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Quantifying the economic benefit of the personal alarm and emergency response system in Australia: a cost analysis of the reduction in ambulance attendances
SUPPLEMENTARY MATERIAL

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Supplementary Material 1. Description of MePACS

MePACS, originally called the Mt Eliza Personal Alarm Care Service, is a personal alarm and emergency response service designed to support frail older people and people with disabilities who are living alone to reside in the community for longer than would otherwise be possible (see <https://mepacs.com.au/>, accessed 31 January 2019).

The service is the sole provider of personal alarms for the Personal Alert Victoria (PAV) program, for which strict eligibility criteria apply. The Victorian Department of Health and Human Services (DHHS) funds the PAV program. Victoria is the second most populous and most densely populated state in Australia, containing over four million people, approximately 70% of whom reside in the capital city of Melbourne. The Victorian government funds approximately 29 000 MePACS clients at any one time from metropolitan and rural areas throughout the state. However, those who are not eligible for the PAV program (e.g. do not live in Victoria or do not meet the assessment criteria) can still use the service as a private client.

The service provides an emergency response when activated by the client, as well as a daily welfare check to clients who do not push the daily call button on their alarm between 6:00am and 11:00am each morning. When the emergency button is pressed, the PAV service provider is automatically contacted, after which they immediately telephone the client and appropriate action is taken. Following alarm activation, possible outcomes include telephone support, calling a nominated contact person (usually a family member or friend), calling a nominated PAV response service (for clients who do not have an appropriate contact person available) or calling an ambulance. As part of the response process, clients are asked about the reason for their emergency activation and what the outcome of the event was, such as whether they were admitted to hospital or required an ambulance call-out.



Table S1. Eligibility criteria for funding under the Personal Alarms Victoria program

To be eligible for funding, individuals must meet the criteria in both Parts A and B

	Eligibility criteria
Part A: all criteria must be met	<ol style="list-style-type: none"> 1. Agree to daily monitoring 2. Are capable of using and willing to wear the MePACS pendant at all times 3. Live alone, or are alone for most of the day or evening, or live with a person who cannot get to the telephone in an emergency or who is unable to use the telephone
Part B: at least two criteria must be met	<ol style="list-style-type: none"> 1. Fallen at least once and needed medical attention in the past 6 months 2. Having a major medical condition or chronic condition that puts them at risk of medical emergencies or has some ongoing effect on health or well-being 3. Taking six or more different medications permanently prescribed by a medical practitioner or doctor

Supplementary Material 2. Costing data

The annual overall MePACS operation cost, inclusive of labour (training staff, salary for operators, information technology (IT) and others), consumables and repair services, was calculated for existing MePACS clients in the financial year 2016–17. Direct costs (i.e. the operation cost of MePACS and the health service cost related to ambulance costs associated with MePACS clients) were used. The total operation cost of the study sample was calculated from the sum of fees for the labour, repair services for all the faulty alarm units and other consumables. The fees for the labour included the salary of administration, accounting, client services, help desk, IT support, general management, monitoring and workshops. Because the government funded most of the MePACS services for PAV clients in lump sums, the marketing or sales costs were not included in this calculation. The mean operation cost was calculated as A\$181.5 per person. Indirect costs, such as the lost productivity of the contact persons measured in lost income from wages, were not considered in the model, nor were health service costs beyond those attributed to ambulance attendances. Ambulance fees were calculated based on the mean metropolitan and regional call-out charges for the financial year 2016–17¹⁹ based on the client's region of residence. The metropolitan emergency road costs were A\$1234 per incidence, whereas regional and rural emergency road charges were A\$1820. Treatment at the scene without transport was charged at a lower rate of A\$532.19.

Table S2. Classification of variables

ABS, Australian Bureau of Statistics; IRSAD, Index of Relative Social Advantage and Disadvantage

Variable	Definition	Classification
Age	Age at 1 June 2016	Categories: young (<65 years), young-old (65–74 years), middle-



Socioeconomic advantage	Calculated based on the suburb of residence using the IRSAD quintiles obtained from the ABS ³⁰	old (75–84 years) and oldest-old (≥85 years) ² Five quintiles
Rurality	Based on health service region ³¹	‘Metropolitan’ and ‘regional/rural’
Living arrangement	Dichotomised	‘Living alone’ and ‘not living alone’
Country of origin	Dichotomised	‘Australia’ and ‘others’
Native language	Dichotomised	‘English’ and ‘not English’

