RESEARCH ROUNDUP

Household Electronic Medication Dispensers

AGEWELL

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Introduction

At APPTA, we strive to find relevant and timely research that has the potential to influence policy decision making for the aging population. One way of doing this is through our Research Roundup series. Our team devotes time to reading and prioritizing academic papers and grey literature, and investigates programming and products that foster innovation related to how we care for older adults. We then summarize that information for a quick and consumable product. These periodical documents will summarize evidence based on relevant policy topics that are discussed through our ongoing stakeholder engagement.

If there are particular topics of interest you would like us to investigate, please let us know by emailing Daniel Smiley, Research & Logistics Specialist, at daniel.smiley@dal.ca.

For this roundup, we are looking at *household electronic medication dispensers*.

What are household electronic medication dispensers?

Household electronic medication dispensers are known by many names and their definitions can vary. In the summaries below, you will see several different names, such as electronic medical adherence products, electronic pillboxes, and digital medication dispensers. All the literature, programs, and products cited all reference similar products: household electronic devices that dispenses medication at pre-determined intervals. Ancillary features of these dispensers can vary, however they all provide the same core function. We excluded automated dispensers that are used outside the home and medication software that do not work in conjuction with a medication dispenser (i.e. mobile reminder applications). Below are some images of the kinds of products we have included.

Literature Review

A review of features and characteristics of smart medication adherence products

Faisal, S., Ivo, J., & Patel, T.	2021	Link to article

Review article by Canadian researchers that compares the features of 51 different 'smart medication adherence products' (smart MAPs); electronic medication dispensers that collect medication intake data and allow for remote monitoring. Features they compared include whether these products contained alarms, were unit-dose, multidose, had locking features, were portable, and sent notifications to patients. The cost of the products available on the market ranged from $10 to $1500 USD, with subscriptions ranging from $10 to $100 USD. This article does not discuss how older adults would use these products.

What does the literature say about using electronic pillboxes for older adults? A systematic literature review

Miguel-Cruz, A., Felipe Bohorquez, A., & Aya Parra, P.A.	2018, Colombia/ Canada	Link to article

A review article that aimed to answer two questions: 1) What is the clinical evidence for the reported outcomes in studies on electronic pillboxes for older adults? and 2) What is the technology readiness level (TRL) of the electronic pillboxes used for older adults? TRL is a measure of how reliable and mature a technology is.
They reviewed 22 different studies and found mixed results for whether electronic pillboxes improved medication adherence. They did not find clear links between improved medication adherence and improved clinical outcomes. They also noted that cost and patient impairments can be barriers to improved outcomes.

Health professionals' experiences with the implementation of a digital medication dispenser in home care services – a qualitative study

Kleiven, H.H., Ljunggren, B., & Solbjør, M.	2020, Norway	Link to article

A qualitative study from Norway that focuses healthcare professionals' experiences implementing electronic medication dispensers as part of home care services. They found that most healthcare professionals were initially apprehensive about training their patients on how to use this technology and were fearful it could negatively impact their patients' health. However, once this technology was implemented and they saw the results, most healthcare professionals trusted that digital medication dispensers can contribute to safe and good care for their patients.

Literature Review (continued)

User perception of automated dose dispensed medicine in home care: A scoping review

Mertz, L., Tornbjerg, K., & Nøhr, C.	2021, Denmark	Link to article

Review article from Denmark that focuses on users' perceptions of household automatic dose dispensing (ADD) systems versus receiving doses from a human healthcare professional. They reviewed 11 articles and found that medication adherence improved and the users reported a general satisfaction in terms of user experiences with the acceptability and functionality of ADD. The review indicates that research is missing on healthcare professionals and patients' perceptions on how ADD affects their routines, both in relation to work and daily life.

Patients' experiences with multidose drug dispensing: A cross sectional study

Mertens, B.J., Kwint, H.-F., Van Marum, R.J., & Bouvy, M.L.	2019, Netherlands	Link to article

Qualitative study from the Netherlands that used interviews to explore patients' experiences with electronic medication dispensers. 90% of the patients said the dispensers were helpful. Approximately 30% of patients reported some disadvantages with the dispensers, mainly with opening the bags or reading the printed text on the bags in which the medication is dispensed.

Views of patients and professionals about electronic multicompartment medication devices: A qualitative study

Hall, J., Bond, C., Kinnear, M., & McKinstry, B.	2016, UK	Link to article

Qualitative study from the UK that looks at the acceptability of electronic medication dispensers. The team conducted focus groups with a range of stakeholders (pharmacists, nurses, social care managers, patients, and informal caregivers). They examined seven examples of commercially available electronic dispensers and provided an overview of pros and cons from different perspectives. They determined that no single device suited everyone. Smaller/lighter devices were preferred, but their usefulness was limited by the small number/size of the storage compartments. Transportability was an important factor for patients and carers. A carer's alert if medication was not taken was problematic - there were multiple barriers to implementation and no consensus as to who should receive the alert. Pharmacists had concerns about funding for devices as well as ensuring devices met regulatory standards for storage and labelling.

Program & Product Review

Medication Dispenser Assistive Technology Program

Nova Scotia Department of Health and Wellness	Program	Nova Scotia

Set up in 2013, this program offers financial assistance to any Nova Scotian that requires a medication dispenser and is over 65 years old. The program provides up to $499 per year for those that are eligible.

