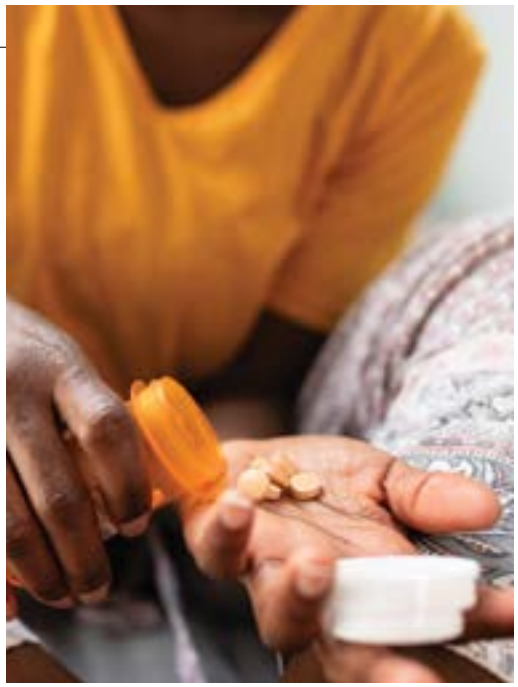

A study of a medication review service for Aboriginal and Torres Strait Islander people (*IMeRSe*) in Australia

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Background and objective
Aboriginal and Torres Strait Islander people can experience inequitable access to health services. This study assessed the effectiveness of a culturally responsive medication management service (referred to as *IMeRSe*).

Methods
This is a pre-post single-arm study involving Aboriginal and Torres Strait Islander health services and community pharmacies. Participants had a chronic condition, were pregnant or postpartum within 2 years. Pharmacists wrote a collaborative *Medicines Plan* and made recommendations to clinicians. The primary outcome was serious medication-related problems 6-months post-*IMeRSe*. Secondary outcomes included medication adherence.

Results
For 255 participants, mean serious medication-related problems reduced from 4.11 to 3.85 per 6 months at risk (incidence rate ratio, 0.93; 95% confidence interval, 0.86–1.01), although rates of potentially preventable medication-related hospitalisations remained similar. Significant improvements in medication adherence were observed. General practitioners accepted 709 of 762 pharmacist recommendations.

Discussion
A culturally responsive medication management service delivered by community pharmacists can contribute to reduced serious medication-related problems, improved medication adherence and consumer empowerment.

ABORIGINAL AND TORRES STRAIT ISLANDER HEALTH SERVICES provide strengths-based, integrated programs to improve health and wellbeing outcomes for Aboriginal and Torres Strait Islander people (hereafter, respectfully referred to collectively as Indigenous Australians; Appendix 1, available online only). However, access to culturally responsive health services, particularly medication management services, is not equitable.[1–3] The national network of >5700 community pharmacies (CPs) presents an opportunity to improve accessibility to medication management services for Indigenous Australians.

Australian pharmacist-led medication management services (MedsCheck/Diabetes MedsCheck and Home Medicines Review) are government funded to address medication safety (Appendix 1). Indigenous Australians who face greater chronic illness burdens than non-Indigenous Australians[4] and a range of medication-related problems (MRPs) could benefit substantially from these medication management services.[5] Despite evidence that medication-related harm can cause preventable hospitalisations,[6] barriers to medication management services for Indigenous Australians include cultural safety, geographical isolation, inflexible program rules and lower trust in non-Indigenous health services.[1–3] Strategies to alleviate barriers include involving Aboriginal health workers (AHWs)/other support people and/or interpreters to ensure cultural and language translation; pharmacist training and mentoring; and funding models that facilitate flexible service delivery, encourage interprofessional relationships and address local needs.[1–3]

A culturally responsive medication management review service (the *IMeRSe)*, delivered through community pharmacies and Aboriginal and Torres Strait Islander health services on a fee-for-service basis, was proposed to address barriers and improve access, using the existing pharmacist and AHW workforce, particularly in rural/remote regions. The aim of this study was to investigate the effectiveness of the *IMeRSe* service.

Methods

This pre-post single-arm study was conducted across nine Aboriginal and Torres Strait Islander health services and 23 associated community pharmacies from three urban, two rural and four remote locations in Queensland, New South Wales and the Northern Territory between June 2018 and October 2019 (Appendix 2, available online only). The study was prospectively registered with

the Australian and New Zealand Clinical Trials Registry (ACTRN12618000188235), the protocol was published,[7] and conduct and reporting were guided by the Consolidated Standards of Reporting Trials (CONSORT) statement.[8] Ethics approval was provided by seven organisations (Appendix 3, available online only). Aboriginal and Torres Strait Islander health service CEO/Directors and pharmacy owners/managers provided written informed consent for their service/pharmacy to participate in the study. Consumers also provided written informed consent to participate in the study.

Recruitment of study sites and consumer participants

Eligibility criteria for sites, which were identified in consultation with study partners, included capacity to participate in training and facilitate *IMeRSe* delivery, to share electronic health records and work collaboratively. Engagement visits were conducted to eligible Aboriginal and Torres Strait Islander health service sites from May to November 2018, meeting staff, Elders, community boards/councils and pharmacists, and seeking input into local implementation. Study Champions and Study Coordinators were nominated.

