Economic evaluation of the Integrating Pharmacists within Aboriginal Community Controlled Health Services (ACCHSs) to improve Chronic Disease Management (IPAC Project)

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Integrating Pharmacists within Aboriginal Community Controlled Health Services (ACCHSs) *to improve Chronic Disease Management* (IPAC) Project.

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ABSTRACT

Objective

An economic analysis was conducted as part of the IPAC project to establish its costs and impacts and assess the extent to which it represented value for money.

Methods

The economic evaluation was a within-trial analysis that adopted a perspective of the publicly funded health system. Participants were Aboriginal and Torres Strait Islander patients with chronic disease who were 18 years and above and who were regular patients of the ACCHSs. Three types of economic analysis were conducted: (i) a cost-consequence analysis that included all participants with changes in biomedical indices for whom pre- and post-measures of outcomes were recorded; (ii) a cost-effectiveness analysis for two sub-groups of participants: those with T2DM with pre- and post-measures of HbA1c and those selected for MAI assessments at baseline and at the end of the study, with potential prescribing omissions (PPOs) used as the relevant outcome measure; and (iii) for participants with a clinical diagnosis of T2DM, a cost-utility analysis that derived lifetime quality of life changes from the decreases in HbA1c observed during the trial period based on T2DM simulation models. Costs and outcome data, with the exception of the modelled QALY changes, were obtained directly from the IPAC trial. Costs included value of resources from delivering the intervention as well as changes in health service use in the short term (trial time period compared with pre-intervention period). Cost offsets from savings as a result of integrating pharmacists in usual care were also included.

Results

In the cost-consequence analysis, the net costs of delivering the intervention of $1,493 per person was associated with statistically significant improvements in the following biomedical indices for participants with pre and post-intervention measures: glycated haemoglobin (HbA1c) (for participants with a clinical diagnosis of T2DM), diastolic blood pressure (DBP), total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), triglycerides (TG), cardiovascular risk 5-year risk (CVD 5-year risk) and estimated glomerular filtration rate (eGFR). In the cost-effectiveness analysis, for participants with a clinical diagnosis of T2DM, the ICER of the IPAC intervention versus no intervention was $3,769 per participant with a clinically meaningful reduction in HbA1c of at least 0.5%. In the case of the subset of participants selected for MAI assessments, the corresponding ICER was $6,809 per reduction in the number of participants with a PPO. For participants with a clinical diagnosis of T2DM, the cost-utility analysis yielded an ICER of $7,463 (95% CI $6,030 – $9,664) per gain in quality adjusted life years (QALYs), assuming no lifetime costs additional to usual care were required to maintain the reduction in HbA1c. Financial implications of implementing the IPAC intervention more widely within ACCHSs were also calculated. On an annual basis, the extended IPAC intervention was estimated to cost $13.2 million. The corresponding annual increase in utilisation of medications and primary health care services associated with better medication management support was $5.1 million. However, cost savings were also likely to be achieved from the improvement in health outcomes, for example, from a reduction in the utilisation and corresponding costs of emergency department presentations and hospital admissions. Under different scenarios, these cost savings were assessed as falling between $0.6 and $1.9 million per annum, varying according to the expected decrease in utilisation achieved.

Conclusion

The IPAC intervention found relatively low costs to be associated with increases in the utilisation of medications and primary health care services, the latter having the potential to contribute to more equitable, needs-based health care expenditure for the Aboriginal and Torres Strait Islander population. Additionally, the modelled cost-utility analysis conducted for patients with T2DM found that, based on commonly used reference ICERs for the Australian health system, the ICER of $7,463 represented good value for money.

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INTRODUCTION

The *Integrating Pharmacists within Aboriginal Community Controlled Health Services* (ACCHSs) *to Improve Chronic Disease Management* (IPAC) Project investigated the potential gains in health outcomes arising from integrating a registered pharmacist as part of the primary health care team within ACCHSs. Study participants included adult patients aged 18 years and over with a diagnosis of cardiovascular disease, Type 2 diabetes mellitus (T2DM), chronic kidney disease, or other chronic conditions and at high risk of developing medication-related problems. Findings indicated that integrated pharmacists embedded into usual care of Aboriginal and Torres Strait islander adults with chronic disease significantly improved the control of CVD risk factors and glycaemic control in patients with T2DM, and reduced absolute CVD risk.

Given scarce resources and limited budgets, advocating for inclusion of a pharmacist as part of the primary health care team within ACCHSs requires that such an initiative is economically feasible in addition to meeting its objective of improving quality of care outcomes. In order to address this question, an economic evaluation was conducted as part of the IPAC project to establish its relative costs and impacts, and with the underlying objective of assessing the extent to which it represents value for money.

Structure of the economic evaluation

This economic evaluation compared the costs and outcomes of the IPAC intervention versus usual care prior to the addition of an integrated non-dispensing pharmacist within ACCHSs to promote the quality use of medicines. The perspective adopted was the publicly funded health system. Discounting was not applied as the mean participant enrolment period was less than one year.

The analysis was trial-based, rather than model-based, with costs and outcomes compared in the post- and pre-intervention periods. As such, types of events and health states did not need to be defined. The trial used a pragmatic study design to evaluate quality of care outcome measures consistent with measures usually explored for quality improvement within clinical practice, with the comparator being 'usual care'. For these reasons, quality of life measures for cost utility analysis were not collected from trial participants to reduce the burden on participants and on clinical staff. Furthermore, (i) changes in quality of life would be unlikely to have been achieved over the relatively short time frame of the IPAC Trial and (ii) problems have been demonstrated in the use of existing instruments to measure the quality of life in Aboriginal populations, especially in populations experiencing more chronic conditions.[1] A single-item question for self-assessed health status of participants (SF1 of the SF-36 scale) was used in the IPAC evaluation but this was not suitable for use in the economic evaluation.

A cost-effectiveness analysis was undertaken for two sub-groups of participants: (i) those with T2DM with pre- and post-measures of HbA1c and (ii) those selected for MAI assessments at baseline and at

the end of the study, with potential prescribing omissions (PPOs) used as the relevant outcome measure.

