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## Cost impact of high staff turnover on primary care in remote Australia

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### Abstract

**Objectives.** The aim of this study was to estimate the costs of providing primary care and quantify the cost impact of high staff turnover in Northern Territory (NT) remote communities.

**Methods.** This cost impact assessment used administrative data from NT Department of Health datasets, including the government accounting system and personnel information and payroll systems between 2004 and 2015, and the primary care information system from 2007 to 2015. Data related to 54 government-managed clinics providing primary care for approximately 27 200 Aboriginal and non-Aboriginal people. Main outcome measures were average costs per consultation and per capita, cost differentials by clinic, year and levels of staff turnover. Linear regression and dominance analysis were used to assess the effect of staff turnover on primary care costs, after adjusting for remoteness and weighting analysis by service population. Both current and constant prices were used.

**Results.** On average, in constant prices, there was a nearly 10% annual increase in remote clinic expenditure between 2004 and 2015 and an almost 15% annual increase in consultation numbers since 2007. In real terms, the average costs per consultation decreased markedly from A\$273 in 2007 to A\$197 in 2015, a figure still well above the Medicare bulk-billing rate. The cost differentials between clinics were proportional to staff turnover and remoteness (both  $P < 0.001$ ). A 10% higher annual turnover rate pertains to an A\$6.12 increase in costs per consultation.

**Conclusions.** High staff turnover exacerbates the already high costs of providing primary care in remote areas, costing approximately A\$50 extra per consultation. This equates to an extra A\$400 000 per clinic per year on average, or A\$21 million annually for the NT government. Over time, sustained investments in developing a more stable primary care workforce should not only improve primary care in remote areas, but also reduce the costs of excessive turnover and overall service delivery costs.

**What is known about the topic?** Population size and geographical remoteness are important cost drivers in remote clinics, whereas elsewhere in Australia the high use of short-term staff to fill positions has been identified as a major contributor to higher nurse turnover costs and to overall health service costs. Nursing staff expenditure accounts for a large proportion (46%) of total expenditure in NT remote health services, whereas expenditure on Aboriginal Health Practitioners

(AHPs) comprises only 6%. Annual nurse turnover rates in remote NT clinics average approximately 150%, whereas levels of 40% in other contexts are considered high.

**What does this paper add?** Annual expenditure for NT remote clinics has increased, on average, by 10% per annum between 2004 and 2015, but small declines in real expenditure have been observed from a maximum in 2012. Expenditure on nursing staff comprises 40% of overall expenditure in remote clinics, whereas expenditure on AHPs comprises less than 5%. The cost impact of every 10% increase in remote nurse and AHP annual turnover has been quantified as an extra A\$6.12 per primary care consultation, which equates, on average, to an extra A\$400 000 per remote clinic, and an extra A\$21 million overall for the NT Department of Health each year. The average real expenditure per primary care consultation has decreased from A\$273 in 2007 to A\$197 in 2015, representing a statistically significant linear trend reduction of A\$7.71 per consultation annually.

**What are the implications for practitioners (and other decision-makers)?** Adjusting policy settings away from the high use of short-term staff to investment in appropriate training ‘pipelines’ for the remote primary care workforce may, in the medium and longer term, result in reduced turnover of resident staff and associated cost savings. Targeted recruitment and retention strategies that ensure individual primary care workers are an optimal fit with the remote communities in which they work, together with improved professional and personal support for staff residing in remote communities, may also help reduce turnover, improve workforce stability and lead to stronger therapeutic relationships and better health outcomes.

**Additional keywords:** health funding and financing, Indigenous health, primary health care, rural and remote health, workforce.

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## Introduction

In the Northern Territory (NT), and across Australia more generally, Aboriginal and Torres Strait Islander (hereafter referred to as Aboriginal) populations experience a far higher burden of disease than non-Aboriginal populations.<sup>1–3</sup> The differences in life expectancy at birth between NT Aboriginal people and the general Australian population are 16.1 years (68.4 vs 84.5 years) for females and 16.4 years (63.6 vs 80.0 years) for males.<sup>4</sup> Aboriginal populations experience a higher prevalence and mortality attributable to diabetes, ischaemic heart disease and renal disease.<sup>1</sup> Further, a large number of health conditions experienced by older non-Aboriginal people affect Aboriginal people at much younger ages, and Aboriginal people are hospitalised at 2.3-fold the rate of non-Aboriginal people.<sup>5</sup> Addressing the heavy burden of disease among Aboriginal populations in the NT is a priority, which has resulted in increased investments by both the NT and Australian governments since 2007.

