Economic evaluation of Indigenous healthcare programs in northern Australia: a review

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Abstract

Government healthcare spending for Indigenous Australians is higher than for non-Indigenous Australians yet it does not appear to be impacting health outcomes equitably, especially in remote areas. Northern Australia is flagged for future investment and has a high concentration of Indigenous people compared with southern Australia. Validated economic evaluation of healthcare is critical to deliver the best allocation of scarce resources for Indigenous communities in Northern Australia however Australian standards for economic evaluation do not relate well to Indigenous people. We present a systematic review of recent economic evaluations of healthcare-related interventions involving Indigenous people living within Northern Australia. The review uses Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and includes peer-reviewed and grey literature from Northern Territory, Queensland and Western Australia published between 2010 and 2016. Sixteen evaluations meeting inclusion criteria were reviewed. These studies used disparate methods for evaluation. Eleven records involved full economic evaluations and thirteen studies took a strong state or territory service focus. Only 2 studies used a comprehensive societal perspective. Seven studies captured patient health service use that extended outside of a state/territory hospital environment. Consideration of patient perspective was low. Northern Australian Indigenous healthcare evaluations in this region have not been conducted consistently or in sufficient depth. A number of valid reasons are identified for why this may have occurred. There is general focus on state and territory health systems and national patient-linked data are underused. Heterogeneous economic evaluation methods means that decision makers may have difficulty in comparing interventions within, and outside the health sector. A greater focus unifying evaluation methods including consumer and societal perspectives may be useful in this context.

Acknowledgement

The authors recognise that there many Aboriginal and Torres Strait Islander peoples in Australia, however for economy of language and readability the word ‘Indigenous’ is used to represent all Aboriginal and Torres Strait Islander peoples throughout this article.

Introduction

Indigenous Australians have a greater burden of poor health in comparison with non-Indigenous Australians (Australian Bureau of Statistics 2010; Australian Institute of Health and Welfare 2015). On review of these health inequalities for every $1 spent on non-Indigenous healthcare, $1.47 is spent on Indigenous healthcare; and this ratio has increased over time (Australian Institute of Health and Welfare 2013b). This ratio, and overall expenditure per person becomes larger with increasing remoteness, with the expenditure ratio in remote or very remote areas of 2.22, with $6,616 spent on average per Indigenous person in remote or very remote areas ($2,979 per person spent on non-Indigenous healthcare) (Australian Institute of Health and Welfare 2013a).
In spite of increased spending, there appears to be poor allocative efficiency within the current health system—many of Northern Australia’s regional and remote Indigenous communities continue to experience a greater burden of disease than urban Indigenous people (Queensland Health 2014). Additionally, avoidable hospitalisation is disproportionately high for some remote Indigenous communities (Li et al. 2009). Remoteness and small population size are known to increase the cost of care in Indigenous communities (Zhao and Malyon 2010; Malyon et al. 2013).

The purpose of economic evaluation of health care interventions is to aide decision makers when deciding which interventions will deliver the most benefit, while also delivering good value for money. As such, economic evaluation of Indigenous healthcare programs are vital, to ensure that this healthcare investment is efficient and equitable. However, Indigenous health and healthcare is diverse and distinct in a number of ways from mainstream Australian health (Khoury 2015). For example, limitations in generalisability of Health Related Quality of Life measures (i.e. Disability Adjusted Life Years) to Indigenous populations have been described (Otim et al. 2015). Allocation of resources based on inappropriate economic evaluation may exacerbate health disparities between Indigenous and non-Indigenous Australians (Ong et al. 2012).

A number of international standards and best practice guidelines for the conduct of economic evaluations have been developed (Edejer et al. 2003; Husereau et al. 2013; National Institute for Health and Care Excellence 2014; Drummond et al. 2015; Ramsey et al. 2015). The only guidelines for economic evaluations within Australia have been developed by the Pharmaceutical Benefits Advisory Committee (PBAC). These guidelines describe best practice for economic evaluation within the Australian context (Pharmaceutical Benefits Advisory Committee 2015). PBAC guidelines have been developed for mainstream Australian healthcare and have no specific provisions for Aboriginal and Torres Strait Islander populations. These guidelines cover the measurement of health service use—one of the key drivers of the cost of an intervention—as well as the quantification of benefits derived from an intervention. These guidelines cover services that most Australians will utilise as a part of standard healthcare treatment, including hospital services, general practitioner and specialist visits, diagnostics such as blood test, and prescription pharmaceuticals. These health services are recommended to be captured by health economists utilising routinely collected administrative data—such as Admitted Patient Data Collection, Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Schedule (PBS) data (Pharmaceutical Benefits Advisory Committee 2015). The use of administrative data is seen, internationally, to hold many benefits over other forms of data collection for health service use (Ritter et al. 2001; van den Brink et al. 2004).

