spent travelling to and from clients' home, 40% face-to-
222 face liaising with clients, and 36% was spent on administration/meetings/referrals. Staff listed
223 diazepam, thiamine and naltrexone as supportive medication, where this was used. While rent
224 costs were stable at \$16,500 per year (subsidised by St John of God Health Care), this did not
225 include *pro bono* space sharing arrangements at several drug and alcohol facilities in Perth.

226 **Discussion**

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

233 We did not have access to inpatient detoxification data. According to budget estimates
234 (Government of Western Australia 2016, p. 856), inpatient detoxification cost \$1,429 per day
235 in 2015-16. Multiplying this by an estimated length of treatment of seven days yields a cost to
236 the WA Government of ~\$10,000/episode (Government of Western Australia 2017). This cost
237 does not take into account the cost of pre-admission supports by other services (including those
238 provided by DAWN). Division of total DAWN expenses by 700 detoxification episodes, yields
239 a lower per-episode cost. However, aggregate data makes such costing difficult, especially
240 given a large number of episodes classified as case management, assessment or counselling,
241 with varying resource requirements. The cost to the WA Government omits the client
242 opportunity cost (e.g. through missed work, during 47% of withdrawal episodes, clients were
243 in some form of paid employment), the support person opportunity cost, and the cost of
244 supportive medications supplied and primary care subsidised through the federally funded
245 Pharmaceutical Benefits Scheme (PBS) and via Medicare, respectively. The client opportunity
246 cost is likely to be similar for home-based and inpatient detoxification, assuming time is taken

247 off work for both. It is likely to be higher for the support person for home-based detoxification.
248 The cost of supportive medication(s) is arguably similar for like clients (though inpatient
249 medications will be paid for by the WA Government, and PBS-subsidised by the
250 Commonwealth/patient co-payment), and similar for before- and after-primary care. However,
251 if inpatients have higher co-morbidity these costs may be higher.

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

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

278

279 Conclusions

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

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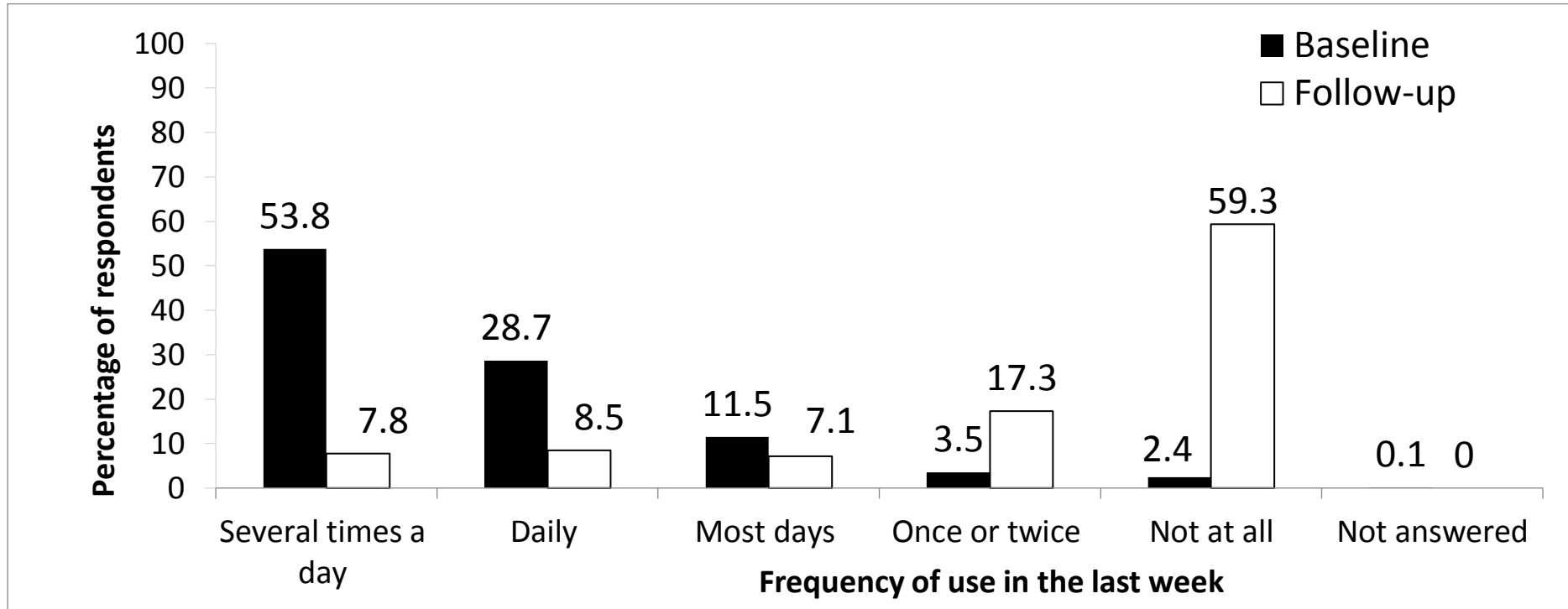
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356 Figure 1. Self-reported primary drug use in the past week for detoxification withdrawal clients at baseline (n=680 of 700 (97%)) and follow-up
357 (n = 637 of 700 (91%)).
358



