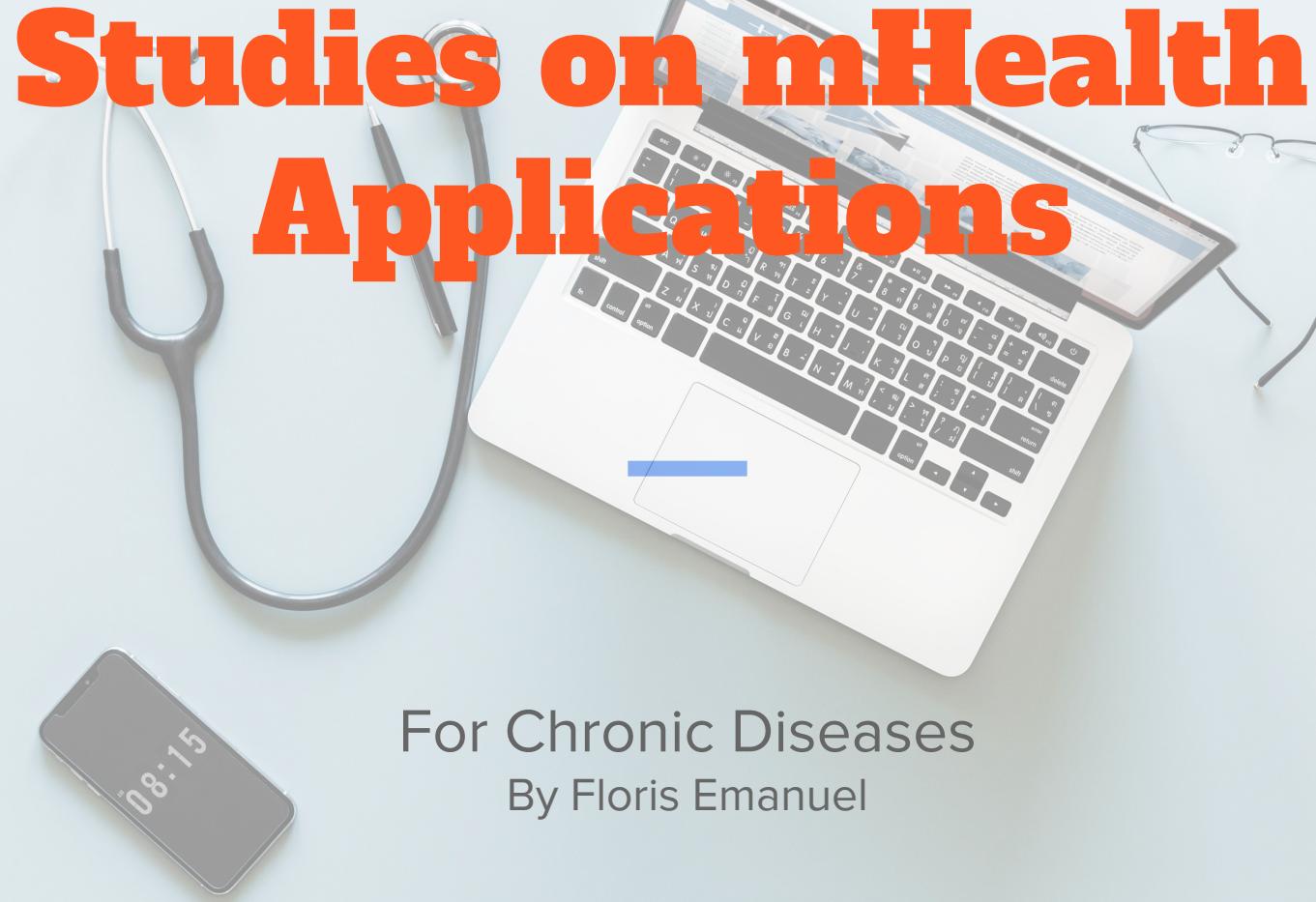


# Studies on mHealth Applications



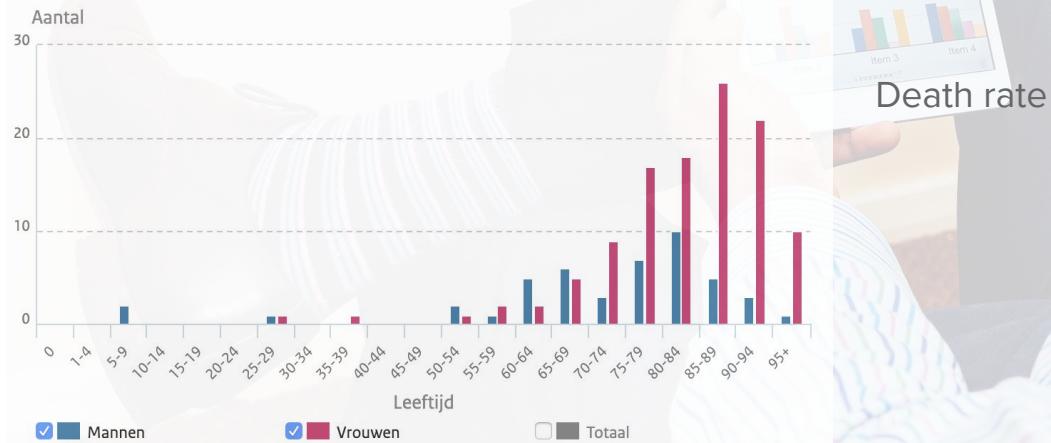
For Chronic Diseases  
By Floris Emanuel

# Intro

## Asthma

Affects 25 million Americans (641.000 people in the Netherlands)

\$3300 annual cost per patient: medical expenses, missed work/school, early death (4.2 million on care NL)



# May I present:

Original Article

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## Improvement in Asthma Control Using a Minimally Burdensome and Proactive Smartphone Application

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**Kevin A. Cook, MD, Brian D. Modena, MD, and Ronald A. Simon, MD** *San Diego, Calif*

Minimally burdensome: no-nonsense, only needed action

pro-active : customized care, actual help

# Content

- Background
- Purpose
- Functionality
- Authors
- Results
- Conclusions
- Questions



# Background

## Problems concerning disease control

missed work/school, and early deaths.<sup>1</sup> Problems such as patient nonadherence to medications, failed trigger avoidance, and low patient expectations of control continue to be major barriers to improving outcomes. Studies on nonadherence have found that patients take only 30% to 70% of prescribed asthma medications.<sup>2</sup> Reasons for poor medication adherence include mecha-

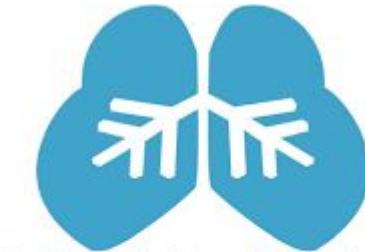
tions.<sup>2</sup> Reasons for poor medication adherence include mechanistic difficulties with use of inhaler devices, medication regimen complexity, and patients' concern for adverse effects.<sup>2,3</sup> Lack of knowledge in patients regarding the importance of adherence,

# Background

So.. What to do?

National Asthma Education and Prevention Program:

- Development of a personalized treatment plan
- Increased time devoted to medication education
- Positive reinforcement as ways to improve adherence and control:
  - Treatment models that include individualized treatment plans
  - Shared decision making
  - Patient education
  - Encouragement of self-care



National Asthma Education  
and Prevention Program (NAEPP)