Pharmacists completed a cross-cultural training program to build confidence and cultural capability for working effectively with Indigenous people and the Aboriginal and Torres Strait Islander health service.[9] Key concepts introduced in an online module were re-inforced in a one-day interactive workshop and welcome/orientation sessions at local Aboriginal and Torres Strait Islander health services. Structured training was delivered to Aboriginal and Torres Strait Islander health service staff onsite regarding study processes. Pharmacists received ongoing support via webinars, with individual mentoring from a pharmacist mentor and a cultural mentor.[9] Teleconferences and mentoring by an Indigenous researcher supported study coordinators.

Indigenous consumers were recruited from 1 June 2018 to 31 July 2019. Eligible consumers were adults (aged ≥18 years); living in the community with at least one chronic condition, and/or pregnant, and/or within 2 years postpartum; at risk of MRPs; engaged with the Aboriginal and Torres Strait Islander health service (three or more times in the last 2 years) and one of the associated pharmacies. Exclusion criterion was receiving a medication review (MedsCheck/Home Medicines Review [HMR]) within the previous 12 months.

IMeRSe process

This six-step, collaborative, medication management service involved consumer participants (and family members), pharmacists, AHWs and general practitioners (GPs), with follow-up(s) as required over 6 months (Box 1). The six steps comprised: (i) consumer recruitment and consent; (ii) collection of participant baseline data and referral for *Medicines Talk;* (iii) *Medicines Talk* with participant, pharmacist and AHW/support person; (iv) completion of *Medicines Report* by a pharmacist via an online system and GP notification; (v) GP response to pharmacist recommendations and completion of *My Medicines Plan* with the consumer and/or AHW*;* and (vi) structured clinical follow-up(s) and monitoring by a pharmacist with the participant and AHW/support person as required.

Outcome data were collected at baseline and at 6 months' follow-up. All clinical data related to *IMeRSe* (eg *Medicines Talks*, *Medicines Reports*) were collected in a purpose-built module within the cloud-based pharmacy software platform GuildCare NG™ (GuildLink Pty Ltd, Melbourne, Vic, Australia).

Box 1. Overview of the six-step *IMeRSe* service

Step one: Consumer recruitment and informed consent

- Study coordinators, Aboriginal and Torres Strait Islander health service and CP staff identified consumers who were at risk of an MRP opportunistically or via targeted strategies.
- Opportunistic recruitment occurred during scheduled/unscheduled appointments, at specialist clinics, outreach visits, community barbeques, when dispensing medication, and self-referral.
- Targeted identification occurred through review of clinical databases, participants accessing other services (eg dose administration aids, exercise programs) and via recall lists.
- Coordinators screened participants for eligibility, explained study processes, obtained consent to participate and to access Aboriginal and Torres Strait Islander health service, CP and hospital records.
- Separate consent was obtained to access health resource use data (eg from Medicare Benefits Schedule, Pharmaceutical Benefits Scheme and pathology).
- Participants' GPs were notified when their patients were enrolled and again when the *Medicines Report*, prepared by the CPT, was ready for review.

Step two: Referral, information exchange and appointments

- The coordinator documented baseline information including demographics, medication-related beliefs and adherence, psychological wellbeing and empowerment.
- The coordinator booked appointments with the CPT to conduct *Medicines Talks*, provided health summaries to the CPT and facilitated further information exchange as required.

Step three: *Medicines Talk* (Tier 1)

- *Medicines Talks* began as initial conversations between participants and CPTs, and Aboriginal and Torres Strait Islander health service staff/other support person(s) according to participant preference, at a mutually agreed location (eg Aboriginal and Torres Strait Islander health service, community centre, CP or other culturally safe location).
- The *Medicines Talk* aimed to establish and/or strengthen relationships using the Stay Strong Plan and to conduct a conversational review of medication(s), medication-related beliefs and adherence.[18,19]
- The Stay Strong Plan was developed for Indigenous Australians as a holistic, strengths-based tool that positions health workers and patients as collaborative partners by integrating the principles of therapeutic problem-solving, motivational interviewing and goal setting. It induced confidence in CPTs to explore participants' family connections, strengths, worries and health-related goals.[18,19] Each party had the opportunity to share and learn from each other; selected problems were resolved through explanation/education.

Box continues on the next page.

Box 1. Overview of the six-step *IMeRSe* service (cont'd)

Step four: *Medicines Report*

- CPTs recorded key information from the *Medicines Talk* in a secure, online, shared record (GuildCare NG™) and submitted *Medicines Reports* as a series of recommendations to participants' GPs for review.
- Automatic emails alerted GPs that a *Medicines Report* was completed. CPTs consulted with coordinators and Aboriginal and Torres Strait Islander health service staff as needed.

Step five: *My Medicines Plan*

- GPs reviewed and selected one of three options for each recommendation made by the pharmacist: (i) accepted; (ii) declined; or (iii) amended recommendations online/or in hardcopy.[A] This informed the *My Medicines Plan* prepared in collaboration with the participant and/or Aboriginal and Torres Strait Islander health service staff.
- The *Medicines Plan* was to be provided to the participant in printed format and filed in their health record.

