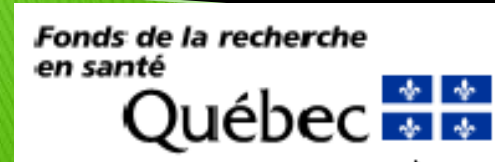


Remote monitoring and self-management support to prevent and address exacerbations in COPD

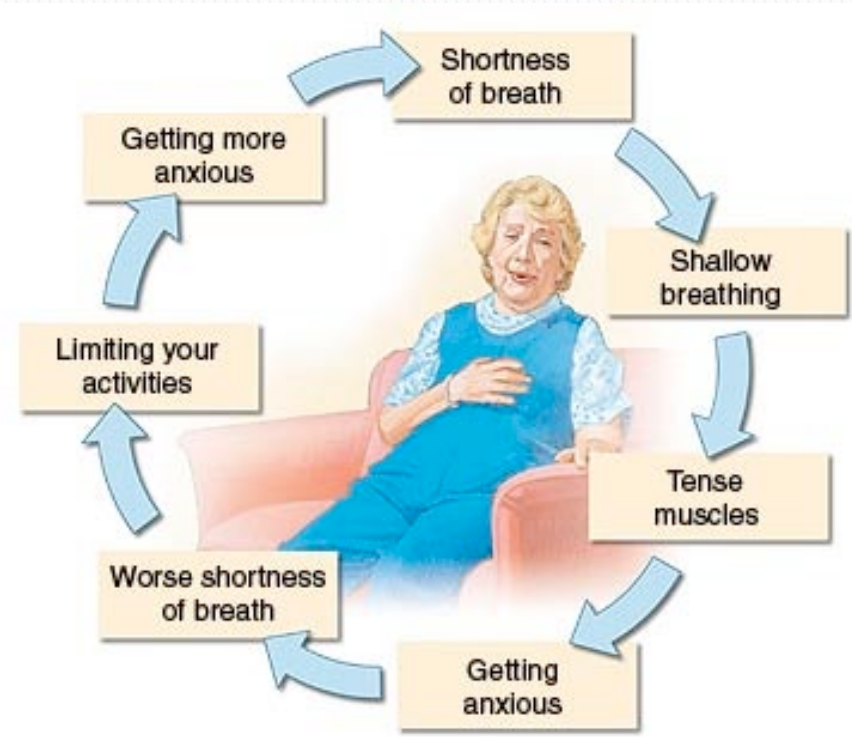
Sara Ahmed, PhD
Susan Bartlett, PhD
Patrick Ware, MPH
Jean Bourbeau, MD

McGill University, Epidemiology & Biostatistics
McGill University Health Center, Clinical Epidemiology



- ▶ No conflicts to declare

COPD Impacts 3 Million Canadians



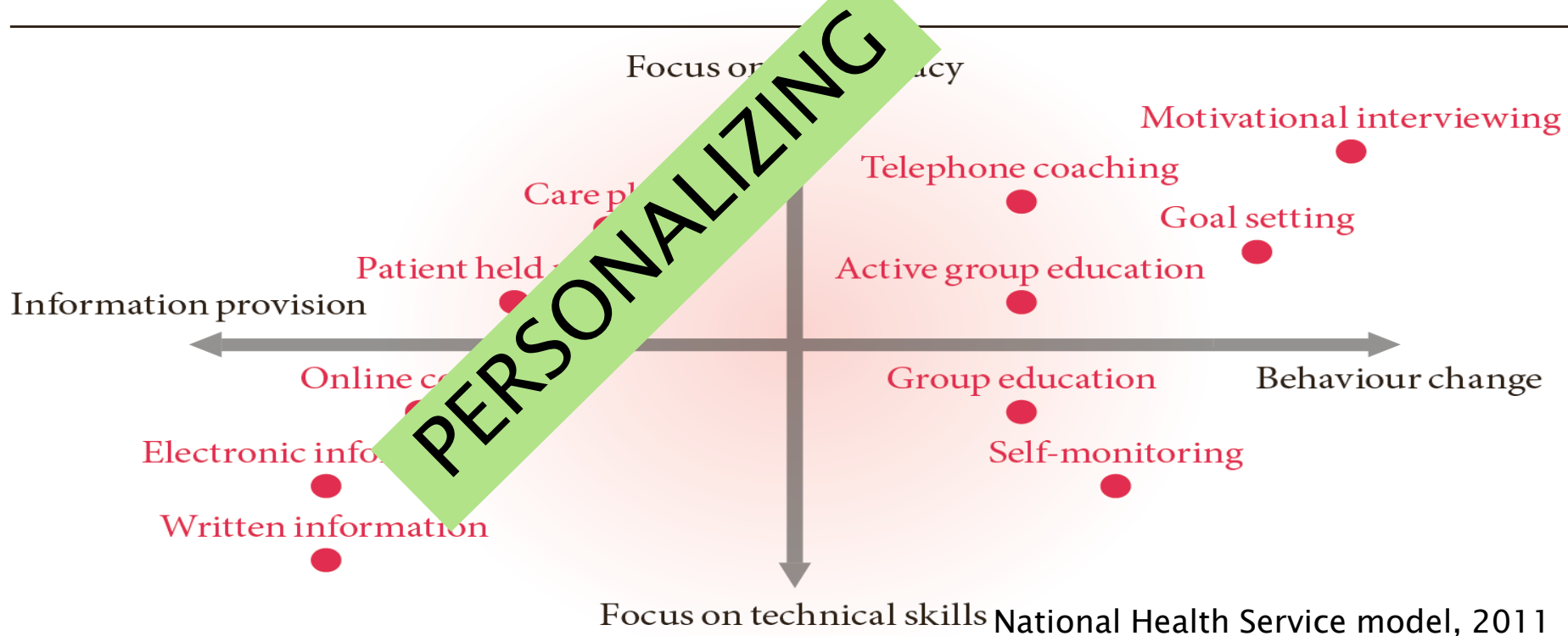
Treatment

- Self-management
 - Smoking cessation
 - Medications – rescue/prevention
 - Pulmonary rehabilitation

Effectiveness of COPD self-management: What seems to work

(Jonsdottir H, *J Clin Nurs*. 2013;22(5-6):621-637.)