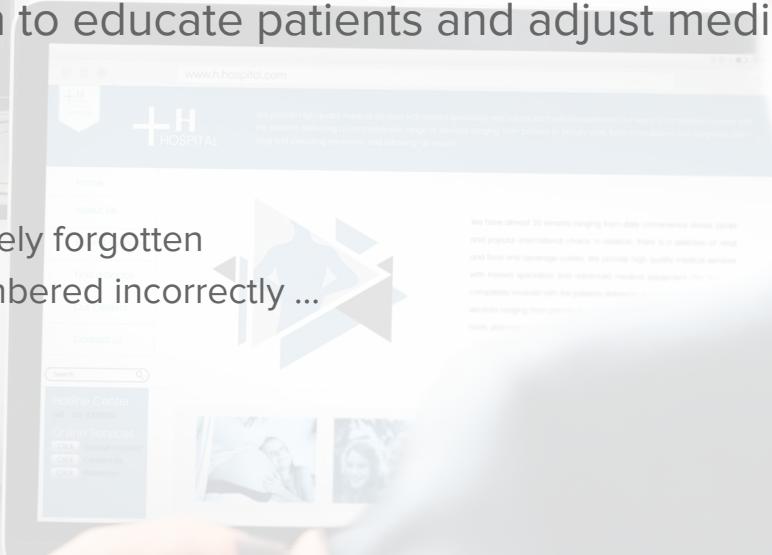
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*Convened by the  
National Institutes of Health*

# Background

Clinic visits is still the primary platform to educate patients and adjust medication regimens, but:

- Time is too short
- 40% to 80% of the information is immediately forgotten
- 50 % of remembered information is remembered incorrectly ...



# Background

Is mHealth the answer?

- Internet, sociale media, apps ...
- There are 200+ asthma apps for iOS, Android
- First asthma ‘mHealth’ used (effective!) SMS for adherence

But remember:

- Quality is low/incorrect
- Most is still fitness, meditation and ...
- Mostly informing/instructing
- Only 10% uses wearables

# Purpose

“A comprehensive coach, targeting all 3 objectives, for a robust, long-lasting improvement in adherence and asthma outcomes” (Self-monitoring of symptoms, Medication adherence, Avoidance of triggers)

“An app emphasizing patient education and self-care with proactive, individualized “coaching” based on the National Asthma Education and Prevention Program treatment guidelines”

## Method

- 60 patients with ‘poorly controlled’ asthma
- 4 months of use
- No instruction, physician encouragement or app support, just the download
- All ages, ethnicity, sex, weight, asthma medication

# Functionality

So... What does the app do?

Alerts:

- Request for self assessment: Asthma Control Test (ACT)
- Assessment of patient knowledge regarding asthma self-care
- Resulting individualized coaching based on their previous entries

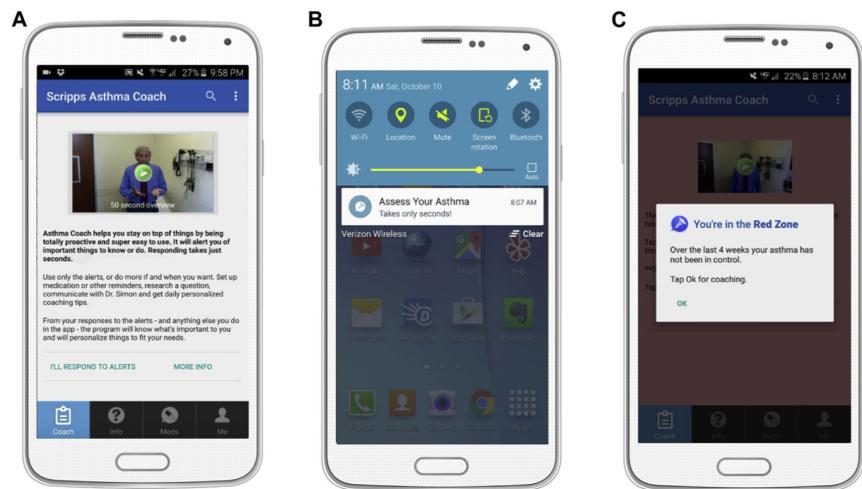
Patient-initiated actions

- Information inquiries
- Data entry: real time user data trends > can be sent to healthcare provider