Step six: Structured follow-up and monitoring over the next 6 months (Tier 2)

- This final step included actions agreed on by the participant, CPT and GP in the *My Medicines Plan*, and additional CPT follow-up and monitoring as required.
- Examples included: face-to-face meetings in the CP, Aboriginal and Torres Strait Islander health service or at home (participant preference); and via telephone.
- CPTs recorded follow-ups online via the GuildCare NG™ software and updated the *Medicines Report* with new recommendations, which treating GPs could incorporate into an updated *My Medicines Plan*.

[A]*Medicines Plans* were intended to be completed in the GuildCare NG™ software; however, internet and IT issues in some settings meant that paper-based recording was also used.

CP, community pharmacy; CPT, community pharmacist; GP, general practitioner; MRP, medication-related problem.

Data included pharmacist-identified MRPs and recommendations, GP acceptance/amendments of recommendations and actions documented in *Medicines Plans*. Potential severity of pharmacist-identified MRPs was classified post-hoc by an independent assessor (experienced pharmacist accredited to conduct HMRs) using the validated Australian DOCUMENT framework.[10]

Outcomes

The primary outcome was the difference in cumulative incidence of serious MRPs in the 6 months before and after *IMeRSe* introduction. Serious MRPs were refined from existing literature[11] by a Clinical Validation Group (CVG) of 13 clinical experts[12–14] (Appendix 4, available online only). A serious MRP was defined as meeting the criteria of suboptimal patterns of care with/without causing a hospitalisation. Serious MRPs were identified from administrative data records (linked PBS and MBS data [Approval for Medicare Benefits Schedule [MBS] and Pharmaceutical Benefit Schedule [PBS] data was provided by the Services Australia External Request Evaluation Committee [EREC] of Australian Government [Ref: M19435; 20.04.18]]; Appendix 1).

Secondary outcomes were: potentially preventable medication-related hospitalisations (PPMRH), the subset of MRPs for which a hospitalisation is realised; medication adherence assessed using the Reported Adherence to Medication scale (RAM),[15] Medication Possession Ratio (MPR)[15] and Proportion of Days Covered (PDC)[16] (Appendix 5, available online only); psychological and social empowerment (Growth and Empowerment Measure [GEM][17]); psychological distress (Kessler Psychological Distress score [K10][18]); beliefs about medicines (Beliefs about Medicines Questionnaire-specific scale [BMQ][15]); treatment satisfaction and confidence (Treatment Satisfaction Questionnaire for Medication [TSQM][19]); self-reported general health (Likert scale); classification of all MRPs (type and severity); and incidence of PPMRHs (Appendix 4). A medication adherence package (Medadhere) was used to estimate MPR and PDC; objective adherence measures using administrative data (PBS; Appendix 5).

Acceptability outcomes were: recruitment, drop-out and follow-up rates, and participant satisfaction with *IMeRSe*.

Statistical analysis

Sample size calculations were based on the primary outcome and assumed the serious MRP rate would decrease by 30% from 0.07 per person to 0.049 per person per 6 months, and with a standard deviation in the difference in serious MRPs of 0.14 (power=80%; α=0.05). With scant evidence from the literature available, our study sample size calculations were based on a previous study of HMR, which found a mean±standard deviation (SD) of 3.5±1.8 drug-related problems per patient reviewed.[20] Given we did not know the comparability of our participants, we assumed 30% would have a mean of 3.5 problems and 70% a mean of 1.7 problems (1 SD lower), and that 3% would be considered serious MRPs.[19] The assumption based on these calculations was that mean serious MRPs at baseline would be 0.07 per person. The 30% reduction in this rate was assumed based on clinical experience. Consequently, 6-month data were needed for 351 participants. Assuming 25% attrition, the recruitment target was 540.[7]

The primary outcome (serious MRPs) was analysed using a mixed-effects Poisson regression model. Time (pre/post) was entered as a fixed effect and participant as a random effect. The model was offset by the natural logarithm for each participant's follow-up time, as some participants did not have full 6-month follow-up data. Effect estimates are reported as incidence rate ratios and 95% confidence intervals (CI). Secondary outcomes were compared between pre- and post-*IMeRSe* periods, using paired t-tests for continuous variables and McNemar's test for paired nominal data. Data were analysed using Stata v13.0 (StataCorp, College Station, TX, USA). Statistical significance was $P<0.05$, with no adjustment for multiple comparisions.

The authors had full access to the data and analysis for this study. The data that support the findings of this study are available on request from the corresponding author, but restrictions apply to the availability of these data, which are not publicly available.