Some recent research is quantitatively supportive of greater investment in primary care for Indigenous peoples (Alford 2014; Zhao et al. 2014a). Tracking health service use with primary care data such as Medicare MBS and PBS claims records is problematic. The use of Medicare cards, and MBS and PBS funded services has historically been low amongst Indigenous Australians. In 1997 it was reported that between 60% and 85% of Indigenous Australians were enrolled in Medicare. Since, 1997 the enrolment rates have increased dramatically, however, issues surrounding lack of use and inaccuracy of Medicare cards and Medicare details are still reported to be common (Urbis Keys Young 2006). Furthermore, Indigenous Australians are less likely to use MBS and PBS services than their non-Indigenous counterparts, and are more likely to use healthcare services outside of the Medicare or hospital system (Dwyer et al. 2004; Australian Institute of Health and Welfare 2013b). Funding and research has also been shown to focus on Indigenous people who access health services more often and therefore data may fail to capture a true reflection of health service utilisation (Couzos and Delaney Thiele 2010).
Section 100 (s100) of the National Health Act allows remote Aboriginal Health Services (AHSs) to access bulk supplies of PBS medicines and supply them onsite to clients. In 2013-14 the Commonwealth government spent $38.5 million on s100. Queensland, Western Australia and Northern Territory that occupy the Northern Australia area used 97% of this section 100 budget (Australian Government Department of Health 2016). The medicines are bulk supplies and are not attributable to individual clients at the PBS level. Therefore, unlike non-remote settings, s100 PBS data cannot be utilised and matched for economic evaluation (Kemp et al. 2012).

In light of these systematic differences between Indigenous healthcare and mainstream healthcare delivery, methodological challenges may arise for researchers attempting vital economic evaluation activities. This paper aims to:

Describe the methods used to identify healthcare use employed within the economic evaluation of Australian Indigenous healthcare programs within Northern Australia. This was done by:

- conducting a systematic review of the peer-reviewed and grey literature to identify economic evaluations of healthcare interventions that focus on improving the health of Indigenous Australians in areas that fall within Northern Australia
- identifying the data sources and measures used to identify the units of health service use of participants.

This paper focuses upon Northern Australia, which covers the land mass north of the Tropic of Capricorn. Northern Australia is home to around one third of Australia’s Indigenous population (Australian Bureau of Statistics 2013) and is characterised by decentralised populations, where Medicare service use has been reported to be lower (Dwyer et al. 2004; Australian Institute of Health and Welfare 2013b). As such, it is a region that is more likely to be affected by these methodological challenges.

Methods

This project undertook a systematic review of economic evaluations of healthcare-related interventions for Indigenous Australians where inclusion criteria were: records with populations solely in Northern Australia and records published between January 2010 and June 2016. Exclusion criteria for records were: the study population was not entirely Indigenous; the population was not entirely within WA, QLD and/or NT; there was insufficient cost analysis (e.g. incomplete cost description); and the intervention was not classified as ‘healthcare-related’ (e.g. a justice system intervention with some health outcomes). In consideration the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist articles were screened for relevance on title, abstract and then full text (Moher et al. 2009). A PRISMA flow chart is used to describe the collection of publications for categorizing and reporting (see Appendix 1).