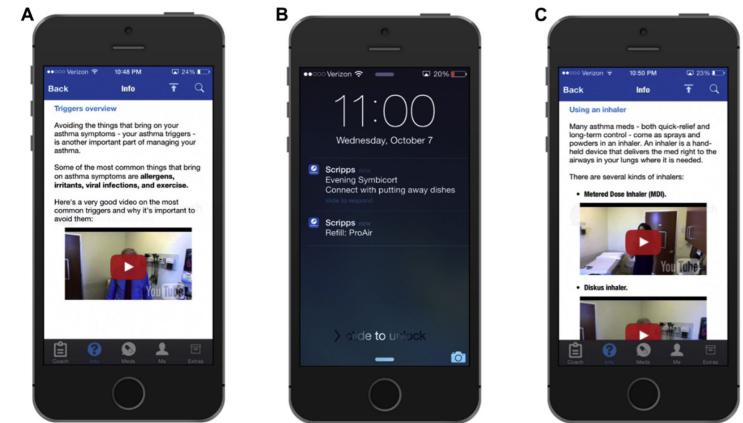
Output:

- Easily modifiable, (real time) personalized, evidence based, educational material (written and video)

# Functionality



**FIGURE 1.** Screenshots demonstrating user engagement and self-assessment functionality. **A**, Embedded videos and accompanying text provide a user-friendly experience. **B**, Proactive alerts appear on the home screen and prompt the patient to actively engage in self-care and self-assessment. **C**, Assessment of asthma control is made using the ACT survey, with results reported as red, yellow, or green. Individualized coaching is provided on the basis of entries (Figure 2).



**FIGURE 2.** Screenshots demonstrating individualized coaching. "Coaching" is provided on the basis of recorded patient entries and inquiries as well as assessment of knowledge regarding asthma self-care. Patient data are continually collected and analyzed by the app to provide personalized content. Personalized content may include (A) discussions of triggers, (B) strategies to improve medication adherence such as coordinating with daily activities (dishwashing, showering, etc), and (C) overview of inhaler technique among other topics relevant to effective self-care.

# Authors

- Scripps: not profit (US; out-of pocket) healthcare system
- Scripps Clinic (Research) for Asthma Allergy, Immunology
- The authors are well cited-researchers within the research institute
- URX: mHealth platform

## URXmobile SENIOR MANAGEMENT



David Thompson

CEO

David has been in senior management at companies that defined and led categories like mobile banking, mobile network security, wireless location, and mobile email.



Roy Albert

Vice President, Engineering

Roy holds 10 patents and brings a deep background in Internet and mobile technologies, including messaging, networking, security, authentication, and complex state machines.



Ronald Simon, MD

Chief Medical Officer

Dr. Simon is a renowned allergist and immunologist who has held numerous national committee positions and authored more than 160 peer-reviewed publications on asthma, allergy, and immunology.



# Scripps

# Authors

Here comes the anticlimax... THEY QUIT 2 months ago!

# URXmobile has ceased operations.

Thank you to our customers and their patients for using the programs we developed for you.

\*<http://www.urxmobile.com/>

used the web archive: <https://web.archive.org/web/20170611165435/http://www.urxmobile.com/>