Figure 1: continuum strategies to support self management



Remote monitoring and self-management support

PATIENT HEALTH PORTAL

- 1) Tailored learning,
- 2) Decision support, &
- 3) Reminders

+

CASE-MANAGER PORTAL

- 1) Optimize self management (skills),
- 2) Facilitate early identification of exacerbations,
- 3) Earlier initiation of treatment

Reduce likelihood of serious exacerbations requiring ED visits & Hospitalization

Development: User-Centered Iterative Design Process

Focus Groups

1. Analyze user requirements
2. Present existing interfaces
3. Identify initial changes

Present interface with changes

Analyze feedback to identify design modifications



Create / Modify Interface

Care Gap

Access to medical information



Knowledge



Self-monitoring



Guidance



Communication & support



PHP Feature

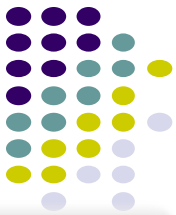
Personal health record

Tailored education based on responses, learning center

Symptoms, medication, action plan, physical activity

Short-term behaviour change goals, decision support, visual feedback

Feedback from case manager



COPD Self-management Portal

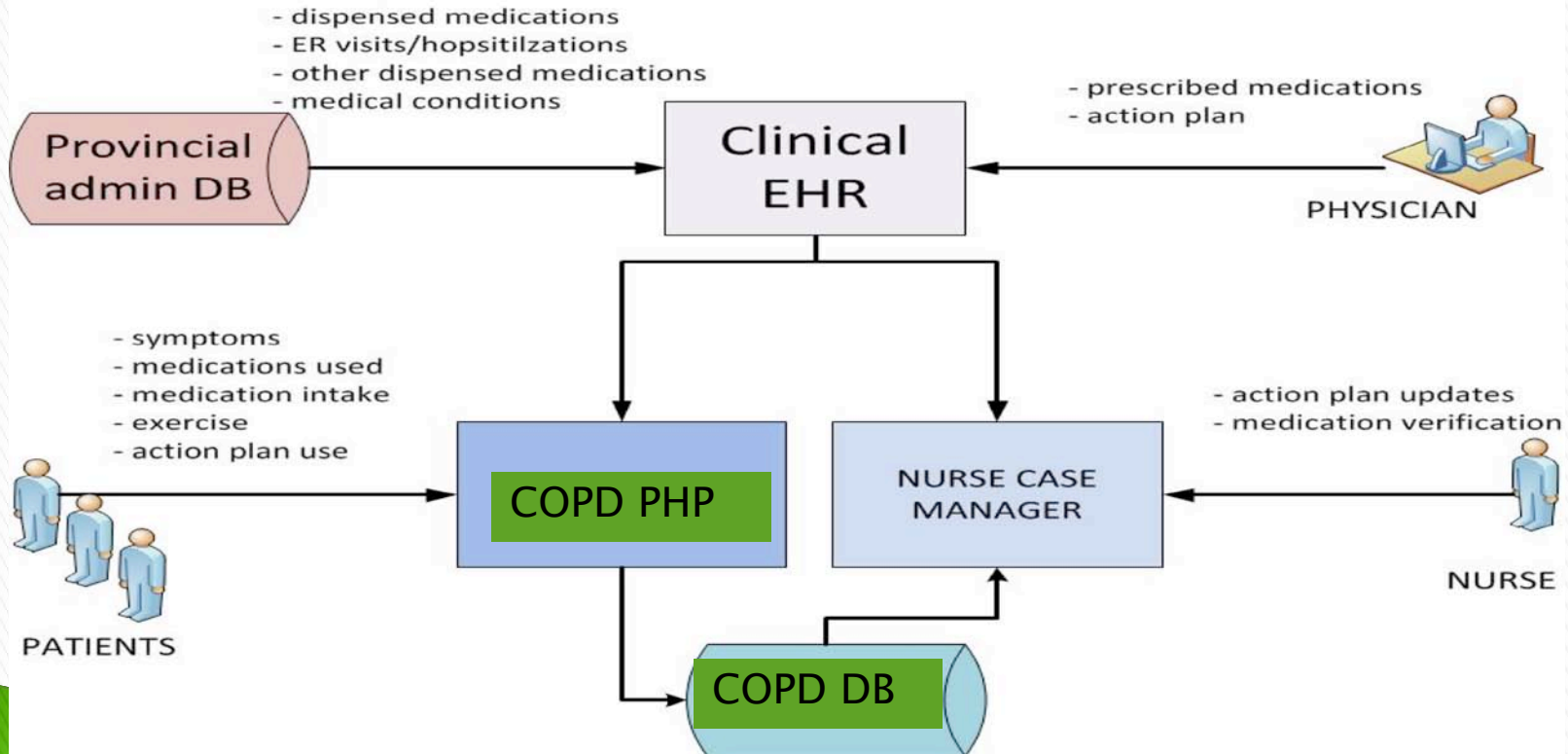


Patient Health Portal
Trial version 2014-04-10

Maximize Adherence to Health Behaviours



Integration of MAP with Clinical EHR & Case Manager System



Results: Feedback on Prototype Patient Health Portal

▶ **Barriers and useful aspects identified by users:**

- Technical
 - Inconsistent loading speed,
- Monitoring and feedback
 - Repetitive feedback messages,
 - Length of the self-monitoring questionnaires, and
 - Perceived complexity of the messaging centre when communicating with the health team.
- ✓ Ease of navigation,
- ✓ Clarity of instructions on how to use system, and
- ✓ Aesthetic appearance (e.g., use of larger font, pictures, color coding)