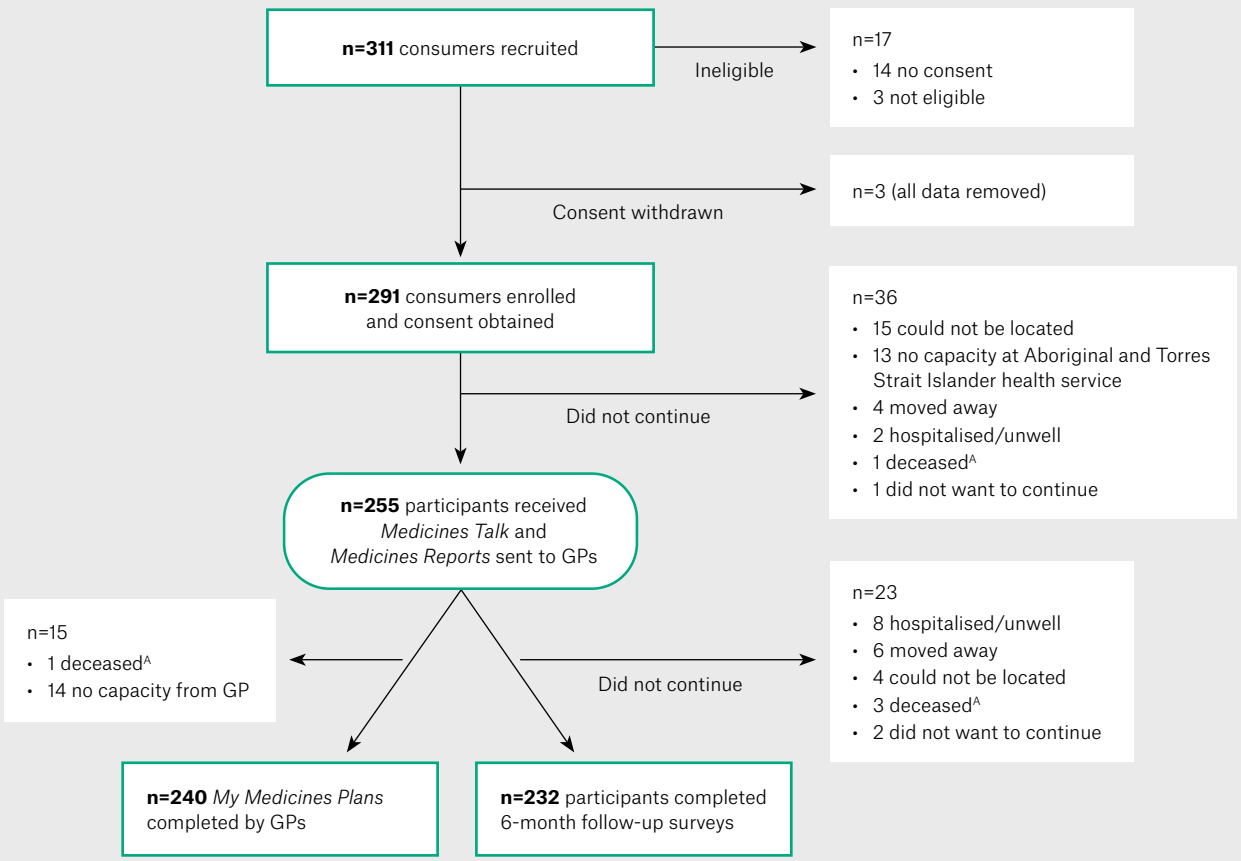
Results

Of the 311 consumers recruited, 291 were eligible and provided consent (Box 2). They were prescribed a median of seven (range 1–27) medications to treat a median of six (range 1–17) current health conditions, most commonly hypertension (77.3%), high cholesterol (76.3%) and diabetes (64.6%) (Table 1). The proportion of the *IMeRSe* cohort with major chronic health conditions was similar or higher than the general Indigenous population (Appendix 6, available online only), with heart disease, diabetes, kidney disease and stroke overrepresented.

Overall, 255 (87.6%) completed a *Medicines Talk* with their pharmacist and had a *Medicines Report* provided to the Aboriginal and Torres Strait Islander health service and GP. Further, GPs finalised 240 (94.1%) management plans based on these reports. *Medicines Talks* took an average of 54.5 minutes; 54.1% occurred at the Aboriginal and Torres Strait Islander health service, 22.0% in CPs, 12.2% at community facilities and 11.8% in participants' homes, with AHWs attending 49.0%. During *Medicines Talks*, pharmacists reviewed 2171 medicines (prescription n=2065; over-the-counter n=58; complementary n=38; bush medicines n=10) and identified 762 MRPs (range 0–10). Most MRPs related to undertreatment (24.8%), adherence issues (20.7%), education/information needs (12.3%), monitoring (12.2%) and drug selection issues (10.9%) (Appendix 7, available online only). Three MRPs were classified as high severity. Pharmacist recommendations mostly suggested review of/change in pharmacotherapy (44.4%; Appendix 7). GPs responded to 709 of 762 pharmacist recommendations, accepting 84.1%. Following *Medicines Talks*, 77 participants had 150 follow-up consultations.

For 207 (84.2%) participants with matched MBS/PBS data, mean (SD) incidence rate of serious MRPs per 6-months at risk reduced from 4.11 to 3.85 from pre- to post-*IMeRSe* (incidence rate-ratio [IRR]=0.93; 95% CI: 0.86–1.01; *P*=0.09; Table 2). Rate of PPMRHs pre- and post-*IMeRSe* was very similar (IRR=1.00; 95%CI 0.55–1.83; Table 2).

Positive differences between pre- and post-*IMeRSe* phases were found for participants' concerns about their medicines (Beliefs about medicines questionnaire [BMQ]-concern scale); however, baseline beliefs about medicine necessity scores remained high (Table 3), indicating that participants believed that medicines



Box 2. Overview of study enrolment, service delivery and follow-up.

[A]Not related to the *IMeRSe* service.

GP, general practitioner.