The NT covers a large area across central and northern Australia (18% of Australia), which is sparsely populated with only 245 048 residents in 2016, or approximately 1% of the total Australian population.<sup>6</sup> Although much of the NT population lives in the five larger towns, there are also many small remote communities, including Aboriginal communities and service towns. Few remote NT communities have public transport and many Aboriginal households in these communities do not own a vehicle; 73% of Aboriginal communities are located  $\geq 100$  km from the nearest hospital.<sup>7</sup> In the NT, geographical remoteness and population dispersion each have a considerable effect on the ability of governments to deliver primary care in a timely and effective, yet efficient, manner.

Primary care in remote NT communities is mostly delivered by remote area nurses and midwives (hereafter termed ‘nurses’) and Aboriginal Health Practitioners (AHPs) residing in the

communities, with professional support from non-resident medical, nursing and allied health staff. Research using data that are now a decade or more old has shown that nursing staff expenditure accounts for a proportionally large part (46%) of total expenditure in NT remote health services, whereas expenditure on AHPs comprises only 6%.<sup>8</sup> Previous research also demonstrated that population size and distance are important cost drivers of remote clinics.<sup>8,9</sup> NT government-run remote clinics are characterised by extremely high turnover and low stability rates of nurses and AHPs, as well as heavy reliance on temporary agency nurses to ensure ongoing supply.<sup>10</sup> Nurse turnover is known to be associated with high direct and indirect costs in both international and Australian healthcare settings,<sup>11–13</sup> with frequent use of temporary staffing (casual and agency nurses) to fill nursing vacancies resulting in higher overall organisational costs.<sup>13</sup> High use of temporary staff to fill positions is a major contributor to higher overall nurse turnover and costs in Australia compared with other countries.<sup>14</sup> Therefore, it is hypothesised that ongoing workforce patterns of high turnover and low stability of permanent and contracted nursing and AHP staff, together with the high use of temporary nurses,<sup>15</sup> contribute to high primary care delivery costs.

The aims of the present study were to: (1) estimate the costs of providing primary care in government-run clinics in NT remote communities between 2004 and 2015; and (2) quantify the effect of staff turnover in these clinics on service delivery costs.

## Methods

This study includes 54 NT government Department of Health (DOH) remote clinics.<sup>16</sup> Expenditure and agency nurse labour hire costs data were sourced from the government accounting system (GAS) database from January 2004 to December 2015 inclusive. Personnel data were sourced from the personnel information and payroll systems (PIPS) database over the same

period. Primary care expenditure at each remote clinic comprised personnel and operational categories. Personnel expenditure included medical, nurse, AHP, agency staff (labour hire) and others. Operational expenditure included travel, recruitment and others. Recruitment costs were identified using the general ledger, mainly covering advertising and relocation. Remote health personnel and operational expenditure captured staff or patient travel, district medical officer (DMO) costs and remote health management overheads. The overheads expenditure was redistributed across all clinics pro rata based on the actual clinic-level expenditure. Major capital costs, spending for non-DOH clinics and outlays not directly related to clinical consultations, such as the central departmental management overheads, were excluded from costing analysis.

Primary care consultation data were sourced from the primary care information system (PCIS) database from 2007 to 2015 inclusive. Numbers of consultations were adjusted by the inverse probability weights for the roll-out period of the PCIS. This meant that in our analysis consultations were adjusted higher for the years in which the PCIS was only partially rolled-out. The number of consultations was measured by occasions of service provided by a health worker of any type at a remote clinic recorded in the PCIS. The number of unique employees was analysed by professional category. Annual nurse and AHP turnover rates were calculated by dividing the number of nurses and AHP exits in a year by the average number of nurses and AHPs in that year. An exit was recorded at a clinic level when an employee left the clinic for more than 12 weeks.

Expenditures in each calendar year were derived using the mean of two neighbouring financial years to facilitate time trend analysis. Average cost per consultation was estimated for each clinic in each calendar year using a top-down approach, which divides the total estimated expenditure by the total number of consultations for each clinic. Per capita expenditure in each clinic was estimated by dividing the total estimated expenditure either by the service or resident population. The service population was defined as the total number of unique patients seen at the clinic in the past 12 months. The resident population was defined as the total number of patients for whom the clinic had primary responsibility for health care, which corresponds closely to the number of usual residents in the community and surrounding area.