Results: Feedback on Prototype Case manager portal

- ▶ **Barriers and useful aspects identified by users:**
 - Notes page throughout the system
 - Patient history of questionnaire completion
 - Dismissing alerts
 - ✓ Changes to the action plan
 - ✓ Medication reconciliation (RAMQ, patient, MOXXI)
 - ✓ Intervention planning module

The screenshot shows the 'Patient Health Portal' interface. The navigation bar includes 'Home', 'Update My COPD Profile' (highlighted with a red box), 'My COPD Profile', 'Action Plan', 'Medications', 'Mail', and 'Learning Center'. Below the navigation bar, there is a 'View' button and a 'Monitoring Symptoms and Action Plan Use' section. The main content area contains a question: 'RESPIRATORY SYMPTOMS: In comparison to your COPD-baseline, which of these respiratory symptoms has worsened today?' followed by a list of radio button options: a) Shortness of breath, b) Secretions (also called phlegm or sputum), c) Cough, d) Chest wheezing, and e) None.

Patients answer questions that serve as triggers to actions taken by the system

The screenshot shows the 'Patient Health Portal' interface with the 'Action Plan' tab selected (highlighted with a red box). The page displays 'Current' information, including the date 'Effective as of :2013-09-23 09:47:32'. Below this, there is a 'COPD' section with a list of symptoms and actions: 'I feel Well' (green bar), 'I feel Worse /Changes in Sputum' (yellow bar), 'I feel Worse / More Shortness of Breath than usual' (yellow bar), 'My New Symptoms' (white bar), 'My Actions' (white bar), and 'My Dyspnea Treatment' (white bar). At the bottom, there are two red bars: 'I feel Much Worse' and 'I feel I am in Danger'.

Each section has patient-specific details about: Symptoms, Actions & Medication.

Feedback to patient through monitoring



Using feedback from the fitbit website, write down the average of steps/day you walked in the past week. How did you do more than before?

- A. I maintained the same number of steps/day of the previous week
- B. I increased my number of daily steps, but not as much as 400 steps/day
- C. I increased my number of daily steps by over 400 steps/day
- D. I was doing well by increasing my number of daily steps, but now I returned to the point I started.



Keep it up!



I need to be careful!



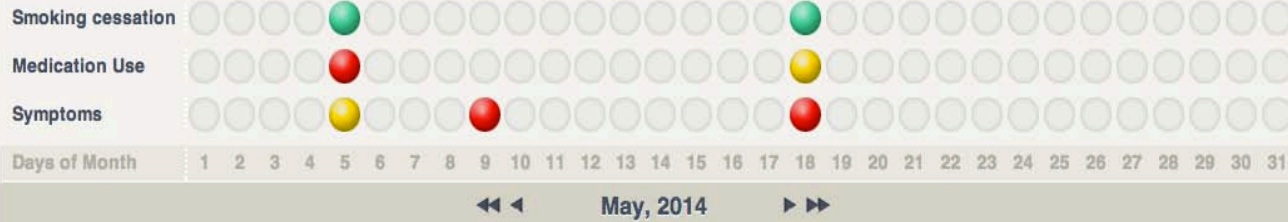
I feel worse!



Smiley Feedback History



Symptoms
 Medication Use
 Smoking cessation
 Physical Activity



The screenshot displays the 'Patient Health Portal' interface. At the top, there is a blue navigation bar with the portal logo and a 'Log out' button. Below this is a secondary navigation bar with tabs for 'Questionnaire', 'Feedback', 'Action Plan', 'Health Record' (which is selected), 'Communicate', and 'Learning Center'. The main content area is titled 'Medication' (highlighted with a red box). It includes a 'Filter by Indication' search bar and a 'Search by Trade Name' search bar with a magnifying glass icon and a 'Show All' button. Below the search filters, it indicates 'Showing records of 1 to 10 of 13'. The medication list contains two entries, both for COPD:

Medication Name	Indication	#/intake:	Unit:	Frequency:	Directives:	For:	With:
GUANETHIDINE, TABLET,oral	COPD		TABLET	Q6H	After Meal	Duration	Repeats
APO ALPRAZ, TABLET,oral	COPD		TABLET	Q6H	After Meal	Duration	Repeats

The patient can view their COPD medication list

Patient Health Portal Log out

Questionnaire Feedback Action Plan Health Record **Communicate** Learning Center

PHP Mail Search by Subject

	Subject	From	To	Received
<input type="checkbox"/>	Question about	copdCM	copd	2013-06-06 01:44:31

Compose Archive

Inbox (1) Sent Draft Archive

COPD symptom Action plan Medication

The patient communicates with the case manager via an email-type platform integrated into the portal

Patient Health Portal

Home Update My COPD Profile My COPD Profile Action Plan Medications Mail Learning Center

Activities for you **Browse by topic**

- Medication adherence
- Exacerbations
- Action Plan
 - What is an Action Plan?
 - Create a contact list
 - Knowing your baseline
 - What to do when you feel worse
 - Other factors that can aggravate your symptoms
 - When are stressed
- Breathing Management
- Exercise
- Managing stress and Anxiety
- Smoke-free environment