Study protocol

The first stage of review involved searching peer-reviewed databases including PubMed (using Medline and MeSH), Scopus, James Cook University ‘One Search’ and Google Scholar. Key website databases were also searched, including Northern Territory Department of Health, Queensland Government and Queensland Health, Government of Western Australia Department of Health and Australian Indigenous HealthInfoNet.
The second stage involved screening of 16 other potentially relevant websites and databases including Australian Institute of Health and Welfare Closing the Gap Clearing House, Medical Services Advisory Committee (MSAC), National Health and Medical Research Council, Cochrane database, Deloitte Access Economics, KPMG, PricewaterhouseCoopers, Lowitja Institute, Centre for Aboriginal Economic Policy Research (CAEPR), Australian Government Office of Aboriginal and Torres Strait Islander Health—IHD Publications and Resources Index, George Institute, Australian Institute of Aboriginal and Torres Strait Islander Studies and National Aboriginal Community Controlled Health Organisation (NACCHO) were searched. For website searching, keywords were adapted for each database to optimise relevance and size of results (See Appendix 2). Where databases did not reasonably accommodate advanced searches to reduce result sample sizes, results were sorted by relevance and screened sequentially until all relevant results were identified.

Thirdly, a number of subject matter experts in Aboriginal and Torres Strait Islander health and economics were contacted to provide any further citations. This included Ian Anderson, Marj Moodie, Sophia Couzos, Yuejen Zhao, Rob Carter and Theo Vos.

All peer-reviewed studies identified from initial database screening, were added to further records identified after the second broader database screening (n=515). After duplicates were removed, a screening against inclusion criteria removed the majority of records (n=277). Then a full text screen of each of these records closely against the inclusion criteria left the final number included studies (n=16) (see figure 1). Each of these studies was then reviewed in detail for common themes and where applicable, against a number of selected Critical Assessment Criteria in Drummond et al (Drummond et al. 2015), including sub-criteria of criteria 1, 4, 5, 6, 7, 8, 9 and 10. Studies were also assessed for risk of bias.

Ethics
Ethical approval was not required as no human or animal subjects were be involved.

Results
After screening a total of 515 records, a final 16 studies were found to fit the inclusion criteria (Table i). Of the 16 studies, only one did not focus solely on regional and/or remote locations. Seven studies were from Northern Territory populations, 3 were from Western Australia and 6 were from Queensland.

Of the 16 evaluations, 11 were full evaluations involving a comparator and 5 were partial evaluations involving cost-outcome descriptions. Of the 16 full evaluations, 5 involved cost-effectiveness analysis, 5 involved direct comparison of costs and could be described as cost-benefit analysis, and 2 were self-described as cost-consequence analyses. Three studies measures incremental cost-effectiveness ratios. Uncertainty was addressed explicitly in only 6 of the studies. Two studies addressed discounting for time differences. Patient and indirect costs were rarely discussed and often deliberately excluded. (Drummond et al. 2015) (See Table i)

Three of the studies did not capture participant’s health service use, only looking at the actual costs of providing the intervention being evaluated—i.e. staff time, equipment, and consumables (Brimblecombe et al. 2013; Liberato et al. 2015; Magnus et al. 2015). Of the 13 studies that did capture health service use, there was bias towards considering respective state or territory government costs (with or without federal or societal perspectives). Four of these specifically took a hospital perspective and only captured in-hospital health service use based upon hospital data.
(Gibson et al. 2012; Malyon et al. 2013; Whitehall et al. 2013; Kruger and Tennant 2016), and one more had a hospital perspective but utilised hospital admission records in combination with primary care clinic data (Gao et al. 2014). One further study only considered hospital use as a part of its analysis, although it aimed to take a societal perspective (Segal et al. 2016).

Less than half of the studies (n=7) captured patient health service use that extended outside of a hospital. These include:

- One study used modelled health service use (Cannon et al. 2013) from a separate study that undertook a maternal chart audit of antenatal health service use in the Townsville Aboriginal and Islanders Health Service (Panaretto et al. 2007).

- Two studies undertook an audit of health service use based upon data from local clinics and public hospitals—both of these evaluations pertained to an intervention that covered a specific geographic area and so were able to audit local healthcare provider records (Thomas et al. 2014; Zhao et al. 2014b).

- One study used service data from records in dental clinics embedded in primary health services (Dyson et al. 2012).

- Only one economic analysis capturing health service data with a societal perspective captured any costs borne by patients (Nguyen et al. 2015).

- McCalman et al and Gador-Whyte et al utilised the One21Seventy audit tool to capture health service use in participating services (Gador-Whyte et al. 2014; McCalman et al. 2014).