A cost-consequence analysis was undertaken for all participants, with changes in biomedical indices reported for participants with pre- and post-measures of each outcome. Cost-consequence analysis differs from cost-effectiveness analysis in not reporting a single summary measure such as the incremental cost per incremental change in outcome. Rather, costs are presented alongside a range of outcomes to demonstrate the full impact of the intervention and allow policy makers to interpret the findings as appropriate to their decision-making context. Cost-consequence analysis has been recommended for complex interventions with multiple effects and public health interventions which have a range of health and non-health benefits that are difficult to measure in a common unit.[2][3]

For participants with a clinical diagnosis of T2DM, a cost-utility analysis was also conducted that derived lifetime quality of life changes from the decreases in HbA1c observed during the trial period. The economic evaluation was conducted using SPSS and MS Excel.

A description of the proposed population, disease states and settings and intervention has been described elsewhere.[4][5]

Assumptions

The *theory of change* for the integrated pharmacist's intervention demonstrates the relationships and interactions between the various events that can influence outcomes and the economic evaluation.[6] In short, the effect of integrated pharmacists is influenced by their training and the integration model within the ACCHS (fidelity to the conditions of the IPAC intervention), as well as assumptions that are outside the control of the ACCHS and integrated pharmacist. For example, patient adherence behaviour can be mediated by social and economic factors outside the control of the patient and the healthcare team, and the effect of integrated pharmacists may also be mediated by the capacity of community pharmacy to engage and support systems that enhance patient-centredness in the quality use of medicines.

The economic evaluation estimated the net cost of medication utilisation during the IPAC trial (as a health system cost). Certain assumptions made in developing these estimates have been reported elsewhere.[7] The cost of medications that were actually dispensed during the study period could not be directly ascertained as dispensing data was not collected for this study.

Consequently, assumptions were applied when estimating the cost of changes to prescription medicines and a conservative approach was taken. It is likely that each of the following assumptions had the effect of overestimating the cost of medication changes during the study period. Costs were assigned to continuous-use medicines (at a standard dosage) for: a) the whole study period; b) assumed complete participant adherence over this time; and c) assumed that prescribing changes occurred immediately following the date of the baseline medication review.

Given that there are delays in patients filling prescriptions from community pharmacy, and a usual non-adherence rate of at least 30% for Aboriginal peoples and Torres Strait Islanders,[8] the actual cost of medications dispensed for the whole follow-up period would most likely have been less than what was assumed. The same assumptions were applied to ceased medications to offset the cost of newly started medications. This may have overestimated the costs saved, as medications may not have been ceased immediately after the baseline MAI. The net effect of these competing assumptions would favour an overestimation of medication costs as it is easier to cease a medication than to take it.

The costs of single-expense medications may also have been overestimated by extending the cost period to 30 days for some items according to the defined standard dosages, but this applied to only a few medications. An assumption was made that these single-expense items were not prescribed at repeated intervals during the study and this may have also underestimated the costs of these type of medications. In this case, the net effect is a more balanced set of assumptions.

The PBS patient co-payment did not factor in any of the medication cost estimates as most participants were concessional and the co-payment for Aboriginal peoples and Torres Strait Islanders in this situation is waived under the Closing the Gap PBS Co-Payment Measure. In addition, some participants were from remote locations sourcing their medications through the ACCHS under the section 100 (of the National Health Act, 1953) scheme that also waives a co-payment. The few remaining participants not in either of these situations may have paid a reduced co-payment of $6.50 (2019 prices) per medication dispensed. If the patient contribution was able to be factored into these estimates, the direction of the net effect on patient 'out of pocket' expenses arising from the medication changes is unclear given that new medications were started as well as ceased.

These assumptions provide a conservative estimate of the costs of medication changes that may be attributed to the pharmacist intervention.

Inputs to the economic evaluation

Intervention costs

Resources used to deliver the intervention included the integrated pharmacist's salary, training time, GP time spent with pharmacists in medicine information sessions and attending workshops conducted by integrated pharmacists, resources provided by the ACCHSs and miscellaneous items. Information on the amount of resource use was collected directly from record keeping systems implemented specifically for the IPAC trial. Unit costs were similarly obtained directly from the trial records or, in the case of GP time, from an official source (i.e. ABS earnings data adjusted to 2019 base year based on the change in average weekly earnings).[9] [10]

The change in use of health care resources resulting from the intervention included: (i) the net change in number of MBS item number 900 consultations with GPs and corresponding Home Medicines Reviews (HMRs) in the pre- and post- periods and (ii) the net effect of new medicines started less medicines stopped (for the subset of participants who had an MAI).

Net costs do not include changes in health system resource utilisation such as hospitalisations. Hospitalisation rates were not investigated as a measure in the IPAC Trial, as the trial was community-based and participatory, being restricted to data extracted from ACCHS clinical information systems in order to respect Aboriginal and Torres Strait Islander participants ownership of their own data.

Including an integrated pharmacist as part of the primary health care team also generated cost savings (i.e. cost offsets). The costs-savings related to the provision by integrated pharmacists of medication management reviews, either as a HMR (MBS item 900 rebate claim) or a comprehensive medication review that was conducted under circumstances that did not fulfil all criteria of the HMR program. Examples of such circumstances included reviews conducted outside the patient's home, or if the pharmacist conducting the review was not accredited to conduct a HMR. These comprehensive reviews were designated for the purposes of the trial as 'non-HMRs'.

In addition to (i) HMRs conducted by the integrated pharmacists for which no Sixth Community Pharmacy Agreement (6CPA) claim was made and (ii) non-HMRs conducted by integrated pharmacists that substituted for HMRs that may, in the absence of the non-HMRs, have resulted in MBS/6CPA claims, time savings for GPs due to health care activities undertaken by pharmacists, were also included as a cost offset on the basis that they relieved GPs of these duties.

Home Medicines Reviews

The number of MBS item 900 claims was obtained for each participant for the 12-month period prior to enrolment and was collected for the duration of the implementation phase of the trial. The fee for MBS item number 900 is $157.30[11] and under the 6CPA the pharmacist's fee for a HMR is $222.77 (the total of HMR fees being $380.07).[12] Given varying follow-up periods for participants, MBS item 900 claims in the 12-month period prior to enrolment were proportionately adjusted to correspond to the period for which the participant was enrolled (i.e. number of MBS item 900 claims in 12-month pre-period multiplied by days in trial divided by 365).