Patient Health Portal

Questionnaire Feedback Action Plan Health Record Communicate Learning Center

Activities for you **Activities for you** Browse by topics

Suggested activities for you

How to deal with stress

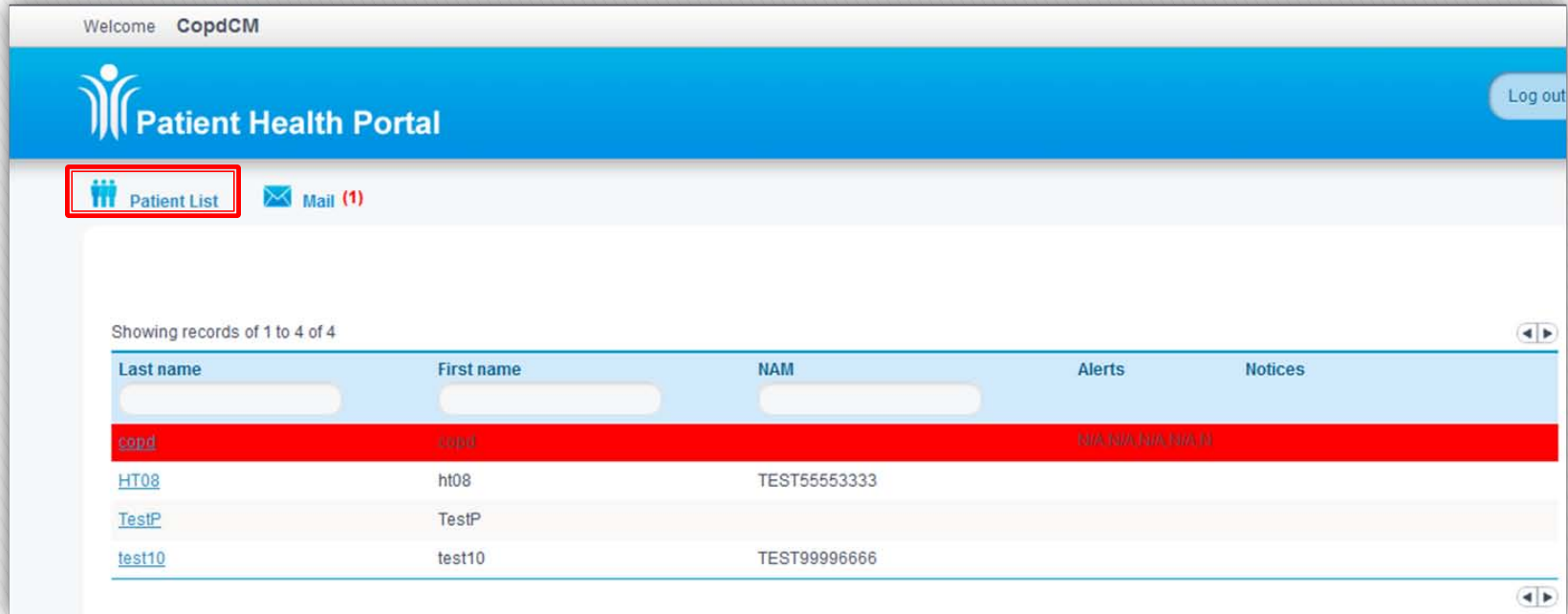
Pacing your daily activities

Review your activity history

Activity	Date	Results	Review suggested reading
Defining the pros and cons of smoking	Jun 01, 2013	View Results	How smoking can affect your pain
Am I getting enough sleep?	May 23, 2013	View Results	How sleep and pain are related
The mind body connection	May 20, 2013	View Results	

Browse by topic: Patients can consult COPD related information at anytime categorized by topics which expand to display a list of PDFs

Learning activities aimed at improving self-management are triggered based on answers to the monitoring questionnaire



Welcome CopdCM

Patient Health Portal

Log out

Patient List Mail (1)

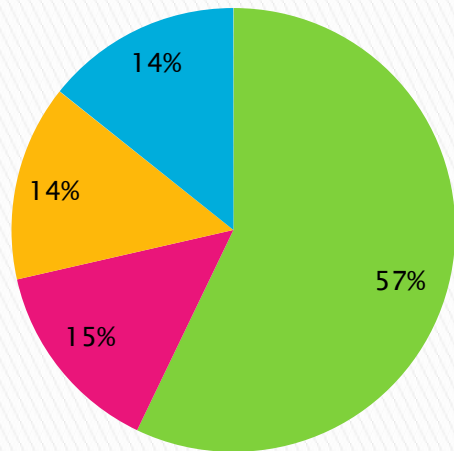
Showing records of 1 to 4 of 4

Last name	First name	NAM	Alerts	Notices
copd	copd		N/A	N/A
HT08	ht08	TEST55553333		
TestP	TestP			
test10	test10	TEST99996666		

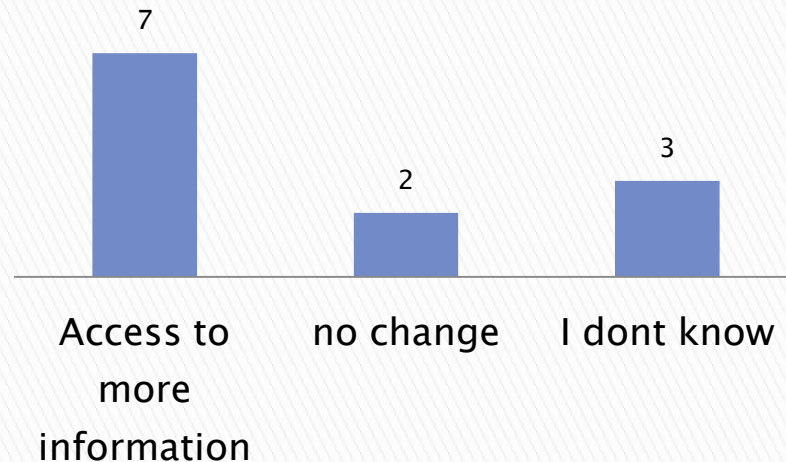
The case manager's patient list is triaged according to severity of symptoms using a color coding system (red, yellow, green), patients in red (most severe) are listed at the top