No economic evaluation of Indigenous interventions in Northern Australia used online government patient health record data, including PCEHR from the Northern Territory or My Health Record. Only two studies utilised the PBS to quantify health service costs (Gador-Whyte et al. 2014; Gao et al. 2014). Similarly MBS was only used to ascertain health service costs in 3 studies (Cannon et al. 2013; Gador-Whyte et al. 2014; Gao et al. 2014). Any limitations or problems associated with patient linking and usage of PBS and MBS service data was not discussed in detail in these studies.

A number of authors noted that complete accommodation and transport cost data was difficult to capture or link. For example, the funded Patient Assisted Transport Scheme (PATS) could not be linked to patients’ health service data in two studies (Cannon et al. 2013; Gao et al. 2014). Six studies captured either accommodation or transport costs (see Table i). This includes, two studies that used Royal Flying Doctors Service data, two studies used PATS data and two more used actual retrospective account data for accommodation and transport costs. Though a range of subsidised transport and accommodation are available in Northern Australia no studies considered any transport or accommodation costs (financial or otherwise) from a consumer perspective.

**Discussion**

Although the study inclusion criteria covered the entire region of Northern Territory, Western Australia and Queensland, 15 of the 16 economic evaluations captured were solely in regional and remote Indigenous populations. These populations predominantly lie in the region defined as Northern Australia (Australian Bureau of Statistics 2006). Results therefore delivered reasonable validity in fulfilling the review’s aims.
Only 1 evaluation used multiple ‘mainstream’ sources to identify units of health service use of study participants—MBS, PBS and hospital admission administration data (Gao et al. 2014). However, given the relatively high rates of community and public health service use that is not captured on MBS, PBS or hospital in-patient data collections (Australian Institute of Health and Welfare 2013b), it may be that this approach would miss a large proportion of Indigenous health service use, potentially explaining why only 1 study took this approach. Three other studies also utilised administrative data, but undertook a more comprehensive audit of available data by including administrative data from all health providers in a local area (Panaretto et al. 2007; Thomas et al. 2014; Zhao et al. 2014b). This is a much more comprehensive, and likely, accurate approach to data extraction, and minimises bias associated with patient recall of health service use (Raina et al. 2002). However, given that each of these studies was restricted to a discrete geographic region it may not be possible to as comprehensively approach all health service providers on larger-scale studies.

Economic evaluations did not consistently reference any specific methodology or reference, including the recently developed IHSD template(Ong et al. 2009). The IHSD distinguishes and quantifies how Indigenous primary health program economic evaluations can be conducted. The lack of consistency across studies may be attributable to the variable validity, unreliability or absence of some mainstream sources of data (for example s100 PBS data). Variation in the quality and reliability of health service records data has also been identified in some Indigenous health services (Bailie et al. 2016). Authors may have developed more tailored approaches to address this. In addition to this, there is extensive consideration of state and territory government costs in the studies. This may also explain why primary care, including MBS and PBS, which are primarily federally funded, does not feature more heavily. Given the identified need for greater focus on primary care services in this region(Thomas et al. 2014; Zhao et al. 2014a), ease of use and linkage of primary care data sources is critical for effective evaluations. One21Seventy audit tool is a validated data-capturing CQI protocol that can address any potential problems related to variation of quality and reliability of primary health service records data. Two studies utilised One21seventy audit tool data while the remaining primary health record data relied on more basic primary care data.

The small proportion of studies that attempted to capture the impact of the intervention in question from a broader societal perspective by assessing health service use from all sources reflects the difficulty in measuring this information. The economic evaluations on predominantly non-Indigenous, urban-based populations have the ability to utilise MBS and PBS claims records in conjunction with hospital in-patient and out-patient records, and be confident that these sources would capture nearly all health service use. Whereas evaluations on Indigenous populations that have a far lower proportion residing in urban areas (71% of non-Indigenous Australians live in major cities, whereas only 35% of Indigenous Australians do)(Australian Bureau of Statistics 2013), may not have the ability to confidently utilise such data, as these data sources may not comprehensively capture all sources of health service use.