Net cost of change in medicines

A method was developed to derive an estimate of the cost of additional medicines started, with cost-offsets for the number of medicines stopped for the subset of participants who had a MAI assessment.[13] Comparisons were made per patient between medicines at baseline and end of study. Whilst the study records could inform on the number and type of 'new medicine started' or 'previous medicine stopped', neither the dose of medicine prescribed nor the date when the medicine change occurred was known. Consequently, a standard, maximum or minimum medication dose was assigned by an expert panel and the dispensed price per maximum quantity (DPMQ) listed by the PBS used to assign costs for a standard time period consistent with complete adherence. A maximum drug dose for 'new drugs started' overestimates the cost of new medicines, and a minimum drug dose for 'medicines stopped' underestimates cost savings. An assumption was made that the medication change occurred from the date of the baseline MAI and continued until the date of the repeat MAI. Participants for whom information on medicine use was not collected were allocated the average cost of PBS medicines per participant as calculated for participants with a medicine cost.

HMRs and non-HMRs conducted by the integrated pharmacists

The number of HMRs and non-HMRs conducted during the IPAC Trial were ascertained from the integrated pharmacist logbook. The majority (96.4%) of HMRs conducted during the trial period were completed by the integrated pharmacists, with approximately half (52.8%) conducted within IPAC hours and for which no 6CPA claim was submitted. Given the fee of $222.77 per HMR, this amounts to a cost offset to the system of $113.39 per HMR (0.964 x 0.528 x $222.77). The non-HMRs were also a cost offset for which the equivalent cost of a HMR of $380.07 was assigned.[14] [15]

Omitted from the analysis was the cost of follow-ups to HMRs and non-HMRs. Approximately half of the HMRs and non-HMRs resulted in follow-up encounters within the implementation phase, which represent a cost offset. However, these follow-up encounters were excluded as a cost offset as they did not relate to an activity funded at the time of the intervention.

Time saved for GPs

Inclusion of an integrated pharmacist as part of the primary health care team resulted in time saved by GPs. A survey of GPs for the qualitative evaluation of the IPAC trial suggested a wide variation in the amount of GP time saved from the support provided to them by integrated pharmacists. This time saving ranged from 3% to 41%.[16] In view of the variation, the evaluation team adopted a minimal and conservative time saving that amounted to approximately 5% of their time. As indicated earlier, the cost of GP time was assigned based on ABS earnings data.[17]

Allocating intervention costs to participants

Intervention costs were divided into (i) variable costs that could be attributed directly to participants (e.g. HMRs, non-HMRs, medicines started/stopped) and (ii) fixed costs which included intervention costs plus cost offsets.

Variable costs were allocated directly to participants based on their unit costs. Fixed cost components were allocated to each ACCHS based on relative resource use. These fixed cost components were allocated to participants based on the number of months each participant was enrolled in the study as a proportion of the total number of months measured across all participants enrolled at that ACCHS. In the case of time saved by GPs, the cost was allocated to participants based on the number of months they were enrolled in the study as a proportion of the total number of months of enrolment measured across all participants. The rationale for this latter was to account for the varying number of participants at each site and thus to allocate these cost offsets in a way more likely to reflect time saved.

Total costs for each participant was calculated as the sum of their variable costs plus share of fixed costs.

Table 1 presents data relating to how direct health care resources used in delivering the IPAC intervention were calculated including unit costs, the source of unit cost data, and relevant explanatory comments. Similarly, Table 2 shows these items in regard to the utilisation of direct health

care resource items by trial participants. Table 3 lists the range of outcome measures used in the primary and secondary economic evaluations.

Table 1. Direct health care resource items associated with delivering the IPAC intervention

Item	Units	Unit cost	Source	Comment
Integrated pharmacist salary	Hours	$50 per hour*	Financial records	Casual hourly rate for a pharmacist at two sites was $68.44. Salary for two discontinued sites was reallocated across other sites based on proportion of total pharmacist hours.
Integrated pharmacist on-costs	% of salary	17% ($8.50 per hour)*	Financial records	Range of $4.81 - $9.86 depending on employment arrangements.
Integrated pharmacist allowances (including relocation costs where applicable)	$	-	Financial records	Total amount across all sites allocated to pharmacists at each site based on their proportion of total hours
Out-of-pocket pharmacists' payments	$	-	Self-report	As above
Integrated pharmacist training	$	-	Financial records	As above
ACCHS support of integrated pharmacists	$	-	ACCHS records	As above
General practitioner time spent in receiving a medicines information service	Hours	$86.80 per hour	Hours from pharmacist logbook; unit cost from ABS (2019a). Updated to 2019 using ABS (2019b) [1,2.]	As above

*Cost estimates were provided by the Pharmaceutical Society of Australia. The pharmacists' salary was budgeted by the PSA for the integrated pharmacist role in the IPAC project. For some pharmacists this rate was an increase on their salary rate prior to IPAC project, whilst for others the rate was lower than their pay rate immediately prior to IPAC. Market rates vary depending on remoteness.
[1] Australian Bureau of Statistics. Employee earnings and hours, Australia, May 2018. Cat no 6306.0. Canberra:ABS; 2019..
[2] Australian Bureau of Statistics. Average weekly earnings, Australia, May 2019. Cat no 6302.0. Canberra:ABS; 2019.

Table 2. Utilisation of direct health care resource items by IPAC Trial participants

Item	Units	Unit cost	Source	Comment
Net Home Medicines Reviews (HMRs)	n	$380.07	MBS and 6CPA	Comprises $157.30 for MBS item 900 plus 6CPA fee for pharmacists of $222.77
Cost offset HMRs conducted within IPAC hours (no 6CPA claim).	n	$113.38	Financial records, MBS item 900 and 6CPA	Attributed as a cost saving
Cost offset Non-HMRs	n	$380.07	MBS and 6CPA	As above
Time saved by GPs	% of time	$86.80 per hour	% of time from GP survey; earnings from ABS (2019a); ABS (2019b)	As above
Net cost of PBS medicines	n	Various based on DPMQ listed by the PBS	See 'Net cost of change in medicines' section above	-

6CPA= 6th Community Pharmacy Agreement; ABS= Australian bureau of Statistics; MBS= Medicare Benefits Schedule

Table 3. Outcome measures used in the primary and secondary economic evaluations

Outcomes	Measures	Source
Primary outcome measures	Biomedical indices including changes in HbA1c for participants with T2DM, and changed in SDP, DBP, TC, LDL-C, HDL-C, TG, ACR and CVD 5-year risk	Trial data
Primary outcome measure – participants with T2DM	Clinically meaningful reduction in HbA1c	Trial data
Secondary outcome measure	Potential prescribing omission	Trial data

ACR= albumin-creatine ratio
BMI= body mass index;
BP= blood pressure;
CVD= cardiovascular disease.
DBP= diastolic blood pressure
eGFR= estimated glomerular filtration rate
HbA1C= glycated haemoglobin
HDL-C= high density lipoprotein cholesterol
LDL-C= low density lipoprotein cholesterol
SBP= systolic blood pressure
TC= total cholesterol
TG= triglycerides
T2DM= type 2 diabetes mellitus