Changes in COPD management with PHP

Effects of the portal



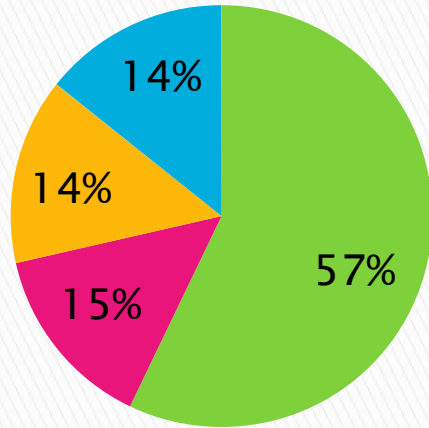
- Portal helps to better understand the disease
- Portal didn't change much in my condition
- Portal is a good reminder for techniques to manage COPD
- I dont know



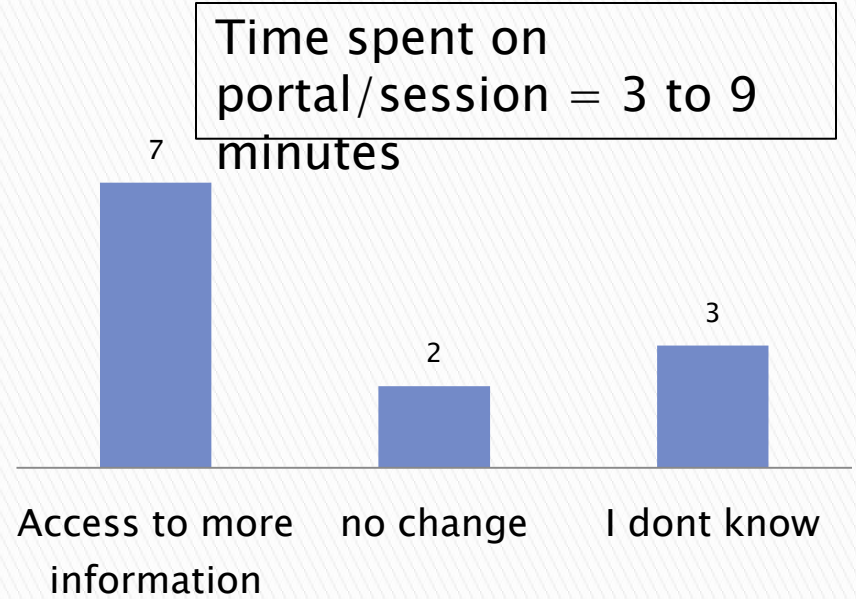
At 4 months
No of subjects, N=6

At 12 months
No of subjects, N=12

Changes in COPD management with PHP



- Portal helps to better understand the disease
- Portal didn't change much in my condition
- Portal is a good reminder for techniques to manage COPD