Carelink Advantage Medsure Stand

Care Link Advantage	Product	Ontario & New Brunswick

Part of a larger selection of products that promote independent living for older adults, the Medsure Stand monitors medication usage on a daily basis. It is linked to a central communication hub in the home. If medication is not being taken when scheduled, the older adult's nominated caregiver will receive an alert. Care Link Advantage is funded by the New Brunswick provincial government's Department of Social Development.

Karie

AceAge	Product	Canada

AceAge's Karie is "a personal health companion that organizes, schedules, and dispenses pills with one-button technology." A University of Toronto randomized cross-over pilot study was conducted to measure Karie's adherence effectiveness, and the study showed the device increased adherence by 300%.

spencer

Catalyst Healthcare	Product	Canada

One of the highest healthcare costs governments face today is that of prescribed medications not being taken properly. Medication errors result in more doctor visits, increased trips to hospitals and poor patient outcomes. Catalyst Healthcare, a technology company based in British Columbia, has developed an electronic dispenser, called spencer®, that works in conjunction with their SaaS product, called AdhereNet. AdhereNet is a software platform that patients and pharmacists use to manage medication adherence.

Clinician guide for electronic medication adherence products[1]

Clinician Guide to Recommending Electronic Medication Adherence Products (eMAP Clinician Guide)		Product Specific Features									Ease of Use				
			Number of Days Products Can Accommodate Based on Daily Dosing Regimen of:												
	Device Name	Maximum Number of Alarms	Once Daily (OD)	Twice Daily (BID)	Three Times Daily (TID)	Four Times Daily (QID)	Price of Device (CAD)	Monthly Subscription	Allows for Portability	Locking Feature	Average Time to Set Device (min)	Number of Steps to Set Device	Unassisted Completion	Average Usability	Average Workload
Automatic Pill Dispenser	GMS Med-e-lert Automatic Pill Dispenser	6	28	14	7	7	$$$	No	No	Yes	17:30	18	13%		
	LiveFine Automatic Pill Dispenser and Reminder	6	28	14	7	7	$$$	No	No	Yes	18:30	18	25%		
	MedReady 1700 Automated Medication Dispenser	4	28	14	7	7	$$$$	No	No	Yes	26:30	16	50%		
	MedSmart Med-Reminder and Dispensing System	6	29	14	7	7	$$$$	No	Yes	Yes	25:30	20	33%		
	e-pill MedTime Station Automatic Pill Dispenser with Tipper	6	28	14	7	7	$$$$	No	No	Yes	31:00	17	25%		
Clock Cap	TimerCap Travel Size	N/A	1*	N/A	N/A	N/A	$	No	Yes	No	5:30	5	100%		
	TimerCap Universal Size	N/A	1*	N/A	N/A	N/A	$	No	Yes	No	5:30	5	100%		
eBlister Pack	Jones Medication Adherence System	∞	14	7	N/A	N/A	N/A	Yes	Yes	No	15:30	12	29%		
Pill Box with Alarm	Reizen Vibrating Pill Box	5	5	2	1	1	$	No	Yes	No	15:30	10	67%		
	VitaCarry Advanced Pill Case	7	7	3	2	1	$$	No	Yes	No	15:00	10	67%		
	Nishiki Round Pill Box with Alarm	5	7	3	2	1	$	No	Yes	No	15:00	10	67%		
	MedGlider System 1 with Talking Reminder	4	4	2	1	1	$$	No	Yes	No	16:30	11	90%		
	Patterson Medical TabTime Super 8	8	8	4	2	2	$$	No	Yes	No	12:30	12	44%		
	100-Hour Pill Reminder	∞	3	1	1	N/A	$	No	Yes	No	9:30	10	89%		
	MedQ Smart PillBox	2	14	7	N/A	N/A	$$$	No	Yes	No	12:30	12	70%		
	e-pill MedGlider Home Medication Management System	4	7	7	7	7	$$$	No	Yes	No	10:00	14	78%		
	MedCentre System	4	30	30	30	30	$$$	No	Yes	No	16:30	8	38%		
	eNNOVEA Weekly Planner with Advanced Auto Reminder	4	14	14	14	14	$$$	No	Yes	No	15:30	14	63%		
	e-pill Multi-Alarm Pocket XL	37	7	3	2	1	$$	No	Yes	No	11:30	12	56%		
	6 Grid Pill Storage Case with Alarm	5	6	3	2	1	$	No	Yes	No	15:30	12	44%		
Reminder Alarm	Itzbeen Pocket Doctor	4	0	0	0	0	$	No	Yes	No	15:00	17	11%		
	***e-pill Accutab Weekly Pill Dispenser*	*N/A*	*7*	*7*	*7*	*N/A*	$$	*No*	*No*	*No*	*9:00*	*5*	33%		

** Device has one compartment that can be accessed multiple times; ∞ No restrictions to the amount of times a device alarm can be programmed; ** Device was advertised as an electronic product; however, does not have electronic components; N/A: Not Applicable;* $ < $30; $$ $30 – $69; $$$ $70 – $109; $$$$ > $109;
High usability; Medium usability; Low usability
Low workload; Medium workload; High workload

1. journals.sagepub.com/doi/10.1177/17151635221074977