The cost-consequence analysis was undertaken using biomedical indices listed above, while the cost-effectiveness analysis was undertaken with regard to the primary outcome of a clinically meaningful reduction in HbA1c for participants with T2DM[18] and potential prescribing omissions for participants selected for MAI assessments.[19] These intermediate health outcome measures reflect 'quality of care' measures, consistent with quality measures used by the Australian Government to monitor the provision of primary health care through arrangements with Primary Health Networks and the ACCHS sector nationally.[20]

The cost of implementing the IPAC intervention was $1,946,876 (Table 4). As a result of the intervention, the net cost of health services (HMRs) increased by $132,899 ($179,012-$46,113) and the net cost of PBS medicines (i.e. medicines started less medicines stopped) increased by $553,849 ($132,899+$418,049). Cost offsets from time saved by GPs and integrated pharmacists conducting HMRs and non-HMRs during the trial period amounted to $459,643.

The net total cost of implementing the IPAC trial was $2,173,981 (calculated as [$1,946,876+($132,899+$553,849)-$459,643]). **On a per participant basis, this cost was equivalent to $1,493 per person**.

Table 4. Resource use, costs and cost offsets in delivering the IPAC intervention (n=1,456)

Item	Resource use (units)	Costs ($) During-trial period	Pre-trial period ("comparator")
Integrated pharmacist salary	27,478 hours	$1,621,079	
Integrated pharmacist allowances	-	$136,658	
Pharmacist out-of-pocket payment	-	$9,741	
Integrated pharmacist training	-	$64,820	
ACCHS contribution[1]	-	$52,158	
General Practitioner time spent	719 hours	$62,420	
Total: Intervention costs	-	**$1,946,876**	
Home Medicines Review based on item 900 claims (HMR)	149 pre-intervention; 471 during intervention[2]	$179,012 [2]	$46,113[3]
Net cost of PBS medicines (participants for whom medicines was measured)		$135,800[4]	
- (PBS medicines started)	-	($514,467)[4]	
- (PBS medicines stopped)	-	($378,667)[4]	
Net cost of medicines (participants for whom medicines were not directly measured)		**$418,049[5]**	
Cost of utilisation health services		**$732,861**	**$46,113[3]**
Time saved by General Practitioners	1366 hours	$118,528	
Cost offsets HMRs	-	$53,402 [6]	
Non-HMRs	757	$287,713	
Cost offsets		**$459,643**	
Net total costs		**$2,220,094**	**$46,113[4]**

HMR= Home Medicines Review. A completed HMR represents a comprehensive medication management review that fulfils the criteria for a Medicare Benefits Scheme (MBS) claim for item 900, as sourced from the integrated pharmacist's logbook.

Non-HMR= a comprehensive medication management review that was not an HMR, as sourced from the integrated pharmacist's logbook.

PBS= Pharmaceutical Benefit Scheme.

1. Excludes overheads and infrastructure costs (e.g. office space, computers, etc)

2. Data from HMR report.[21] A cost offset of $380.07 per HMR was applied.

3. A cost offset of $380.07 per HMR was applied but was adjusted for each participant to reflect equivalent number of days in pre-trial period as during trial period.

4. Derived from: *Couzos S, Drovandi A, Smith D, Hendrie D, Biros E. Net cost to the PBS of medication changes arising from the IPAC intervention: Method used to assess health system costs for economic analysis. Supplement to the Economic Evaluation for the IPAC Project. Report to the PSA, December 2019.* The costs differ slightly from this report as the costs here also include the cost of medicines for four participants who were not in the AoU group, totalling $2593.69 ($135,800 - $133,206). This cost relates to the subset of participants who had an AoU conducted.

5. Participants for whom information on medicine use was not collected were allocated the average cost of PBS medicines per participant as calculated for participants with a medicine cost.

6. Derived from 471 HMRs X $113.39. The majority (96.4%) of HMRs conducted during the trial period were completed by the integrated pharmacists, with approximately half (52.8%) conducted within IPAC hours and for which no 6CPA claim was submitted. Given the fee of $222.77 per HMR, this amounts to a cost offset to the system of $113.39 per HMR (0.964 x 0.528 x $222.77).

Table 5 presents costs for subgroups of participants. It was possible to report costs for subgroups as intervention costs (variable and fixed) and components of the net cost of direct health care resources

were apportioned to individuals either directly or based on allocation factors. Identifying costs separately for subgroups enabled the appropriate costs to be compared with corresponding outcomes in the incremental cost-effectiveness ratios presented in the cost-effectiveness analysis. Calculating costs for subgroup of participants assumes that the costs of implementing the IPAC intervention are proportionately divisible.

Table 5. Resource use, costs and cost offsets in delivering the IPAC intervention for specific subgroups of participants.

Subgroup	No. of participants	Total intervention costs[1]	Net cost of utilisation of health services[2]	Cost offsets	Net total costs (including cost offsets)
Participants with T2DM and pre-post HbA1c measures[3]	539	$732,130	$198,822	$177,178	$753,774
Participants for whom AoU conducted[3]	353	$690,949	$161,115	$137,105	$714,959

AoU= Assessment of medication underutilisation
HbA1C= glycated haemoglobin
T2DM= type 2 diabetes mellitus
[1] Includes sum of variable and fixed costs of the IPAC intervention for participants in each subgroup.
[2] Includes net cost of utilisation of health services for participants in each subgroup.
[3] Participants with T2DM and in the AoU groups had a mean length of participation in the IPAC trial of 287 and 326 days respectively. Additionally, more participants in the AoU group were associated with ACCHSs with higher mean costs per participant.

RESULTS OF THE ECONOMIC EVALUATION

Cost-consequence analysis

The results of the cost-consequence analysis, comparing the cost of the IPAC intervention with changes in biomedical indices for which statistically significant differences were observed, are presented below (Table 6). Changes in biomedical indices were calculated using paired pre and post-intervention measures, adjusted for health service cluster and the length of follow-up time.

The total cost of implementing the IPAC intervention was $1,493 per participant. This cost was associated with statistically significant improvements in the following biomedical indices for participants with pre and post-intervention measures: glycated haemoglobin (HbA1c) (for participants with a clinical diagnosis of T2DM , diastolic blood pressure (DBP), total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), triglycerides (TG), cardiovascular risk 5-year risk (CVD 5-year risk) and estimated glomerular filtration rate (eGFR).