Two types of outliers were omitted from analysis: clinic years in which the per capita expenditure was over A\$10 000 and clinic years in which the service population was less than 50. These outliers were caused by anomalies related to incomplete coverage of the PCIS during its introduction, client movements in and out of government-run clinics, the use of an alternative electronic clinical information system to the PCIS in several clinics and the small resident population of one community.

Spearman's rank order correlation coefficient ( $r_s$ ) was used to test the correlation between average cost per consultation and the number of consultations per clinic. Mean and 95% confidence intervals (CIs) were used to describe variations in costs. Associations between average cost per consultation and staff turnover were investigated by aggregating costs into four categories of staff turnover (<50%, 50–99%, 100–149% and  $\geq 150\%$ ). Average cost per consultation was further analysed using robust multiple regression to reduce the influence of

outliers and correct for underestimation of standard errors.<sup>17</sup> Key independent variables were annual staff turnover rates and geographical remoteness. Analysis was weighted by service population.<sup>8</sup> The cost data were analysed using constant prices adjusted for health inflation to 2015 Australian dollars using the health consumer price index.<sup>18</sup> Constant prices were used for time trend analysis. Actual costs are presented in current prices, unless specified otherwise. Dominance analysis was used to compare the contributions of remoteness and staff turnover to the total variance of costs.<sup>19</sup> As part of the sensitivity analysis, the resident population was also used to estimate per capita costs. Stata SE Version 14 (Stata Corp., College Station, TX, USA) was used for all analyses.

Ethics approval was received from the Human Research Ethics Committee of the NT DOH and Menzies School of Health Research (Ethics reference: 2015–2363).

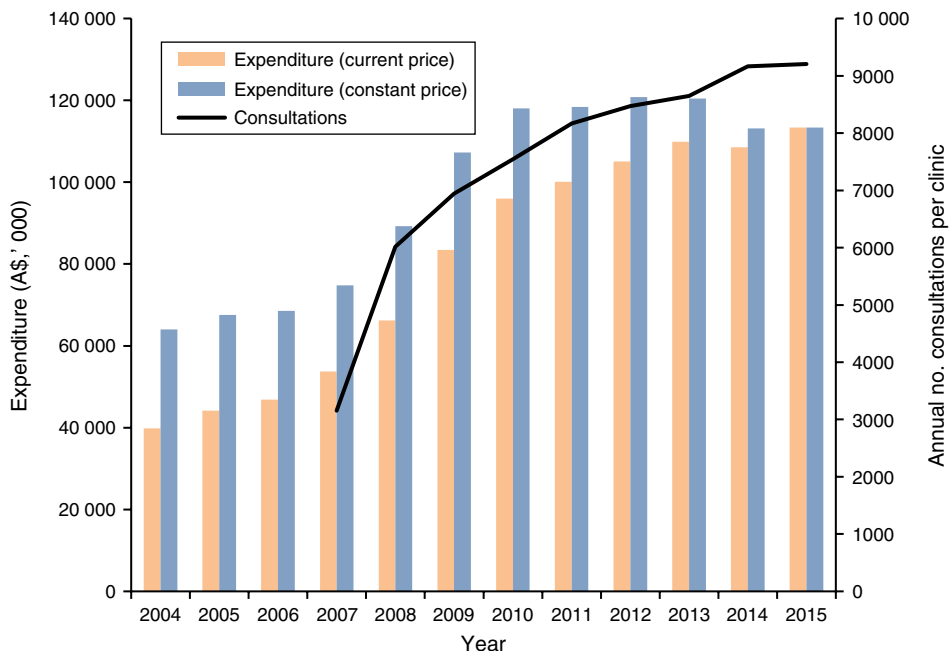
## Results

After 49 outliers (10%) were omitted from the analysis, 437 clinic-years remained for costing analysis. There was a substantial increase in total expenditure, from A\$39.9 million in 2004 to A\$113.3 million in 2015, despite a 6% drop between 2013 and 2014 and no growth in inflation-adjusted expenditure since 2012 (see Fig. 1). Expenditure totalled A\$967.1 million over the 12-year study period. The mean per capita expenditure was A\$2275 (95% CI A\$2130–2462) annually (Table 1). During this period, the number of employees residing in remote communities increased from 487 in 2004 to 648 in 2015. The total number of unique employees between 2004 and 2015 was 3167, of whom 1465 were nurses (46%), 217 were AHPs (7%) and 1525 (48%) were in other employment categories. From 2007, when the PCIS roll-out commenced, the number of consultations provided increased, from an average of 3153 consultations per clinic in 2007 to 9206 consultations in 2015.