The results also revealed that many economic evaluations did not quantify health service use of participants during the study or trial period. These studies generally only captured the direct costs of providing the service in question, and did not attempt to quantify the net costs associated with each study arm. As a result, these studies may have missed any associated rises in health service use as a result of providing the intervention; or similarly, missed the opportunity to capture any reduction in health service use. Similarly, the studies that only took a hospital perspective would not have captured any impact on primary health care service use.
While much of health services delivery is fully subsidised in regional and remote Australia, there are still costs to any patient receiving care, whether financial or not. This may include such costs as lost productivity or transport to a clinic. Few studies reviewed consumer perspective. Consumer based incentives or disincentives are known to modify health behaviour for some Indigenous clients (Davidson et al. 2010; Black et al. 2013; Cobiac et al. 2015).

On our review, literature regarding Medicare usage in remote communities has not been updated for some years. Some recent data suggest remote Medicare usage has improved slightly (Zhao 2013), and online methods for health services to update and maintain individuals’ Medicare details have also improved, but it is unknown to what degree. If Australia-wide regional and remote MBS utilisation is now more closely aligned with mainstream health settings and the data is linkable then this information should be more readily available for health economists and researchers. While PBS uptake in regional and remote locations seems to have improved dramatically (Zhao 2013; Australian Government Department of Health 2016), this data is essentially not patient linked. Though many pharmacies supply s100 medicines through their dispensing records and therefore linkable medication data may exist for some areas. This practise is ad hoc and not supported by policy or any overarching system to address this problem.

The opportunities to further invest in the healthcare and healthcare delivery of Indigenous people in Northern Australia that will likely be brought about by the CRC for Developing Northern Australia (Australian Government 2015; National Health and Medical Research Council (NHMRC) 2016), and the associated investment in health in the region, should involve economic evaluations of new services and interventions to ensure their cost-effectiveness. However, the Northern Australia region is characterised by a decentralised population living predominately outside major cities (Information and Research Branch Department of Health and Aged Care 2001), with Indigenous healthcare services being provided by a number of providers outside of the mainstream Medicare system (Australian Institute of Health and Welfare 2013b). This is likely to make economic evaluation design more challenging due to difficulties in creating robust and consistent means of capturing health service use. As technology improves and data capturing methods improve, automatic health and cost data may be more abundant and available to be used for health program evaluations. Specifically, online health records systems, such as My Health Record, are being used more widely across Australia. If quality data is captured by these platforms then this will potentially address some issues raised in this review. Where data quality is variable, funding of high quality audit tools to cleanse and extract data, such as One21Seventy, is essential for delivering valid economic evaluations. Effective and distinct models of primary care, such as federally funded Indigenous community-controlled health services were underrepresented in studies reviewed. Further research that focused more on data capture and evaluation in this area could provide greater insight and validity from a consumer and societal perspective.

Conclusion

This review yielded a number of lessons for the design of economic evaluation of Indigenous healthcare services in non-urban regions such as Northern Australia. The need for careful planning, in conjunction with local service providers, should be seen as imperative, as a bottom-up approach to data collection will be needed. While MBS, PBS and hospital administrative data will likely provide supplementary information, there is still a need to take a more comprehensive audit of health service use at a provider level (Jamieson et al. 2012).
References


Dwyer, J, Wilson, G, Silburn, K (2004) 'National strategies for improving Indigenous health and health care.' (Department of Health and Ageing, Office for Aboriginal and Torres Strait Islander Health:


Urbis Keys Young (2006) Aboriginal and Torres Strait Islander access to major health programs. Department of Health and Ageing and Medicare Australia, Canberra.