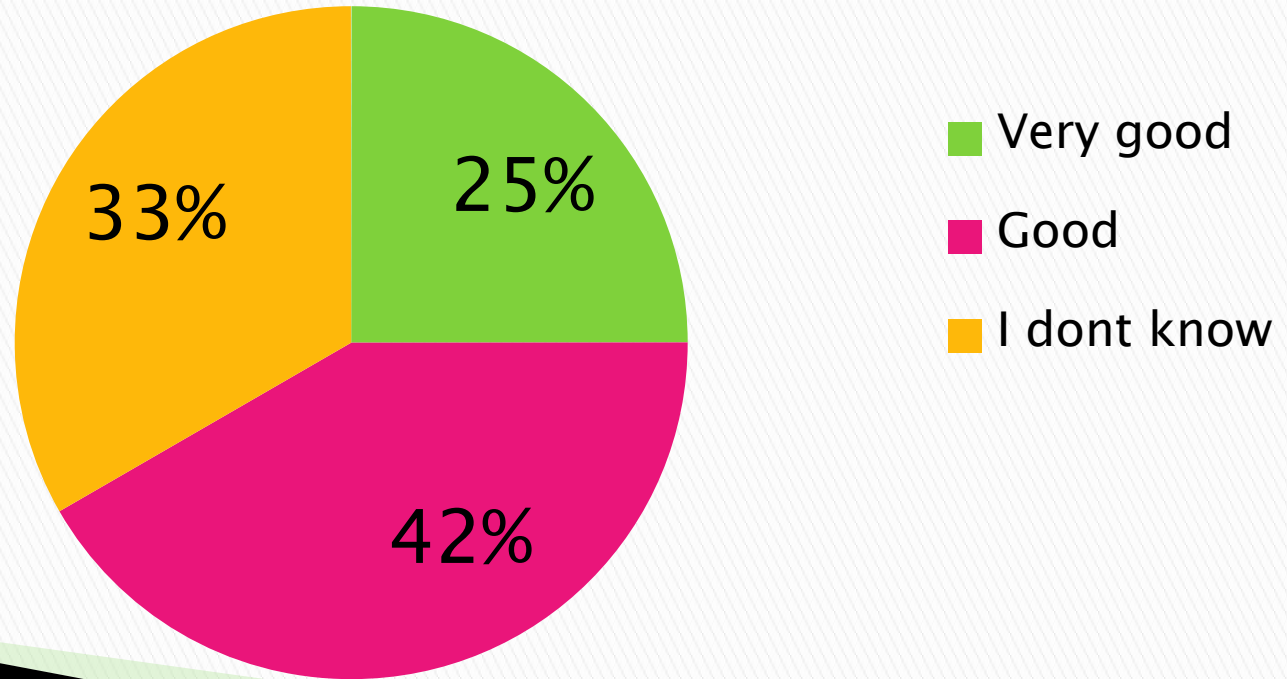


At 4 months
No of subjects, N=6


At 12 months
No of subjects, N=12

Quality of portal in general

N= 12 subjects at 12 months

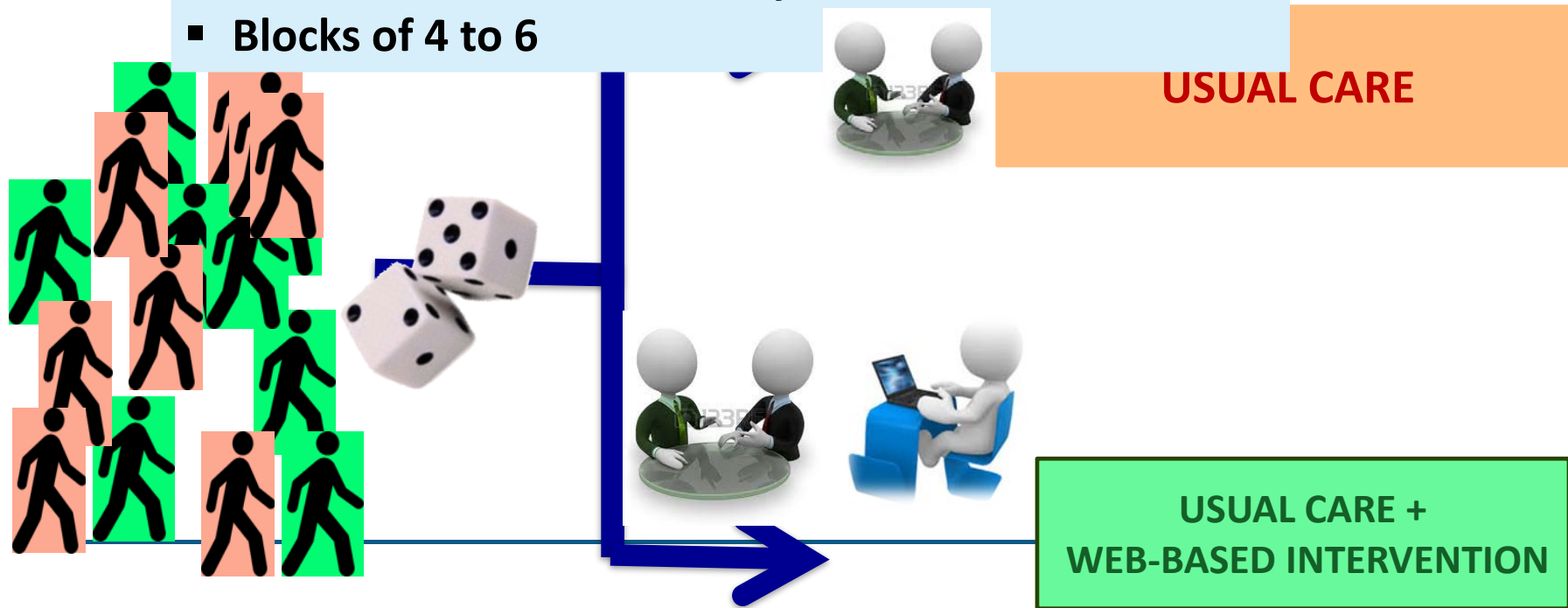


Conclusions

- ▶ A PHP may be an enabler of self-management for some individuals
 - ▶ Complex care process is difficult to translate to an digital solution
 - ▶ Tailoring requires a priori understanding of possible variations in symptoms, preferences, etc.
 - ▶ Simplicity is key
 - ▶ Never a final solution
- 

Next Steps- Trial

- A multicenter, randomized, non-blinded, parallel group, pilot trial
 - Randomization stratified by site of recruitment
 - Blocks of 4 to 6



Thank you

Sara.ahmed@mcgill.ca

Prepared
Proactive
Practice Team



Shared decision making

Building Partnerships

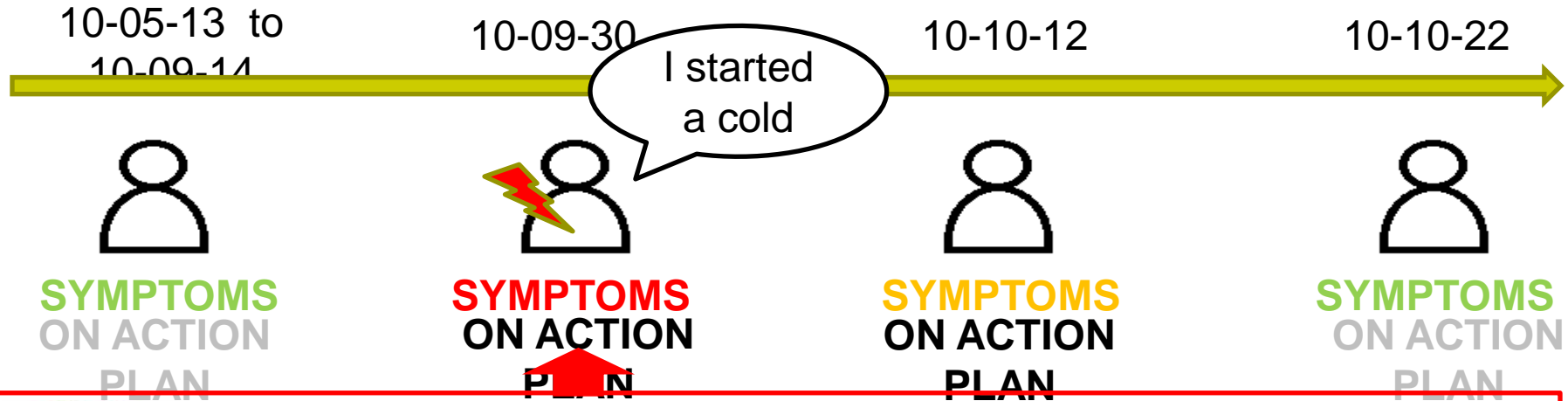
Monitoring/Managing
Signs & Symptoms

Self-Tailoring

Informed
Activated
Patient



Participant starts action plan as soon as symptoms deteriorate



 YOUR ASTHMA DOES NOT SEEM TO BE UNDER GOOD CONTROL. IT'S TIME TO GO TO THE YELLOW SECTION OF YOUR ASTHMA ACTION PLAN AND FOLLOW THE STEPS THAT ARE OUTLINED IN THE SECTION CALLED "WHAT DO I NEED TO DO:"