Table 1 details the mean number of annual consultations per clinic, average costs per consultation and per capita costs (calculated using the service population). In real terms, a 28% reduction occurred in average costs per consultation from A\$273 in 2007 to A\$197 in 2015 ( $P < 0.05$ ), comprising a linear trend reduction of A\$7.71 per consultation annually ( $F_{1,437} = 373.7$ ,  $P < 0.001$ ). However, the per capita costs showed an upward trend from A\$1962 per capita in 2007 to A\$3004 in 2015, comprising an annual expenditure increase of A\$49.50 per annum per person ( $F_{1,437} = 213.5$ ,  $P < 0.001$ ).

Wide variations by clinics in the average costs per consultation were evident. There was a weak negative correlation between the number of consultations and costs per consultation ( $r_s = -0.239$ ,  $P = 0.081$ ). Average costs per consultation were as low as A\$100 for some clinics, but more than A\$400 per consultation in other clinics. Service population and per capita costs were also not significantly correlated ( $r_s = -0.123$ ,  $P = 0.394$ ). Sensitivity analysis showed that the per capita expenditure using the resident population was approximately double the quantum derived using the service population.

Between 2004 and 2015, expenditure on nursing staff comprised a total of 40% of overall expenditure in remote clinics (DOH employed 32%, agency employed 8%), whereas expenditure on AHPs comprised only 5% (Fig. 2). Medical personnel



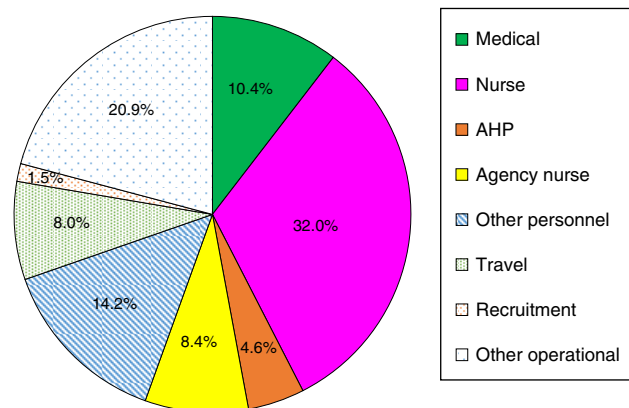
**Fig. 1.** Annual remote clinic expenditure (in current and 2015 constant price) compared with the annual number of consultations per clinic, for Northern Territory Government-run remote clinics, 2004–15.

**Table 1.** Mean (95% confidence interval) number of consultations per clinic, costs per consultation and costs per person, for Northern Territory Government-run remote clinics, 2007–15

	Mean no. consultations (95% CI)	Mean cost per consultation (A\$) (95% CI)	Mean cost per person (A\$) (95% CI)
2007	3153 (1412–5061)	273 (222–351)	1962 (1450–2415)
2008	6017 (3967–7423)	224 (192–256)	1889 (1339–2540)
2009	6943 (4961–9192)	198 (148–249)	2306 (1778–2966)
2010	7543 (5420–9288)	184 (147–217)	1734 (1188–2296)
2011	8167 (6469–10 074)	181 (141–210)	1597 (1264–2128)
2012	8473 (6433–11 790)	176 (146–211)	2436 (1936–2885)
2013	8652 (6700–11 054)	186 (149–227)	2805 (2372–3220)
2014	9164 (6959–12 005)	180 (136–212)	2877 (2283–3315)
2015	9206 (6916–11 735)	197 (159–247)	3004 (2578–3435)
2007–15	7480 (6773–8120)	200 (186–214)	2275 (2130–2462)

expenditure comprised 10% of all expenditure, and travel comprised 8%. Recruitment costs amounted to 1.5% of the total expenditure. Overtime costs for nurses, AHPs and medical staff, contributing in Fig. 2 to personnel costs, were estimated at A\$62 million (6.4% of overall expenditure).

Fig. 3 compares the average consultation costs by levels of nurse and AHP annual turnover. Clinics with higher average consultation costs were also those with higher levels of nurse and AHP turnover. Further regression analysis (Table 2) indicated that for every 10% increase in annual turnover rate, there was a A\$6.12 higher cost per consultation ( $P < 0.001$ ). In addition, every kilometre increase in distance from the nearest hospital was associated with an A\$0.34 higher cost per consultation ( $P < 0.001$ ), after weighting the analysis by service population. Dominance analysis showed that distance to the nearest hospital



**Fig. 2.** Primary care costs by categories, for Northern Territory Government-run remote clinics, 2004–15. AHP, Aboriginal Health Practitioner.

explained 55% of the variation in costs per consultation, whereas turnover explained 8% of the variation.