Table 6 Cost-consequence analysis comparing mean incremental cost with mean differences in biomedical indices[1]

Variable	Mean incremental cost	Mean difference in biomedical indices mean (SD, 95% CI)	p-value[1]
Net total cost (including cost offsets)[2]	$1,493		
HbA1c mmol/mol *[% units]* (n=539 in T2DM)		-2.8 (19.5, -4.5 to -1.0) *[-0.3% (3.9%, -0.4% to -0.1%)]*	0.001
DBP, mmHg (n=1045)		-0.8 (9.4, -1.4 to -0.2)	0.008
TC, mmol/L (n=660)		-0.15 (0.77, -0.22 to -0.09)	<0.001
LDL-C mmol/L (n=575)		-0.08 (0.48, -0.13 to -0.03)	0.001
TG mmol/L (n=730)		-0.11 (1.08, -0.20 to -0.01)	0.006
CVD 5-year risk % units (n=38)		-1.0 (2.6, -1.8 to -0.12)	0.027
eGFR (no minimum follow-up time) ml/min/1.73m^2 (n=895)		1.9 (25.7, 0.1 to 3.7)	<0.001
eGFR (6-month follow-up time) ml/min/1.73m^2 (n=895)		-0.2 (36.0, -2.99 to 2.7)	0.034

1. Data pertains to biomedical indices with mean difference that was statistically significant at the 0.05 level, as sourced from clinical endpoint analysis report.[22]
BP= blood pressure;
CVD= cardiovascular disease.
DBP= diastolic blood pressure
eGFR= estimated glomerular filtration rate
HbA1C= glycated haemoglobin
LDL-C= low density lipoprotein cholesterol
TC= total cholesterol
TG= triglycerides
T2DM= type 2 diabetes mellitus
2. The estimate of $1,493 per participant, which includes the net costs of utilisation of health services and PBS medicines, is believed to be an overestimate. The net cost of medicine was estimated for a subset of participants based on assumptions that maximised the cost of new medicines started and minimised the cost of medicines that were stopped (see Appendix 15).

Cost-effectiveness analysis

The cost-effectiveness analysis was undertaken for: (i) participants with a clinical diagnosis of T2DM with pre- and post-measures of HbA1c and (ii) participants selected for MAI assessments at baseline and at the end of the study, with potential prescribing omissions used as the relevant outcome measure.[23]

For participants with a clinical diagnosis of T2DM, and with pre and post-measures of HbA1c, costs and outcomes for the IPAC intervention compared with no IPAC intervention (the comparator) are shown in the Table 7. The ICER of the IPAC intervention versus no IPAC intervention was $3,769 ($753,774/200) per participant with a clinically meaningful reduction in HbA1c of at least 0.5%.[24]

Adopting the statistically significant but still clinically meaningful reduction in HbA1c of 0.3% as the benchmark (rather than the benchmark reduction of 0.5%), the ICER reduces to $3,235 ($753,774/233) per participant.

Table 7 Incremental cost effectiveness ratio for reduction in HbA1c in participants with Type 2 diabetes mellitus

	Cost	A Incremental cost	Effectiveness: Mean HbA1c (SD) mmol/mol [% units]	B No. of participants with a clinically meaningful reduction in HbA1c[2]	A/B ICER[1]
Intervention	$772,098	$753,774	64.0 (22.3) [8.0% (2.0%)]	200	$3,769
Comparator	$18,324[3]		66.8 (23.8) [8.3% (2.2%)]		

[1] ICER = Incremental Cost Effectiveness Ratio (defined as incremental cost divided by number of participants with a clinically meaningful reduction in HbA1c).

[2] Number with clinically meaningful reduction (mean difference) in HbA1c of at least 0.5% at the participant level, from baseline compared with end of study (n=539).[25] HbA1c conversions used the formula: %HbA1c (units) = [IFCC HbA1c (mmol/mol)* 0.0915] +2.15. Note that a clinically meaningful reduction refers to whether the difference is likely to impact current medical practice based on change at the individual rather than population level. It differs from statistical significance, which quantifies the probability of a study's results being due to chance.[26] This analysis therefore adopts a conservative approach to estimating the ICER, as even small reductions in HbA1c can be clinically meaningful at both individual and population levels.[27]

[3] Cost reflects health system costs in the pre-intervention period; HMRs were the only cost item included.

For the sample of participants assessed for the underutilisation of medications (AoU), the overall costs and outcomes, and incremental costs and outcomes, for the IPAC intervention compared with no IPAC intervention are shown below (Table 8). For this subset of participants, the ICER of the IPAC intervention versus no IPAC intervention was $6,809 per reduction in the number of participants with a potential prescribing omission.

Table 8 Incremental cost effectiveness ratio for reduction in potential prescribing omissions in participants assessed for the underutilisation of medications (AoU)

	Cost	Incremental cost	Effectiveness PPOs (n)	Incremental effectiveness[1]	ICER
Intervention	$729,237	$714,959	181	105	$6,809
Comparator	$14,278[2]		76		

AoU = Assessment of Underutilisation
ICER = Incremental Cost Effectiveness Ratio
PPO = Potential Prescribing Omission

[1] Reduction in the number of participants with a potential prescribing omission.

[2] Cost reflects health system costs in the pre-intervention period; HMRs were the only cost item included.

Cost-utility analysis

For participants with a clinical diagnosis of T2DM, and with pre and post-measures of HbA1c, changes in HbA1c during the trial period were mapped to lifetime quality of life changes based on the findings of a systematic review.[28] This review included 76 studies using T2DM simulation models to evaluate the relationship between improvements in HbA1c and modelled health outcomes in terms of quality-

adjusted life years (QALYs) or life expectancy. Of the 76 studies, 57 were based on the CORE Diabetes Model.[29]

Findings of the systematic review based on multivariable regression indicated a linear relationship of every 1% decrease in HbA1c resulting in a 0.371 (95% CI 0.286-0.456) increase in lifetime QALYs. However, studies did not appear to include a decrease in HbA1c exceeding 3%. Participants in the IPAC trial that were recorded to have HbA1c reductions of greater than 3% were assumed to have QALY gains corresponding to a 3% decrease. Percentage reductions in HbA1c refer to the change in measured HbA1c. For example, a change from 9% to 8% reflects a decrease of 1%.

The increase in lifetime QALYs for participants with T2DM were calculated based on the following assumptions:

1) Participants with a decrease in HbA1c of less than 1% were assigned no lifetime QALYs.