10-05-13

10-06-14
10-07-19



10-09-30



"WHAT DO I NEED TO DO:"

- Female
- Age: 25

The screenshot shows a web interface with a navigation bar at the top containing tabs for 'Alerts/Notices', 'Questionnaire', 'Action Plan', 'Health Record', 'Feedback', 'Clinical Notes', and 'Mail'. The 'Alerts/Notices' tab is highlighted with a red box. Below the navigation bar, the patient's name 'PATRICK_PA1,WARE' is displayed, along with their name 'PATRICKWAREPA1' and date of birth 'Sep 11, 2013'. The main content area is divided into two sections: 'Alert' and 'Notice'. The 'Alert' section shows two records with details such as 'Respiratory Symptoms - No Action' and 'Cold symptoms - No action', each with a 'Release' button. The 'Notice' section shows one record about 'Patient has added a regular medication' with a 'Release' button. A decorative graphic of colored dots is visible in the top right corner of the interface.

Alerts and notices are automatically triggered based on the patient's activity in the portal

The screenshot shows a user interface for a COPD case manager. At the top, there are 'Save' and 'Publish' buttons, along with 'Last Update' and 'Status' information. The main content area is divided into several sections: 'I feel Well', 'I feel Worse / Changes in Sputum', 'I feel Worse / More Shortness of Breath than usual', 'My New Symptoms', 'My Actions', and 'My Dyspnea Treatment'. A modal window titled 'Patient's Existing Medications' is overlaid on the bottom right, showing a table of medications.

Medication	#/Intake	Unit	Frequency	Directives	Duration	Repeats
<input type="checkbox"/> OXEZE TURBUHALER, POWDER INH.,oral-inhalation	2	POWDER INH.	Q6H	After meal	2	3 Refills
<input type="checkbox"/> BRICANYL TURBUHALER, POWDER INH.,oral-inhalation	3	POWDER INH.	Q9H	After meal	5 2	1 Refill

Buttons at the bottom of the modal: 'Add to ActionPlanSection' and 'Close'.

The case manager can modify and tailor the content of the action plan to a specific patient

The screenshot displays the 'Health Record' section of the PHP nurse case manager interface. The 'Medication' tab is highlighted with a red box. The patient's name is 'copd.copd' and the date of birth is 'May 11, 1950'. Below this, there are two columns of medication lists: 'RAMQ Medications' and 'Patients Medications'. Both columns list the same medications, including Guanethidine, APO Alprazolam, Zyrtec, Advil, Bronchocort, and Ventolin.

RAMQ Medications	Patients Medications
GUANETHIDINE, TABLET,oral	GUANETHIDINE, TABLET,oral ✕
APO ALPRAZ, TABLET,oral	APO ALPRAZ, TABLET,oral ✕
ZYTRAM XL, 24H-TABLET,oral	ZYTRAM XL, 24H-TABLET,oral ✕
ADVANCED FORMULA BETA CAR, CAPSULE,oral	ADVANCED FORMULA BETA CAR, CAPSULE,oral ✕
ADVANCED REVITALIFT DAY, SUNSCREEN,topical	ADVANCED REVITALIFT DAY, SUNSCREEN,topical ✕
BRONCHO RUB, OINTMENT,topical	BRONCHO RUB, OINTMENT,topical ✕
ADVIL COLD AND SINUS PLUS, TABLET,oral	ADVIL COLD AND SINUS PLUS, TABLET,oral ✕
VENTOLIN DISKUS, POWDER INH.,oral-inhalation	VENTOLIN DISKUS, POWDER INH.,oral-inhalation ✕
VENTOLIN DISKUS, POWDER INH.,oral-inhalation	VENTOLIN DISKUS, POWDER INH.,oral-inhalation ✕
VENTOLIN DISKUS, POWDER INH.,oral-inhalation	VENTOLIN DISKUS, POWDER INH.,oral-inhalation ✕

The case manager receives a live feed of all dispensed medications from RAMQ. He/she selects which medications are to be displayed in the patient's medication list

The screenshot displays the 'Patient Health Portal' interface. At the top, there is a navigation bar with 'Patient List', 'Mail', and 'Add Clinical Note' buttons. Below this, a tabbed interface shows 'Clinical Notes' as the active tab. A table lists existing notes with columns for Subject, Updated On, Status, and Type. A red box highlights the 'Add Clinical Note' button. A modal window is open, showing a form for adding a new note. The form includes fields for Date (2013-06-06) and Subject (Auto-Gestion), and a list of note templates: 'Prevention des exacerbations', 'Gestion des exacerbations', 'Maintien d'un environnement sans fumer', 'Adhesion a la medication', and 'Technique d'inhalation'. The modal also has 'Save', 'Publish', and 'Cancel' buttons.

