Impact of Personalized Visual Medication Charts in Patients with Cardiovascular Disease

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Introduction

- Polypharmacy is a commonly encountered problem in patients with cardiovascular disease.[1-3]
- Consequences of polypharmacy include increased risk of severe drug-drug interactions and all cause mortality.[4-5]
- With a high pill burden, there is a higher incidence of non-adherence possibly from lack of understanding of the different medications.[6-8]
- Patients often describe their medications by pill color and size while health care providers identify pills by dose and names.
- To bridge this gap, a personalized visual medication chart (PVMC) was created to display a pictographic table of pills tailored to each patient.

Aims and Objectives

To evaluate the impact of PVMCs on cardiac medication knowledge and assess associated medication and dosage changes over a 3-6 month period among patients presenting to ambulatory cardiology clinics.

Methods

- Patients presenting to ambulatory cardiology clinics and taking 2 or more oral cardiac medications were recruited in the control or intervention group.
- Patients were consented for participation then assessed on their baseline medication knowledge by a 4 point scale for each oral cardiac medication (Figure 1).
- 0 points were given for each incorrect or unrecalled answer. 1 point was given for each correct answer. Medication knowledge was expressed as a percentage of the total correct answers.

Methods (cont.)

Medication	Correct Name	Correct Dose	Correct Frequency	Correct Indication	Total Score for Each Medication
apixaban	1	1	1	1	4
rosuvastatin	1	1	1	1	4
losartan	1	0	1	0	2
metoprolol tartrate	1	0	1	1	3
amlodipine	0	0	1	0	1
Sum Total					14
Max Possible Score	5	5	5	5	20
Percentage Correct					70%

Figure 1: Example of a medication knowledge assessment using a 4 point scale for each oral cardiac medication (name, dosing, frequency and indication).

- Patients in the intervention group received a PVMC at the end of their index visit (Figure 2).
- All patients were called 3-6 months later to reassess their medication knowledge and evaluate for changes in medications and dosages.
- Statistical analysis included descriptive analysis and paired two-tailed t-test for follow up data.

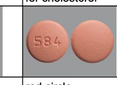
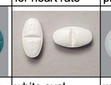
Medication Name	Eliquis (apixaban)	Crestor (rosuvastatin)	Cozaar (losartan)	Toprol XL (metoprolol succinate)	Norvasc (amlodipine)
Dosage	5 mg	20 mg	50 mg	25 mg	5 mg
Indication	Blood thinner	for cholesterol	for blood pressure	for heart rate	for blood pressure
Picture					
Pill Identification	red oval	red circle	blue-green circle	white oval	white circle
Morning	1 tab		1 tab	1 tab	1 tab
Afternoon					
Evening	1 tab				
Night		1 tab			

Figure 2: Example of a personalized visual medication chart displaying each oral cardiac medication's name (brand and generic), dosage, frequency and indication along with a color picture of the corresponding pill. Chart was created on Google sheets and pill pictures were obtained from epocrates.com

Results

Table 1: Baseline Descriptive Characteristics

Characteristics	Control (n=110)	Intervention (n=114)	p-value
Age, years, mean (SD)	69 (10)	68 (12)	ns
Cardiac medications, mean (SD)	4 (2)	5 (2)	ns
Gender (Male), n (%)	52 (47.3%)	56 (49.1%)	ns
Race (White), n (%)	91 (82.7%)	92 (80.7%)	ns
Education (College graduate or higher), n (%)	59 (53.6%)	60 (52.6%)	ns

SD: Standard Deviation, ns: Not Significant

Results (cont.)

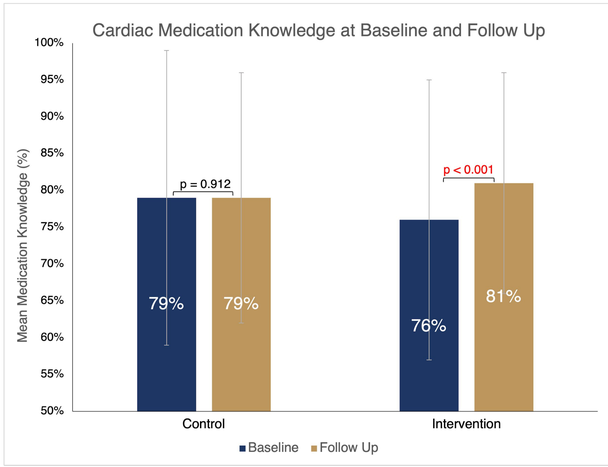


Figure 3: Mean medication knowledge (as a percentage) at baseline and follow up for the control and intervention group. Statistical analysis done via paired t-test. Mean ± Standard Deviation.

Table 2: Number of Participants with a Change in Medication Regimen

Type of Change	Control (n=110)	Intervention (n=114)	p-value
Medication change, n (%)	49 (44.5%)	47 (41.2%)	ns
Dosage Change, n (%)	12 (10.9%)	23 (20.2%)	ns

ns: Not Significant

- Baseline characteristics were similar across both groups.
- Mean medication knowledge did not increase significantly from baseline (79%) to reassessment (79%) in the control group (p=0.912).
- Mean medication knowledge increased significantly from baseline (76%) to reassessment (81%) in the intervention group (p<0.001).
- Across both groups, 43% of patients had medication changes and 16% had dosage changes.

Conclusions

- There was a significant amount of medication and dosage changes over a short follow up period, emphasizing the need for dynamic and easily implementable medication insight tools.
- PVMCs represent a promising tool for increasing medication knowledge in patients with cardiovascular disease.
- Further studies are needed to assess the impact of PVMCs on medication adherence.
- Limitations include study design and study population with a high baseline medication knowledge. Redesigning the study as a randomized control trial with a larger, more representative patient population would be of value.

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Acknowledgements

We would like to extend our gratitude to Diedre Brunk, Dr. Peter Khalil and Dr. David Haines for their assistance in executing this project. We would also like to thank Michelle Jankowski for performing the statistical analysis.