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361

362 Table 1. Characteristics of first time presentation for clients enrolled after 1 July 2011 and discharged prior to 30 June 2016, by financial year.

Financial year of starting date	2011/12		2012/13		2013/14		2014/15		2015/16		Total	
Mean age (standard deviation)	36.0 (13.1)		38.0 (12.5)		38.1(12.7)		38.1 (12.0)		37.6(12.0)		37.5 (12.5)	
Sex	n	%	n	%	n	%	n	%	n	%	n	%
Male	218	55.6	191	53.7	194	55.9	179	53.0	196	53.4	978	54.3
Treatment program type												
Counselling	<5		0	0.0	0	0.0	0	0.0	0	0.0	<5	
Detoxification	136	34.7	107	30.1	124	35.7	117	34.6	112	30.5	596	33.1
Assessment only	117	29.8	128	36.0	121	34.9	127	37.6	138	37.6	631	35.1
Support and case management	138	35.2	121	34.0	102	29.4	94	27.8	117	31.9	572	31.8
Indigenous Status												
Aboriginal	18	4.6	30	8.4	18	5.2	19	5.6	14	3.8	99	5.5
Primary drug of concern ^a												
Alcohol	207	52.8	198	55.6	180	51.9	167	49.4	189	51.5	941	52.3
Cannabis	82	20.9	60	16.9	57	16.4	39	11.5	38	10.4	276	15.3
Methamphetamine	15	3.8	32	9.0	37	10.7	73	21.6	85	23.2	242	13.4
Total unique patients	392	100	356	100	347	100	338	100	367	100	1,800	100

a. Three most prevalent drug groups are listed, thus the percentages do not add to 100%. Cell counts with less than 5 cases are shown as <5 to preserve anonymity.

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

Item category	2011-12 (\$)	2012-13 (\$)	2013-14 (\$)	2014-15 (\$)	2015-16 (\$)	Total cost (\$)	Total cost (%)
DAWN salaries	763,695	841,472	799,899	923,911	979,887	4,308,864	89
Other staff/service costs	39,266	38,351	20,173	30,572	54,079	182,441	4
Rent	16,500	16,500	16,500	16,500	16,500	82,500	2
Vehicles	25,730	31,806	31,325	26,916	21,876	137,653	3
Phone	12,838	14,029	13,157	19,875	6,853	66,752	1
Supplies	7,210	9,479	4,315	15,858	7,830	44,692	1
Other	2,491	4,492	2,365	3,642	6,422	19,412	0
Total	867,730	956,129	887,734	1,037,274	1,093,447	4,842,314	100

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

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