Subject	Updated On	Status	Type
Auto-Gestion:	May 24, 2013	Saved	Auto-gestion
Auto-Gestion:	May 24, 2013	Saved	Auto-gestion
Auto-Gestion:	May 24, 2013	Saved	Auto-gestion
Auto-Gestion:	May 24, 2013	Saved	Auto-gestion
Simple note	May 24, 2013	Saved	Simple Note

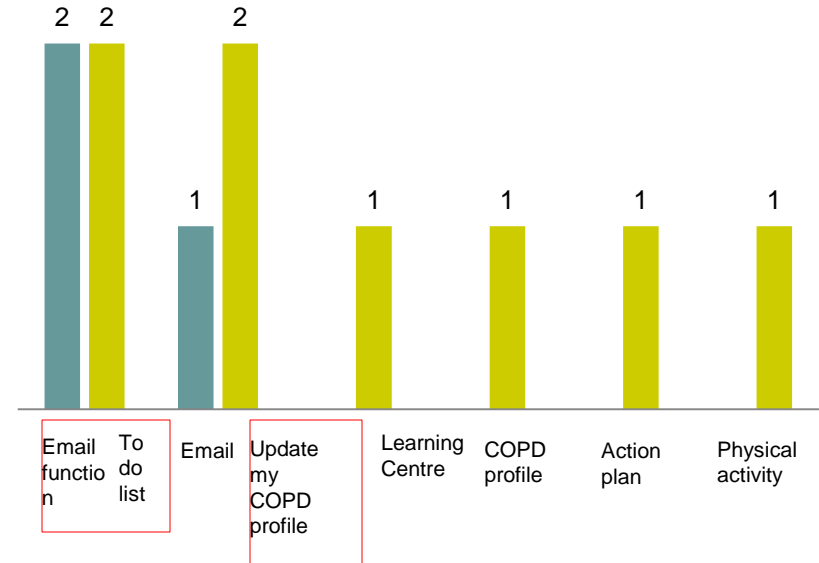
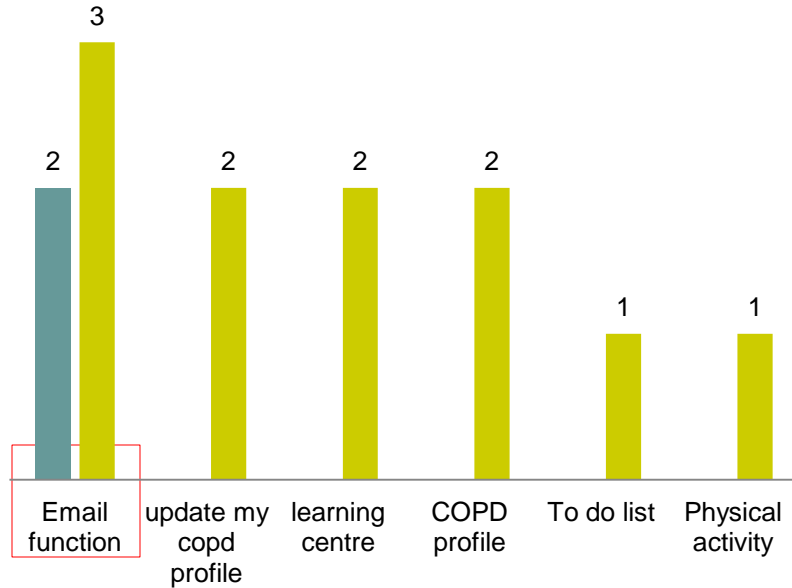
The case manager can write and store clinical notes documenting all actions and interventions associated to that patient

Use of PHP features for COPD management



- Non useful for COPD management, N=2 subjects
- Useful for COPD management, N=5 subjects

- Non useful for copd management, N=3
- Useful for copd management, N=4



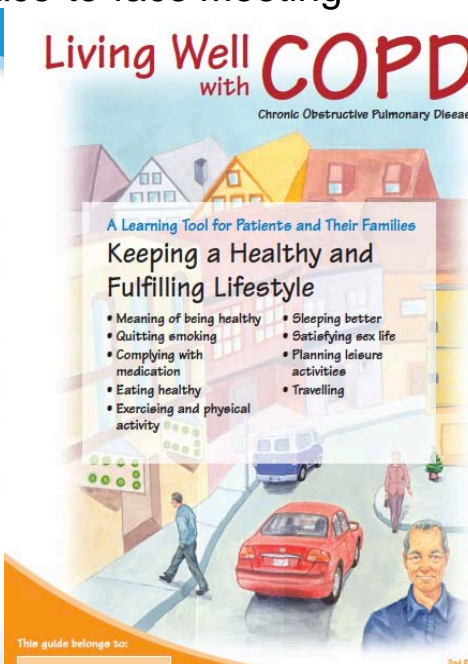
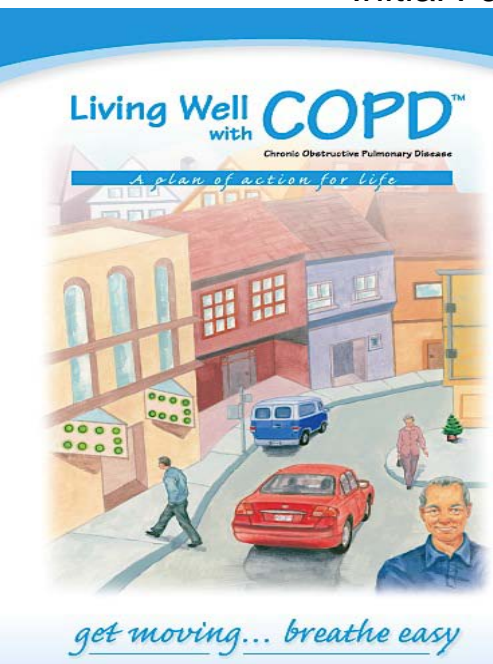
At 4 months

At 12 months

Usual Care= “Living Well with COPD” (LWCOPD)



- Physical Activity Guidance (case manager)
- Initial Face-to-face Meeting
- Brochures
- Link to LWCOPD



Web-based Intervention: Feedback to patient through monitoring



- Visual feedback of physical activity progression and symptoms through fitbit pedometer, graphs, figures and tailored motivational messages