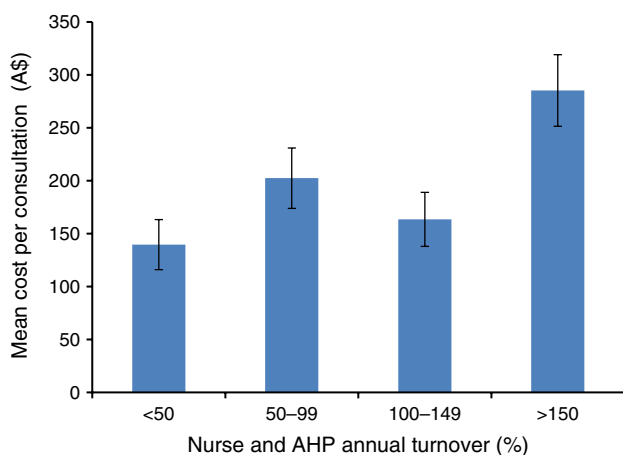
**Discussion**

The present study is the first to quantify the substantial cost impact of remote nurse and AHP turnover on primary care services and is part of a larger research project assessing the effect of turnover and employment of short-term staff on the quality of health services.<sup>20</sup> In a previous study we demonstrated that annual nurse and AHP turnover rates in these remote NT clinics was 128% in 2013–2015.<sup>10</sup> Hypothetically, if turnover was reduced to 40% annually (a level considered to be high in many other contexts),<sup>21,22</sup> extrapolating the figure of A\$6.12 per consultation for every 10 percentage points of annual staff turnover would lead to an estimated cost reduction



of approximately A\$50 per consultation.<sup>23,24</sup> With a mean 7480 consultations per clinic per annum during the study period, this equates to an average saving in remote clinics of approximately A\$400 000 per clinic per annum, or over A\$21 million per annum for the NT DOH.

These findings are consistent with national and international studies, which demonstrate that high staff turnover not only jeopardises quality of primary care, but, importantly, also increases healthcare costs.<sup>25–27</sup> Adjusting policy settings away from the high use of short-term staff towards investment in appropriate training ‘pipelines’ for the remote primary care workforce may have benefits in the medium and longer term in reducing the turnover of resident staff. Crucially, appropriate training ‘pipelines’ should include providing improved education, career development and training opportunities for local Aboriginal community members, because their turnover levels from remote communities are lower.<sup>28</sup> Training pathways for remote area nurses and AHPs could also be strengthened with increased focus on appropriate student selection, contextualised training programs and supported postgraduate employment pathways. Investing resources into targeted recruitment, where there is a focus on improving individual fit with a specific community and on providing better professional and personal support for nurses and AHPs working in remote communities, may also reduce turnover and produce improved efficiencies for government.<sup>10,29,30</sup> So, too, improving housing, work conditions, equity of remuneration and flexibility of employment arrangements each have the potential to reduce high turnover levels.



**Fig. 3.** Mean (95% confidence interval) cost per consultation by level of staff turnover, for Northern Territory Government-run remote clinics, 2004–15. AHP, Aboriginal Health Practitioner.

Annual remote health expenditure increased during the study period, and the average costs per consultation declined substantially from nearly A\$273 in 2007 to A\$197 in 2015 (28% in real terms). The 2015 cost per consultation (A\$197) was slightly less than an estimate of A\$227 reported in a smaller sample of high-performing remote services.<sup>9</sup> The reduction over time in costs per consultation may indicate increasing efficiency of primary care services. However, growth in measured consultation numbers is also likely to be related to the roll-out of the PCIS, increased focus on and improved systems for chronic disease management and increased attention to recording consultations to ensure that Medicare can be billed. Despite reducing costs per consultation, the average consultation cost in 2015 was still substantially higher than comparable Medicare fees for primary care consultations.<sup>31</sup> Our estimates of personnel costs were also higher than corresponding 2003–04 estimates of remote primary care costs, in which each medical consultation was estimated to cost A\$168, each nurse consultation A\$113 and each AHP consultation A\$107.<sup>15</sup> The reasons for these discrepancies are most likely due to substantial health inflation in recent years, and the inclusion of remote health overheads in the present study. There was also high variability in both per consultation and per capita costs across the 54 communities, with an average per capita cost in 2015 of A\$3004 in this study, which was lower than a previous estimate of A\$3445.<sup>9</sup> These differences can be explained, at least in part, by variations in the selection of participating clinics, especially in their population size and geographical remoteness, which are known to be key drivers of costs in remote communities.<sup>9</sup> The per capita cost for the service population is only 22% higher than the national primary care expenditure figure of A\$2466. Given factors of isolation and disease burden in remote communities, it seems likely that the NT expenditure is inadequate to meet needs. Equitable funding and staffing of these remote clinics is likely to contribute to decreased staffing stress and decreased turnover.<sup>30</sup>