2) Participants with a decrease in HbA1c of between 1% and 3% were assigned lifetime QALY gains calculated as 0.371 multiplied by the corresponding decrease.

3) Participants with a decrease in HbA1c of more than 3% were assigned lifetime QALY gains calculated as 0.371 multiplied by 3.

Mapping changes in HbA1c over the trial period to a gain in lifetime QALYs resulted in a projected increase of 101 QALYs (95% CI 78-125) (Table 8a).

Table 8a Distribution of lifetime QALY gains by changes in HbA1c for participants with T2DM

Change in HbA1c (%)	No. of participants	Lifetime QALY gains
<1%	401	0
1% to 3%	111	71.27
>3%	27	30.05
Total	**539**	**101.32**

Based on an incremental cost of the IPAC intervention of $753,774 for participants with a clinical diagnosis of T2DM, and with pre and post-measures of HbA1c, this suggested an ICER of $7,463 (95% CI $6,030-$9,664) per QALY, assuming no lifetime costs additional to usual care are required to maintain the reduction in HbA1c.

Only one study identified in the literature review of the cost-effectiveness of non-dispensing pharmacist services integrated within primary health care presented an ICER based on lifetime cost/QALY, but its target group were patients with hypertension.[30]

While the concept of having a cost-effectiveness threshold as a guide for selecting health care interventions for inclusion in a national health insurance scheme has proved controversial,[31] these thresholds provide guidance as to which interventions provide relative value for money.[32] In Australia, analysis of public summary documents have shown that medical services with ICERs over $40,000 per QALY have been recommended for funding, whilst summary documents from the Pharmaceutical Benefits Advisory Committee have indicated an ICER threshold of between $45,000 and $75,000.[33,34] A recent study that estimated a reference ICER for the Australian health system showed a lower figure of $28,033 per QALY gained.[35] This latter threshold was based on adopting a supply-side rather than demand-side approach, which has been argued to be preferred in decisions about adding or subtracting interventions to a publicly funded health system.[36]

Based on these ICER thresholds for Australia of assessing the value of new interventions, the modelled ICER for the IPAC intervention for participants with T2DM of $7,463 (95% CI $6,030-$9,664) per QALY indicates good value for money.

Sensitivity analyses

The sensitivity analysis tested for uncertainty in two parameters: variability in the number of HMR claims (MBS item 900) during the trial period, which accounted for 57% of the cost of utilisation of health services; and an increase in time saved for GPs, which accounted for 29% of cost offsets. While varying the number of HMR claims adds direct health care costs, cost offsets are also generated as the majority of HMRs conducted during the trial period were conducted by integrated pharmacists with no 6CPA claims payments made. Salary and related costs of including integrated pharmacists within the ACCHS setting are the key driver of the cost of the IPAC intervention but unlikely to be subjected to variability.

Variability in HMR claims may occur if, in the future roll-out of the IPAC intervention, there are more integrated pharmacists who are accredited to complete HMRs. In the IPAC study, about 75% of integrated pharmacists were accredited. If this number increases to 100%, then even more HMRs are likely to be completed (and claimed). While this will increase health system costs, it increases patient access to the HMRs (which is a health system goal). Also, the variability in HMRs (costs to the health system) may also occur if community pharmacy (external pharmacists) complete more HMRs because the integrated pharmacist refers the patient to them, which occurred during the IPAC intervention.

The sensitivity analysis increased the number of HMRs during the trial period to 1.33 of the number conducted during the intervention period (n=626 rather than n=471). The number of HMRs is dependent on program rules; future changes to these rules will impact on the frequency of HMRs conducted.

Time saved for GPs may increase as the integrated pharmacists become more embedded in the practice and assume more roles related to their expertise in medication use and safety.[37] The survey of GPs for the qualitative evaluation of the IPAC trial suggested a variation in the amount of GP time saved from the support provided to them by integrated pharmacists of between 3% and 41%. In the sensitivity analysis this percentage was assumed to be 10%, an increase from 5% in the base case analysis.

Increasing the number of HMRs by one third during the trial period increased net total costs of the IPAC Trial by $76,492, while the increase in time saved for GPs by having integrated pharmacists embedded in the ACCHSs decreased costs by $118,528. The impact of varying both parameters was low (Table 9).

Table 9. Key drivers of the economic evaluation

Description	Method/Value	Impact
Increase in number of HMRs	1.33 of number completed by integrated pharmacists during trial period	Low, favours comparator
Increase in time savings for GPs	10% (instead of 5%)	Low; favours intervention

FINANCIAL IMPLICATIONS

Justification of the Selection of Sources of Data

The financial implications have been determined based on the integrated model of care for pharmacists investigated in the IPAC Trial.

The approach used to estimate the financial implications of the introduction of an integrated pharmacist within ACCHSs has been based on costings for recruitment, employment, training, the proposed settings and the proposed population, extrapolated to the proposed ACCHS services. Information is also drawn from the economic evaluation presented earlier.

Financial implications include the cost of (i) delivering the proposed service and (ii) additional utilisation of health services resulting from integrated pharmacists being part of the primary health care team. Costs presented are a maximum figure that assumes all ACCHSs across Australia will participate in the extended IPAC program and be able to access suitable pharmacists.

Cost offsets from implementing the IPAC model of care will be generated as the integrated pharmacists assume tasks previously undertaken by GPs, thus freeing up time for GPs. Additionally, improvement in biomedical indices for clients is likely to lead to a reduction in the need for acute health care services over time.

In brief, the proposed funding model for salary of the pharmacists adopted the IPAC methodology for allocation of pharmacist FTE and salary, with a baseline 0.2FTE allocated to each ACCHS and a further allocation according to ACCHSs' client numbers plus a rural loading added, as is applied in the Workforce Incentive Payment program.

Client numbers were estimated from: (i) data from the Australia Institute of Health and Welfare (AIHW), with assumptions made about the relative number of ACCHSs (the AIHW data combines the number of ACCHSs and state/territory primary health services), and (ii) the number of ACCHS clients likely to have their medication reviewed by an integrated pharmacist or have a HMR conducted annually, with these estimates based on findings of the IPAC trial.

Training for integrated pharmacists to enable them to work with complex patients and requiring an understanding of social determinants of health and the public health challenges related to Aboriginal and Torres Strait Islander peoples, includes the creation of online or face-to-face training courses (drawing on existing material) plus mentorship programs and ongoing support.