Presenter

Mike Stephens is a consultant pharmacist and policy advisor at the National Aboriginal Community Controlled Health Organisation (NACCHO). Prior to this he has worked as practice pharmacist at Danila Dilba Health Service in the Northern Territory. Mike has recently convened a joint NACCHO–Pharmaceutical Society of Australia special interest network of pharmacists working in Aboriginal Community Controlled Health Organisations. He is also a member of the NACCHO Lead Clinicians Group. Mike has had experience in community and hospital pharmacies in Australia, the United Kingdom and Guatemala, and also worked in a range of health project management roles. Mike is in the final stages of a combined Master of Public Health and Business Administration with a focus on health economics.
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<tr>
<th>Study</th>
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<th>Evaluation type</th>
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<th>How health service use captured</th>
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<tr>
<td>Brimblecombe, J., et al.</td>
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<td>Cost to consumer in remote Australia</td>
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<td>Dyson, K., et al.</td>
<td>Networked remote area dental services: a viable, sustainable approach to oral health care in challenging environments</td>
<td>WA</td>
<td>WA Rural and remote clinics and health service -using Accessibility/Remoteness Index of Australia</td>
<td>CEA</td>
<td>Service cost data from the Centre’s records. Centre’s costs were adjusted to remove unique cost-savings relating to free flights and accommodation, and special initiatives of the Centre, such as student participation as integral visiting team members. Salaries (including on-costs and allowances), travel (taxis and flights) and accommodation. Nominal weekly allocations for clinical support and mentoring, administrative support, consumables, maintenance and licensing per clinic, per visit were determined based on year averaging across sites. Australian Government’s Department of Veterans’ Affairs (DVA) Fee Schedule for Dental Services (Dentists and Dental Specialists) (Nov 2010)</td>
<td>Service activity data from clinic records (recorded using the Australian Dental Association Number for each item of care provided).</td>
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<td>Gador-Whyte, A. P., et al.</td>
<td>Cost of best-practice primary care management of chronic disease in a remote Aboriginal community</td>
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<td>One21Sevety audit tool used on health service electronic health record disease severity and prevalence. Semi-structured interviews w staff to estimate time needed to deliver care. Direct observation of staff daily work patterns in time-motion.</td>
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<tr>
<td><strong>Gao, Y., et al.</strong></td>
<td>A cost-consequences analysis of a midwifery group practice for Aboriginal mothers and infants in the top end of the Northern Territory, Australia</td>
<td>Y NT</td>
<td>Regional hospital in Northern Territory (NT). Direct costs to the NT Department of Health</td>
<td>MBS: antenatal/postnatal care visits and tests PBS: drugs. Care costs were based on the hourly costs of an MGP midwife, AHW, and Senior Woman. Hospitalisation costs were based on AR-DRG weights. Personnel cost for antenatal/postnatal visits in the community were estimated using the standard working unit (SWU). The price for a SWU equals a 25-minute professional's consultation costs in a typical NT remote health centre. Professional's salary, on-cost, operational costs and capital were included in the calculations of a SWU price.</td>
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<tr>
<td><strong>Gibson, O. R., et al.</strong></td>
<td>A simple diabetes vascular severity staging instrument and its application to a Torres Strait Islander and Aboriginal adult cohort of north Australia</td>
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<td>Hospital (North QLD)</td>
<td>AR-DRG cost weights</td>
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<td><strong>Kruger, E., &amp; Tennant, M.</strong></td>
<td>Fractures of the mandible and maxilla: A 10-year analysis. The Australasian medical journal</td>
<td>N WA</td>
<td>WA hospital and Aboriginal population</td>
<td>AR-DRG cost weights</td>
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How cost of each health service use quantified: Medical records were retrospectively audited and cohort data were prospectively collected. Manual data linkage between community birth records from two government operated primary health centres and medical records at the regional hospital.

How health service use captured: A cross sectional population health screen known as the Well Persons Health Check (WPHC). Hospital admission and separation data, and mortality data. Royal Flying Doctor Service clinical notes were used to corroborate WPHC.
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<tr>
<td>Malyon, R., et al.</td>
<td>Differences in the cost of admitted patient care for Indigenous people and people from remote locations</td>
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| McCalman, J., et al. | Evaluating the Baby Basket program in north Queensland: As delivered by Apunipima Cape York Health Council | Y | QLD | Federal and state government funded Aboriginal health services | CBA | Resources used to prepare and deliver the three Baby Baskets plus the estimated value of fresh fruit vouchers. Wages based on salary scales based on labour market prices with the inclusion of overheads. | Routinely collected One21Seventy audit data of AHS EHR - clinical indicators.
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<td>Nguyen, K.-H., et al.</td>
<td>Regional and/or Remote NT, WA or QLD</td>
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<td>Vehicle, equipment, installation, consumables and staff costs are valued at market prices with depreciation. The cost of a cochlear implant was sourced from the AR-DRG v.6.</td>
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<td>Health system and primary care. Hospitals and clinics.</td>
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<td>Whitehall, J., et al.</td>
<td>Burden of paediatric pyoderma and scabies in North West Queensland. J Paediatr Child Health</td>
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