Nursing costs constituted the largest cost component (32%) in remote primary care services in the NT and, with the addition of nursing agency labour hire cost (8%), account for over 40% of the total remote primary care costs. This is consistent with international studies that indicate that nurses play a crucial role in primary care delivery in remote settings.<sup>32,33</sup> A lack of doctors in the NT and in remote areas in general results in nurses substituting for a medical workforce.<sup>34</sup> Medical services, mainly fly-in, fly-out DMO visiting services to the clinics, complemented by readily accessible telephone consultations, comprised approximately 10% of the total remote primary care costs. Travel was the third largest cost component, largely driven by the geographical remoteness of the NT, where, on average, the

**Table 2.** Regression analysis of cost impact on nurse and Aboriginal Health Practitioner (AHP) turnover and remoteness, for Northern Territory remote clinics, 2007–15  
CI, confidence interval

	$\beta$ -coefficient	P-value	95% CI	Standardised contributions (%)
Nurse and AHP turnover (for every 10% increment in turnover rate)	6.12	<0.001	5.90–6.35	8
Distance from nearest hospital	0.34	<0.001	0.33–0.35	55
Variation explained ( $R^2$ )				62

distance between a remote clinic and the nearest hospital is 275 km.<sup>15</sup> During the wet season, the only access to some clinics is by air, further increasing health-related travel costs. Recruitment costs were twice the departmental average, indicative of the difficulties in replacing the remote health workforce. Overtime costs for remote nurses, AHPs and DMOs were estimated at A\$62 million in this study. However, it was not possible to accurately estimate the proportion of overtime attributable to excessive remote resident staff turnover levels because cost classification-level time series data were not available at a clinic level. Nor was it possible to accurately estimate additional costs associated with indirect consequences of high turnover, including lost productivity, reduced continuity of care or reduced quality of primary care, because of the top-down method of cost redistributions used in this study. Therefore, the potential estimated savings resulting from stabilisation of this workforce are likely to be an underestimate.

Despite these significant findings, there are several limitations to the present study. First, the financial and personnel data covered a 12-year study period from 2004 to 2015, whereas activity and costing data covered 9 years from 2007. We elected to present all available data rather than restrict the study period. Second, although we used time-series data and modelling to produce outcome estimates, the study is limited by the accuracy and completeness of the underlying administrative data. In this study, missing activity and population data were evident, related to the progressive rollout and uptake of the PCIS between 2007 and 2011. We attempted to correct for any effect by using inverse probability weightings in our analyses for this period, based on PCIS service populations, and we omitted outliers. Third, there is a lack of individual-level personnel information for agency-employed nurses, which meant that agency-employed nurses were unable to be included in turnover calculations.<sup>10</sup> Fourth, it is likely that our estimates of the excess costs attributable to staff turnover are imprecise. International studies suggest a target annual turnover in the order of 20%,<sup>23,24</sup> whereas we have used a standard of 40% annual turnover. However, the study context was one of very high and extremely high turnover clinics, and there were no low turnover clinics to provide data to study the relationship between cost and turnover across a full spectrum of turnover. Even with the more liberal reference of 40% annual turnover, the estimate, based on a simple linear extrapolation, requires some caution. Finally, the estimate for travel costs was likely an underestimate, because NT public hospitals also subsidise in-patient return to community. These limitations notwithstanding, the results highlight the overwhelming importance and value of maximising workforce stability and minimising preventable staff turnover.

## Conclusion

The findings of the present study suggest that strategies that mitigate the extraordinarily high turnover in remote areas could result in significant cost savings for government over time. A sustained, equitable investment in a systematic approach to training a remote health workforce and the provision of better professional and personal support for nurses and AHPs working in remote communities may, in the longer term, produce such

cost savings. Cost savings could then be reinvested in remote primary care, to address the very high health needs.

## Competing interests

YZ, SG and MR are employed by the Northern Territory Department of Health. There are no other competing interests to declare.

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