Program support for ACCHS has been based on methods for medicines-related programs within ACCHSs that have been found to be effective. The timing of program support is skewed towards the earlier stages to facilitate program uptake and early implementation including recruitment of pharmacists.

Ongoing evaluation of the extended program to embed pharmacists in ACCHSs is proposed to ensure the program is meeting its stated objectives and to identify any issues affecting implementation and address these in a timely manner.

Over the projected 5-year period, total costs of implementing the extended IPAC intervention average $13.2 million per annum (Table 10).

Table 10 Financial implications of extending the IPAC intervention to all ACCHSs

Item	Year 1 ($)	Year 2 ($)	Year 3 ($)	Year 4 ($)	Year 5 ($)
Pharmacists salary	11,735,262	11,735,262	11,735,262	11,735,262	**11,735,262**
Training and support for pharmacists	1,151,000	621,000	621,000	488,750	488,750
Program support for ACCHSs	647,500	622,500	490,000	357,500	332,500
Program monitoring and evaluation	312,380	294,780	294,780	294,780	294,780
TOTAL COSTS	13,846,142	13,273,542	13,141,042	12,876,292	12,851,292

The IPAC Trial was associated with an increase in the utilisation of medications and primary health care services, an important finding with the potential to contribute to more equitable, needs-based health care expenditure. The Australian Institute of Health and Welfare has estimated that the Aboriginal and Torres Strait Islander burden of disease is 2.3 times greater than the non-Indigenous burden,[38] yet underutilisation of mainstream services is reflected in ratios of Indigenous to non-Indigenous expenditure of 0.67 to 1.00 for the MBS and 0.80 to 1.00 for the PBS.[39]

The additional cost of utilisation of health services was based on scaling up costs presented in the economic evaluation to the estimated number of ACCHS clients with chronic disease who would be likely to: (i) have their medication reviewed by an integrated pharmacist (approximately 2.6% of patients with chronic disease; n=11,000) or (ii) have a HMR conducted annually. The unit cost applied to calculate the total cost of HMRs assumes no 6CPA amount is claimed; and the additional number of HMRs is based on the increase observed during the trial period compared with the pre-trial period.

Annual costs of the net cost of medicines and additional HMRs are estimated to be $ 5.1 million (Table 11).

Table 11 Financial implications of extending the IPAC intervention to all ACCHSs for more equitable use of PBS medicines and Home Medicines Review.

Items	Year 1 ($)	Year 2 ($)	Year 3 ($)	Year 4 ($)	Year 5 ($)
Net cost of PBS medicines*	4,684,865	4,684,865	4,684,865	4,684,865	4,684,865
Cost of additional HMRs**	454,912	454,912	454,912	454,912	454,912
TOTAL	5,139,777	5,139,777	5,139,777	5,139,777	5,139,777

*Based on scaling-up of the estimated net increase in the number of medications prescribed for IPAC participants within ACCHSs. The net increase occurred in participants who had an assessment of medication appropriateness completed by integrated pharmacists. Pharmacists made recommendations for medication adjustments to prescribers.[40]
**Based on scaling up of the observed increase in participant uptake of HMR services (based on item 900 claims) when pharmacists were integrated within ACCHSs. The additional number of HMRs will be dependent on program rules.
ACCHS= Aboriginal community-controlled health services
HMR= Home Medicines Review.
PBS= Pharmaceutical Benefits Scheme

Cost offsets from time saved for GPs across the 140 ACCHSs, assuming a conservative (and minimal) estimate of a 5% time saving, are estimated as $1,184,820 per annum. This type of cost offset may be much higher given that there was a considerable degree of variation in the estimates of GP time-saved, given by general practitioners within ACCHSs (see earlier).

Use and Costs of health services

The number of clients with chronic disease accessing ACCHS services from integrated pharmacists is based on the capacity of the pharmacists to deliver services, based on the findings of the IPAC trial (irrespective of the age of participants).

The cost of implementing the IPAC intervention and embedding pharmacists in all ACCHSs, and the additional use of health services (i.e. HMRs and appropriate use of medicines) has been estimated by scaling up the findings of the IPAC intervention to clients likely to have their medicines reviewed or have HMRs conducted across all ACCHSs (Table 12).

Table 12 Use of the proposed service and additional costs of extending the IPAC intervention to all ACCHSs

Items	Year 1	Year 2	Year 3	Year 4	Year 5
Number. of clients with chronic disease likely to be reviewed by an integrated pharmacist for medicines management	11,000[1]*	11,000	11,000	11,000	11,000
Number of additional HMRs	2,892	2,892	2,892	2,892	2,892
Cost of scaled-up IPAC intervention	S13,846,142	$13,273,542	$13,141,042	$12,876,292	$12,851,292
Cost of additional use of health services[1]	$5,139,777	$5,139,777	$5,139,777	$5,139,777	$5,139,777

[1] The total number of regular clients accessing ACCHSs was 409,646 (data provided by NACCHO, from AIHW statistics related to attendance of clients at Aboriginal primary health services).[41] The estimated number of ACCHS clients with chronic disease who would be reviewed by an integrated pharmacist or have a HMR conducted was based on the findings of the IPAC trial (irrespective of age).

Changes in Use and Cost of Other Medical Services

Other MBS-funded medical services are have not been analysed in preparing this submission.

Financial Implications for the MBS

The IPAC Trial identified that MBS item 900 claims for participants significantly increased (3.9 times in a period of 12 months, p<0.001) from the integration of pharmacists within ACCHSs.

For an integrated pharmacist program to be delivered more broadly to the proposed population, the financial implications for the MBS (with regard to item 900) are the cost of the rebate for this service multiplied by the proposed number of beneficiaries over a 12-month period.

PBS and MBS safety net implications have not been included, as co-payments may not be applicable to the majority of clients. Based on the clinical endpoints analysis, over 80% of participants were pensioners or had concessional status.[42] There is also an absence of data to make assumptions on this issue.

A cost offset from time saved for GPs as a result of the support provided by integrated pharmacists amounts to $1,184,820 per annum. This freeing up of GP capacity will allow more time for clinical activities rather than being realised in monetary terms, hence this is not included in Table 13.

Table 13 Total costs to the MBS of extending the IPAC intervention to all ACCHSs

	Year 1	Year 2	Year 3	Year 4	Year 5
Number of services (additional HMRs)*	2,892	2,892	2,892	2,892	2,892
Costs to the MBS**	$454,912	$454,912	$454,912	$454,912	$454,912

* The calculations are based on the number of regular clients attending ACCHSs with chronic disease who would have a HMR conducted based on the capacity of the integrated pharmacists to conduct HMRs, given the additional number conducted during the IPAC trial. This was derived by multiplying as the additional capacity from the program rollout (78/12.3) by the net increase in the number of HMRs during the intervention period (annualised), (see Appendix 12), which results in an expected increase of 2,892 HMRs per annum.