Table 1. Consumer participant characteristics at baseline (n=291)

Characteristic	Total n=291 n (%)	*Medicines Talk* n=255 n (%)	No intervention n=36 n (%)	*P* value[A]
Age (years)				**0.51**
<45	24 (8.3)	21 (8.2)	3 (8.3)	
45–54	65 (22.3)	58 (22.8)	7 (19.4)	
55–64	95 (32.7)	83 (32.6)	12 (33.3)	
65–74	79 (27.2)	66 (25.9)	13 (36.1)	
≥75	28 (9.6)	27 (10.6)	1 (2.8)	
Mean (SD)	59.9 (11.6)	60.0 (11.7)	58.7 (11.1)	0.52
Gender				**0.15**
Male	104 (35.7)	95 (37.3)	9 (25.0)	
Female	187 (64.3)	160 (62.8)	27 (75.0)	
Cultural identity				
Aboriginal	267 (97.5)	236 (97.1)	31	
Torres Strait Islander	2 (0.7)	2 (0.8)	Nil	
Both	5 (1.8)	5 (2.1)	Nil	
Location				**0.02**
Urban	74 (25.4)	59 (23.1)	15 (41.7)	
Rural	74 (25.4)	70 (27.5)	4 (11.1)	
Remote	143 (49.1)	126 (49.4)	17 (47.2)	

Table continued on the next page.

were necessary for their health and wellbeing, and this did not really change post-*IMeRSe*. Self-reported medication adherence improved significantly (RAM scores, Table 3) as did objective adherence assessment (Appendix 5) and treatment satisfaction (TSQM scores, Table 3). Medication adherence, measured using the medication possession ratio (Appendix 5), increased significantly from median 0.83 (IQR 0.59, 0.99) to 0.92 (0.62, 1.02) (P=0.03).

Participants rated their general health better post-*IMeRSe* (P=0.019, Wilcoxon signed-rank test; Appendix 8, available online only). High participant satisfaction for *IMeRSe* was reported; increased confidence and motivation to manage health and medication-related issues, and greater access to medicines via pharmacies (Figure 1; Appendix 8).

Discussion

In this study, where community pharmacists worked with Aboriginal and Torres Strait Islander health service staff to deliver essential elements of a medication review as a culturally responsive service across diverse models of care and Australian Indigenous communities, the *IMeRSe* service was associated with decreased incidence of serious MRPs (modelled rate) by 7% at 6 months. The observed 7% reduction was lower than the anticipated reduction of 30% used in sample size calculations, and reduced participant recruitment potentially impacted study power. However, the observed baseline rate of serious MRPs (4.11 per 6-month period) was more than five-fold greater than anticipated (0.07 per 6-month period), suggesting that even a small relative reduction could lead to a clinically important absolute decrease of serious MRPs. Significant improvements observed in medication adherence (objective and subjective), concerns about medicines, treatment satisfaction and overall empowerment and wellbeing, point to longer-term health outcomes not captured within the 6-month observation period.

Other research has found that collaboration between GPs and pharmacists is significantly related to the implementation rate of medication review recommendations.[21] *IMeRSe* facilitated a team-based approach between pharmacists and Aboriginal and Torres Strait Islander health service staff including GPs. Responsive GP input to reviewing pharmacists' recommendations (94% of *Medicines Reports* reviewed

Table 1. Consumer participant characteristics at baseline (n=291) (cont'd)

Characteristic	Total n=291 n (%)	*Medicines Talk* n=255 n (%)	No intervention n=36 n (%)	*P* value[A]
Years with the Aboriginal and Torres Strait Islander health service				**1.00**
<5	39 (18.2)	35 (18.3)	4 (17.4)	
≥5	175 (81.8)	156 (81.7)	19 (82.6)	
Self-reported general health				**0.68**
Excellent	11 (4.0)	10 (4.1)	1 (3.2)	
Very good	47 (17.2)	44 (18.1)	3 (9.7)	
Good	126 (46.0)	112 (46.1)	14 (45.2)	
Fair	69 (25.2)	59 (24.3)	10 (32.3)	
Poor	21 (7.7)	18 (7.4)	3 (9.7)	
Number of health conditions, median (IQR)	**6 (4)**	**6 (4)**	**6 (4)**	**0.60[B]**
Diabetes[C]	188 (64.6)	165 (64.7)	23 (63.9)	0.92
High cholesterol	222 (76.3)	194 (76.1)	28 (77.8)	0.82
Hypertension	225 (77.3)	194 (76.1)	31 (86.1)	0.18
Ischaemic heart disease[D]	82 (28.2)	72 (28.2)	10 (27.8)	0.95
Kidney disease	68 (23.4)	55 (21.6)	13 (36.1)	0.05
Asthma	65 (22.3)	56 (22.0)	9 (25.0)	0.68
Mental and behavioural problems	90 (30.9)	80 (31.4)	10 (27.8)	0.66
Number of medications, median (IQR)	**7 (6)**	**7 (6)**	**6.5 (7)**	**0.27[B]**

Note: Missing observations per characteristic: cultural identity, n=17; years with the Aboriginal and Torres Strait Islander health service, n=77; self-reported general health, n=17.

[A]Pearson's chi-square test or Fisher's exact test was used for categorical variables; one-way analysis of variance was used for continuous variable.

[B]Two-sample Wilcoxon rank-sum test.

[C]Including type 1, type 2, unknown and gestational diabetes; the majority (94.2%) were type 2 diabetes.

[D]Angina, heart attack and other ischaemic heart disease.

IQR, interquartile range; SD, standard deviation.