References

- <ref>1 **Victoria State Government**. Personal Alert Victoria – assessment and eligibility. 2018. Available at: <https://www2.health.vic.gov.au/ageing-and-aged-care/supporting-independent-living/personal-alert-victoria/pav-assessment-eligibility> [verified 20 August 2020].</ref>
- <jrn>2 **Zizza CA, Ellison KJ, Wernette CM**. Total water intakes of community-living middle-old and oldest-old adults. *J Gerontol A Biol Sci Med Sci* 2009; 64: 481–6.</jrn>
- <other>3 **Ambulance Performance and Policy Consultative Committee**. Working with paramedics to end the ambulance crisis. Interim report. 2015. Available at <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjxkp3e-JTrAhUQzTgGHeIHDYYQFjAAegQIAxAB&url=https%3A%2F%2Fwww2.health.vic.gov.au%2FApi%2Fdownloadmedia%2F%257B61008B3B-C71F-4062-8ABD-379DC940C8F2%257D&usg=AOvVaw1-C5hYpsw0rmO5QTGPMF70> [verified 12 August 2020].</other>
- <other>4 **Ambulance Victoria**. Ambulance Victoria 2016–2017 annual report. 2017. Available at: <https://www.ambulance.vic.gov.au/wp-content/uploads/2017/10/ambulance-victoria-annual-report-2016-2017.pdf> [verified 12 August 2020].</other>
- <ref>5 **Department of Research and Evaluation, Ambulance Victoria**. Delivering our patients the right care, at the right time, at the right place. Revised clinical response model evaluation report June 2017. 2017 Available at: <https://www.ambulance.vic.gov.au/wp-content/uploads/2017/06/av-revised-clinical-response-model-evaluation-report.pdf> [verified 20 August 2020].</ref>
- <other>6 **Productivity Commission**. Ambulance services, report on government services. 2018. Available at: <https://www.pc.gov.au/research/ongoing/report-on-government-services/2018/health/ambulance-services/rogs-2018-part2-chapter11> [verified 12 August 2020].</other>

CHEERS Checklist
Items to include when reporting economic evaluations of health interventions

The **ISPOR CHEERS Task Force Report**, *Consolidated Health Economic Evaluation Reporting Standards (CHEERS)—Explanation and Elaboration: A Report of the ISPOR Health Economic Evaluations Publication Guidelines Good Reporting Practices Task Force*, provides examples and further discussion of the 24-item CHEERS Checklist and the CHEERS Statement. It may be accessed via the *Value in Health* or via the ISPOR Health Economic Evaluation Publication Guidelines – CHEERS: Good Reporting Practices webpage: <http://www.ispor.org/TaskForces/EconomicPubGuidelines.asp>

Section/item	Item No	Recommendation	Reported on page No/ line No
Title and abstract			
Title	1	Identify the study as an economic evaluation or use more specific terms such as “cost-effectiveness analysis”, and describe the interventions compared.	Page 1 line 1
Abstract	2	Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses), and conclusions.	Page 2 line 22
Introduction			
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Page 4 line 52
Methods			
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Page 5 line 75 and Page 6 line 122



Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Page 5 line 97
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Page 5 line 85
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Page 6 line 106
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Page 7 line 123 Page 8 line 171
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed	Page 9 line 172
Measurement of effectiveness	11a	<i>Single study-based estimates:</i> Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	Page 5 line 85
	11b	<i>Synthesis-based estimates:</i> Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	N/A
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A
Estimating resources and costs	13a	<i>Single study-based economic evaluation:</i> Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any	Page 7 line 141

		adjustments made to approximate to opportunity costs.	
	13b	<i>Model-based economic evaluation:</i> Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	N/A
Currency, price date, and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	Page 7 line 141
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	N/A
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Page 8 line 158
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Page 7 line 136 page 9 line 178
Results			
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Table 1

Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Page 11 line 226 Page 11 line 230 Page 12 line 250 Table 3 Table 4
Characterising uncertainty	20a	<i>Single study-based economic evaluation:</i> Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact	Page 12 line 258
	20b	<i>Model-based economic evaluation:</i> Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions	N/A
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information	N/A
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Page 13 line 270
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Page 17 line 367

Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Page 17 line 365
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For consistency, the CHEERS Statement checklist format is based on the format of the CONSORT statement checklist.