** The fee for the MBS item number 900 is $157.30 multiplied by the number of potential services over 12 months.

Financial Implications for Government Health Budgets

While the IPAC project did not monitor utilisation of health care and other services beyond its focus on primary medical services (including medications), the improvement in biomedical indices is expected to be associated with a reduction in the utilisation and corresponding costs of other government funded health services including emergency department presentations and hospital admissions.

For example, preliminary analysis of the outcomes of the Western Sydney integrated care program targeting patients with chronic disease, including people with type 2 diabetes, chronic obstructive pulmonary disease and coronary artery disease or congestive cardiac failure found statistically significant reductions as follows: 34% in the number of hospital admissions, 37% in potentially preventable hospitalisations; 32% in ED presentations; and 25% in unplanned admission length of stay.[43] While adopting different processes to achieve service improvement, the IPAC model shares the main objective of integrated care programs, namely to improve overall care for patients and achieve a better coordinated journey. An umbrella review of systematic reviews of integrated care programs found that more than half of reviews found a statistically significant improvement in at least one outcome measure, with improvements of the following order of magnitude: reductions in emergency admissions, 15-50%; all-cause readmissions, 10-30%; condition-specific readmissions, 15-50%; reported length of stay of 1 to 7 days; and lower emergency department presentations, 30-40%.[44]

Table 14 presents the financial implications for government budgets of extending the IPAC intervention to all ACCHSs, excluding the impact on the MBS and PBS (sections E1, E2 and E4).

Estimated reductions in the utilisation of hospital services from the improvement in biomedical indices achieved by the IPAC intervention were assumed to be 10%, 20% or 30%, based on findings of studies of the effectiveness of integrated care programs. These reductions were applied to estimates of the rate of hospital utilisation by the Aboriginal and Torres Strait Islander population for ACCHS clients, including hospital admissions for chronic disease (but excluding same day dialysis admissions for renal disease)[45] and emergency department presentations.[46] Costs per hospital admissions and emergency

department presentations were obtained from relevant unit costs extracted from the National Hospital Cost Data Collection Round 21 tables,[47] updated from 2016/2017 to 2018/2019 prices.[48]

The resultant impact for government budgets is a reduction in hospital costs of between $0.6 million and $1.9 million per annum, varying according to the decrease in utilisation achieved, with the majority of savings arising from fewer emergency department presentations.

Table 14. Financial implications for government budgets from a potential reduction in hospital costs

Items	Current utilisation of hospital services		Estimated reduction in utilisation of hospital services	
	(n)	($)	(n)	($)
ACCHS clients with chronic disease	11,000	-	-	-
ASSUMING A 10% REDUCTION				
Hospital admissions for chronic conditions	212[1]	1,189,101	21	118,910
ED presentations	7,394 [2]	5,146,224	739	514,622
Total	**-**	**6,335,325**	**-**	**633,532**
ASSUMING A 20% REDUCTION				
Hospital admissions for chronic conditions	212[1]	1,189,101	42	237,820
ED presentations	7,394 [2]	5,146,224	1,479	1,029,245
Total	**-**	**6,335,325**	**-**	**1,267,065**
ASSUMING A 30% REDUCTION				
Hospital admissions for chronic conditions	212[1]	1,189,101	64	356,730
ED presentations	7,394[2]	5,146,224	2,218	1,543,867
Total	**-**	**6,335,325**	**-**	**1,900,597**

[1] Estimates of the rate of hospital utilisation by the Indigenous Aboriginal and Torres Strait Islander Australian population applied to ACCHS clients reviewed by an integrated pharmacist, including hospital admissions for chronic disease (but excluding same day dialysis admissions for renal disease). [49]

[2] Estimates of the rate of emergency department presentations by the Indigenous Aboriginal and Torres Strait Islander Australian population applied to ACCHS clients reviewed by an integrated pharmacist.[50]

CONCLUSION

The economic analysis of the IPAC project included a cost-consequence analysis, a cost-effectiveness analysis and a cost-utility analysis.

In the cost-consequence analysis, the net costs of delivering the intervention of $1,493 per person was associated with statistically significant improvements in the following biomedical indices for participants with pre and post-intervention measures: glycated haemoglobin (HbA1c) (for participants with a clinical diagnosis of T2DM), diastolic blood pressure (DBP), total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), triglycerides (TG), cardiovascular risk 5-year risk (CVD 5-year risk) and estimated glomerular filtration rate (eGFR).

The cost-effectiveness analysis was undertaken for: (i) participants with a clinical diagnosis of T2DM with pre- and post-measures of HbA1c and (ii) participants selected for MAI assessments at baseline and at the end of the study, with potential prescribing omissions (PPO) used as the relevant outcome measure. For participants with a clinical diagnosis of T2DM, the ICER of the IPAC intervention versus no intervention was $3,769 per participant with a clinically meaningful reduction in HbA1c of at least 0.5%. In the case of the subset of participants selected for MAI assessments, the corresponding ICER was $6,809 per reduction in the number of participants with a PPO.

For participants with a clinical diagnosis of T2DM, and with pre and post-measures of HbA1c, a cost-utility analysis was conducted in which changes in HbA1c during the trial period were mapped to lifetime quality of life changes based on the findings of T2DM simulation models. The resultant ICER was $7,463 (95% CI $$6,030 –$9,664) per gain in quality adjusted life years (QALYs), assuming no lifetime costs additional to usual care were required to maintain the reduction in HbA1c. Based on commonly used reference ICERs for the Australian health system, this modelled ICER indicated good value for money.

Financial implications of implementing the IPAC intervention more widely within ACCHSs were also calculated. On an annual basis, implementing the extended IPAC intervention was estimated to cost $13.2 million. The corresponding annual increase in utilisation of medications and primary health care services associated with better medication management support and for more equitable use of health systems by the Aboriginal and Torres Strait Islander population was $5.1 million. However cost savings were also likely to be achieved from the improvement in health outcomes, for example, from a reduction in the utilisation and corresponding costs of emergency department presentations and hospital admissions. Under different scenarios, these cost savings were assessed as falling between $0.6 and $1.9 million per annum, varying according to the expected decrease in utilisation achieved.

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