Table 2. Incidence rate-ratio for serious medication-related problems and potentially preventable medication-related hospitalisations

Outcome	n[A]	N pre	N post	Pre-rate (95% CI)	Post-rate (95% CI)	Incidence rate-ratio (95% CI)	*P* value
Serious MRPs	207	1267	1184	4.11 (3.14–5.39)	3.85 (2.94–5.04)	0.93 (0.86–1.01)	0.09
PPMRHs	207	21	21	0.06 (0.02–0.15)	0.06 (0.02–0.15)	1.00 (0.55–1.83)	1.00

Note: The rate is reported as the rate per person per 6 months; pre- and post-rates and the incidence rate-ratio are estimated using a mixed-effects Poisson model. The primary outcome, serious MRPs, is significant at the *P*<0.10 level.

[A]Number of participants with available Medicare Benefits Schedule and Pharmaceutical Benefits Scheme data for analysis.

CI, confidence interval; MRP, medication-related problem; PPMRH, potentially preventable medication-related hospitalisations.

with 84% recommendations accepted), particularly the 46% rated by the independent assessor as moderate severity and requiring GP treatment, were critical to improving participants' health outcomes. The high level of engagement and collaboration observed in *IMeRSe* might be because of: team-based care being usual practice for GPs working in Aboriginal Health Services; and that working with local community pharmacists in the study who had pre-existing relationships with the consumer participants, GPs and AHWs promoted confidence in the medication review recommendations.

The flexibility of *IMeRSe* emphasised cultural safety with participant choice for location of *Medicines Talks* and AHW involvement. Most chose the Aboriginal and Torres Strait Islander health service for their appointment and approximately half chose to have an AHW alongside, re-inforcing the

Table 3. Secondary outcomes (self-reported survey data)

	n[A]	Pre-score mean (SD)	Post-score mean (SD)	Mean difference (95% CI)	*P* value
BMQ[B]					
BMQ-necessity	215	20.68 (3.62)	20.56 (3.57)	0.12 (−0.40 to 0.65)	0.65
BMQ-concern	213	13.80 (4.54)	13.00 (3.79)	0.80 (0.18–1.42)	0.01
Adherence (RAM)[C]	215	15.27 (3.29)	15.84 (3.09)	−0.57 (−1.04 to −0.09)	0.02
TSQM[D]					
Effectiveness	220	80.51 (20.70)	86.74 (15.93)	−6.24 (−9.24 to −3.23)	<0.001
Side effects	10	81.88 (28.02)	75.63 (31.52)	6.25 (−21.23 to 33.73)	0.620
Convenience	220	82.88 (22.76)	89.72 (15.18)	−6.84 (−9.73 to −3.96)	<0.001
Global satisfaction	220	110.44 (30.50)	118.87 (20.28)	−8.43 (−12.48 to −4.38)	<0.001
GEM[E]					
GEM total score	96	88.83 (16.93)	92.96 (16.22)	−4.13 (−7.19 to −1.06)	0.009
Inner peace	96	31.50 (6.41)	33.03 (6.09)	−1.53 (−2.82 to −0.24)	0.020
Self-capacity	96	20.10 (4.35)	21.04 (4.22)	−0.94 (−1.82 to −0.05)	0.040
Healing and growth	96	21.33 (5.72)	22.61 (4.81)	−1.28 (−2.39 to −0.17)	0.020
Connection and purpose	96	11.57 (2.73)	11.95 (2.56)	−0.38 (−0.95 to 0.20)	0.200
Psychological distress (K10)[F]					
K10 total score	94	19.04 (9.01)	17.80 (7.95)	1.24 (−0.47 to 2.96)	0.15
K10 distress		Pre n (%)	Post n (%)		0.29
Low (10–15)		38/94 (40.04)	41/94 (43.60)		
Moderate (16–21)		25/94 (26.60)	28/94 (29.80)		
High (22–29)		16/94 (17.00)	14/94 (14.90)		
Very high (30–35)		15/94 (16.00)	11/94 (11.70)		

[A]Number of participants with completed paired baseline and follow-up survey.

[B]Higher scores on specific-necessity scale indicate stronger beliefs that medicines are important to improve/maintain health and higher scores on specific concerns scale indicate higher concerns about taking medicines to maintain health.

[C]Higher scores indicate greater medication adherence.

[D]Higher scores indicate a higher level of treatment satisfaction.

[E]Higher scores indicate higher levels of empowerment (inner peace subscale items: EES 2 3 4 10 11 12 13 14; Self-capacity subscale items: EES 5 6 7 8 9; Healing and growth subscale items: scenarios 1 2 5 6; Connection and purpose subscale items: scenarios 3 4).

[F]Lower scores indicate lower levels of psychological distress.

BMQ, Beliefs about Medicines Questionnaire; CI, confidence interval; EES, Emotional Empowerment Scale; GEM, Growth and Empowerment Measure; K10, Kessler psychological distress scale; RAM, Reported Adherence to Medication scale; SD, standard deviation; TSQM, Treatment Satisfaction Questionnaire for Medication.

importance of trusting relationships and removing access barriers.

Another essential element supporting integrated *IMeRSe* delivery included secure transfer of health information between Aboriginal and Torres Strait Islander health service and CP staff via the GuildCare NG platform, although some Aboriginal and Torres Strait Islander health services preferred more traditional technologies (eg faxing).

Findings of the qualitative elements (participant and health practitioner experiences) and health expenditure will be published separately.

Key study strengths included use of administrative data to provide objective measures of medication safety (eg serious MRPs and PPMRHs) and triangulation of key outcomes and associated correlations (eg medication adherence/beliefs about medicines/treatment satisfaction). Limitations related to study design include the inability to attribute causal effects of the intervention; a quasi-experimental design compared outcomes observed pre- and post-*IMeRSe*. Selection bias might have been introduced by limitations related to study scope including site/consumer recruitment and research burden. Site recruitment was potentially limited by requirements for a minimum level of Aboriginal and Torres Strait Islander health service and pharmacy capacity to deliver *IMeRSe*, when local needs necessitated prioritisation of other activities, and concurrent recruitment to another Aboriginal and Torres Strait Islander health service-pharmacist trial. Restricted study timelines and research burden limited consumer recruitment, which potentially impacted study power.

Conclusion

This study demonstrates that a culturally responsive medication management service delivered by community pharmacists working with Aboriginal and Torres Strait Islander health service staff might reduce the incidence of serious MRPs and improve consumer health, medication use and wellbeing. *IMeRSe* addressed established barriers to existing medication review programs with existing workforce and minimal changes to workflows to facilitate more equitable access for Indigenous Australians. GPs could consider including pharmacists regularly in team-based care

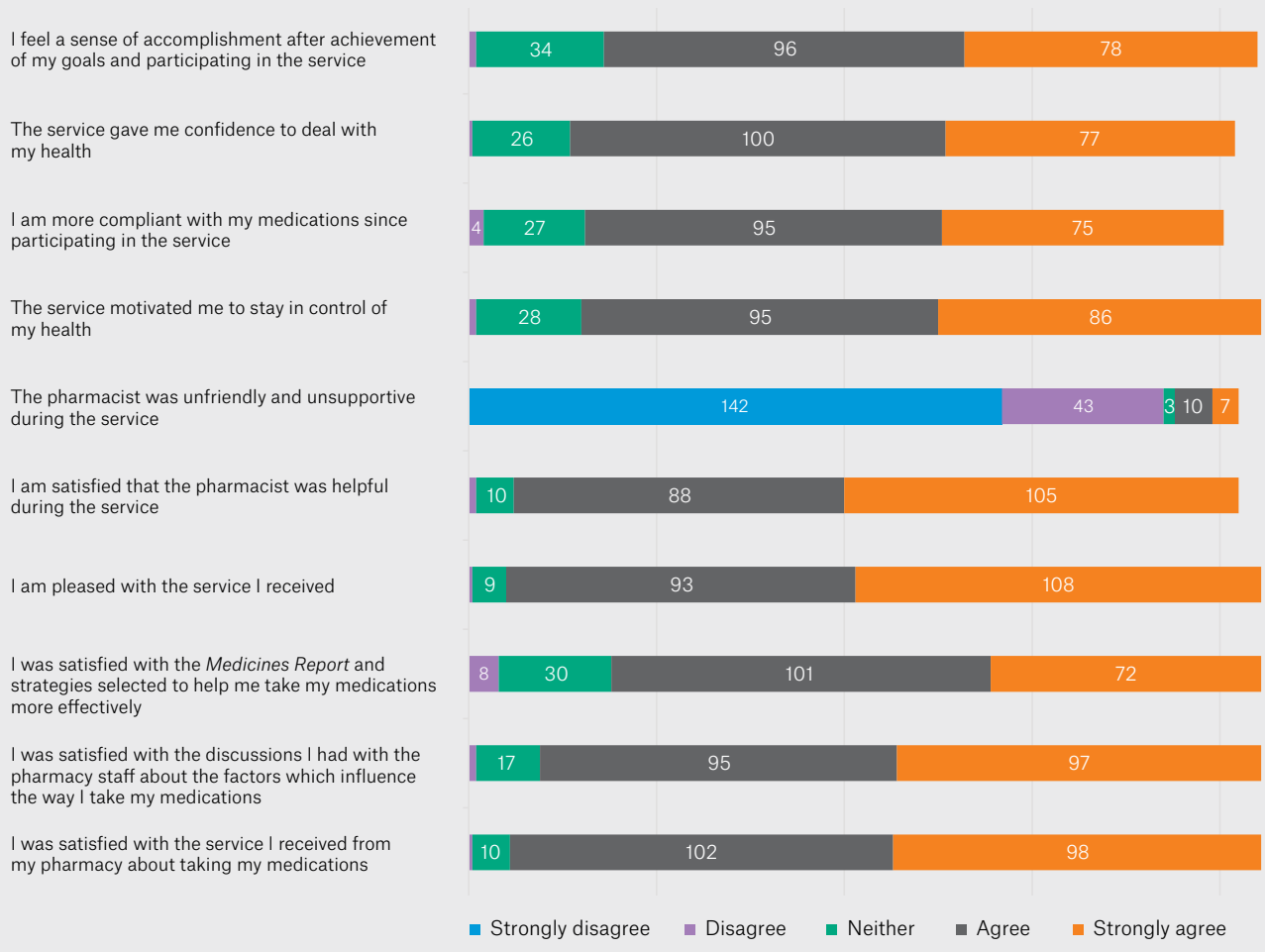


Figure 1. Participant satisfaction with the *IMeRSe* service.

such as in case conferences and using local community pharmacists to conduct culturally responsive medication reviews, which show promising engagement and outcomes for underserved populations.

Authors

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References

1. Madden A. HMRs with Indigenous communities – challenges and rewards. Australian Pharmacist 2011;30(11):911–15.
2. Stoneman J, Taylor SJ. Pharmacists' views on Indigenous health: Is there more that can be done? Rural Remote Health 2007;7(3):743. doi: 10.22605/RRH743.
3. Swain LS, Barclay L. Exploration of Aboriginal and Torres Strait Islander perspectives of Home Medicines Review. Rural Remote Health 2015;15:3009. doi: 10.22605/RRH3009.
4. Australian Government, Australian Institute of Health and Welfare (AIHW). Australia burden of disease study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2018. AIHW, 2022. Available at www.aihw.gov.au/reports/burden-of-disease/illness-death-indigenous-2018/summary [Accessed 20 December 2023].
5. Australian Government Department of Health. National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Australian Government, 2013. Available at www.health.gov.au/resources/publications/national-aboriginal-and-torres-strait-islander-health-plan-2013-2023?language=en [Accessed 20 December 2023].
6. Spinks J, Mihala G, Jennings W, et al. Potentially preventable medication-related hospitalisations with cardiovascular disease of Aboriginal and Torres Strait Islander people, Queensland, 2013-2017: A retrospective cohort study. Med J Aust 2025;222(4):198–204. doi: 10.5694/mja2.52600.
7. Wheeler AJ, Spinks J, Kelly F, et al. Protocol for a feasibility study of an Indigenous Medication Review Service (IMeRSe) in Australia. BMJ Open 2018;8(11):e026462–74. doi: 10.1136/bmjopen-2018-026462.
8. Lancaster GA, Thabane L. Guidelines for reporting non-randomised pilot and feasibility studies. Pilot Feasibility Stud 2019;5(1):114. doi: 10.1186/s40814-019-0499-1.
9. Wheeler AJ, Hu J, Tadakamadla SK, Hall K, Miller A, Kelly F. Development and feasibility testing of a training programme for community pharmacists to deliver a culturally responsive medication review intervention. Pilot Feasibility Stud 2022;8(1):51. doi: 10.1186/s40814-022-01006-2.
10. Williams M, Peterson GM, Tenni PC, Bindoff IK, Stafford AC. DOCUMENT: A system for classifying drug-related problems in community pharmacy. Int J Clin Pharm 2012;34(1):43–52. doi: 10.1007/s11096-011-9583-1.
11. Kalisch LM, Caughey GE, Barratt JD, et al. Prevalence of preventable medication-related hospitalizations in Australia: An opportunity to reduce harm. Int J Qual Health Care 2012;24(3):239–49. doi: 10.1093/intqhc/mzs015.
12. Caughey GE, Kalisch Ellett LM, Wong TY. Development of evidence-based Australian medication-related indicators of potentially preventable hospitalisations: A modified RAND appropriateness method. BMJ Open 2014;4(4):e004625. doi: 10.1136/bmjopen-2013-004625.
13. Linstone H, Turoff M. The Delphi Method: Techniques and applications. 2nd edn. Addison-Wesley Publishing Company, 2002.
14. Spinks JM, Kalisch Ellett LM, Spurling G, Theodoros T, Williamson D, Wheeler AJ. Adaptation of potentially preventable medication-related hospitalisation indicators for Indigenous populations in Australia using a modified Delphi technique. BMJ Open 2019;9(11):e031369. doi:10.1136/bmjopen-2019-031369.
15. Horne R, Weiman J, Hankins M. The beliefs about medicines questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication. Psychol Health 1999;14(1):1–24. doi:10.1080/08870449908407311.
16. Raebel MA, Schmittdiel J, Karter AJ, Konieczny JL, Steiner JF. Standardizing terminology and definitions of medication adherence and persistence in research employing electronic databases. Med Care 2013;51(8) Suppl 3:S11–21. doi: 10.1097/MLR.0b013e31829b1d2a.
17. Haswell MR, Kavanagh D, Tsey K, et al. Psychometric validation of the Growth and Empowerment Measure (GEM) applied with Indigenous Australians. Aust N Z J Psychiatry 2010;44(9):791–99. doi: 10.3109/00048674.2010.482919.
18. Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychol Med 2002;32(6):959–76. doi: 10.1017/S0033291702006074.
19. Atkinson MJ, Sinha A, Hass SL, et al. Validation of a general measure of treatment satisfaction, the Treatment Satisfaction Questionnaire for Medication (TSQM), using a national panel study of chronic disease. Health Qual Life Outcomes 2004;2(1):12. doi: 10.1186/1477-7525-2-12.
20. Curtain C, Bindoff I, Westbury J, Peterson G. An investigation into drug-related problems identifiable by commercial medication review software. Australas Med J 2013;6(4):183–88. doi: 10.4066/AMJ.2013.1637.
21. Kwint HF, Bermingham L, Faber A, Gussekloo J, Bouvy ML. The relationship between the extent of collaboration of general practitioners and pharmacists and the implementation of recommendations arising from medication review: A systematic review. Drugs Aging 2013;30(2):91–102. doi: 10.1007/s40266-012-0048-6.

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