# Results

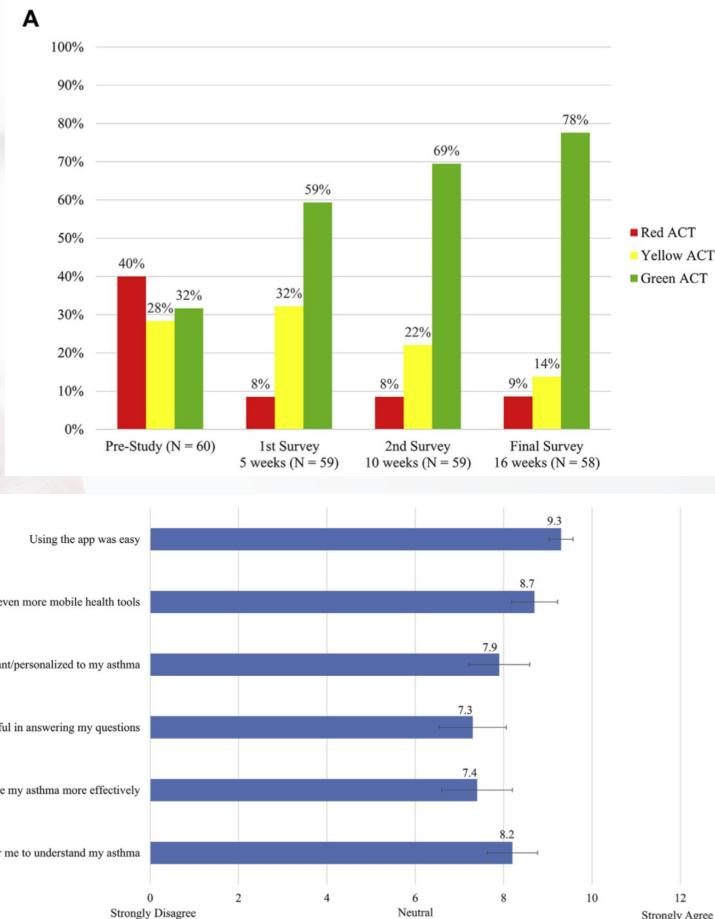
ACT scores: notable trend towards well controlled asthma statistically and clinically significant improvement

Spirometry (lung function): FEV (forced expiratory volume): statistically significant improvement; positively correlated with ACT scores

Significant decrease in prescribed medication (Systemic steroids)

73% continued to use the mobile app

Usability: promising



**FIGURE 5.** Patient satisfaction and user engagement. After 4 months of using Scripps Asthma Coach, patients were asked to rate their level of agreement or disagreement with various aspects of their experience with the app. Fifty-eight of 60 patients completed the survey. Responses indicated that patients found the app easy-to-use, personalized, and helpful in managing their asthma. 95% CIs are included.

# Conclusions

Improvement in asthma control!

Growing interest among patients, caregivers, and stakeholder in mHealth (more apps available, rising number of downloads)

Engaging in self-care through mHealth is not unique to younger patients

However:

This app used monetary rewards

User engagement for self-care apps tend to decrease over time

Perhaps confounding(learning) effects ACT

Future:

Adaptive, individualized treatment models with significant improvement for asthma outcomes

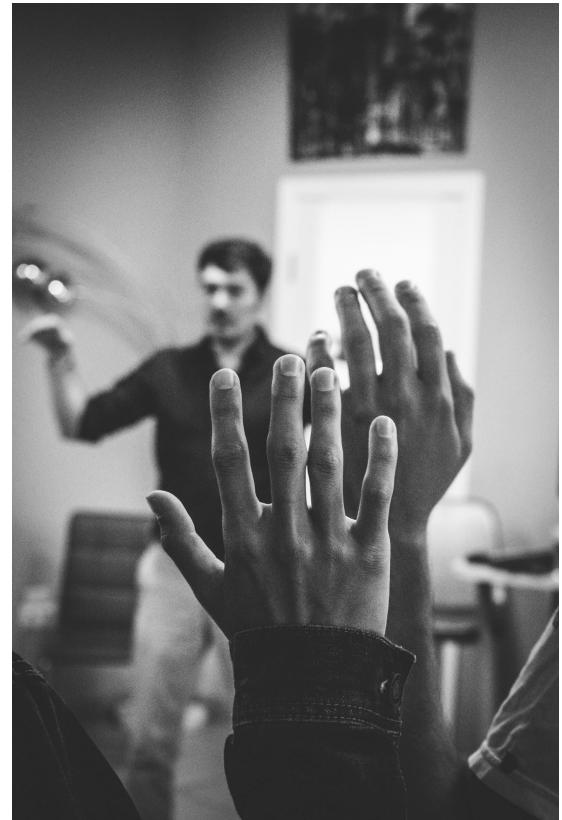
New longer trial with more **diverse population** and prospective collection of additional outcome data

# References

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- Cook, K. A., Modena, B. D., & Simon, R. A. (2016). Improvement in asthma control using a minimally burdensome and proactive smartphone application. *The Journal of Allergy and Clinical Immunology: In Practice*, 4(4), 730-737.
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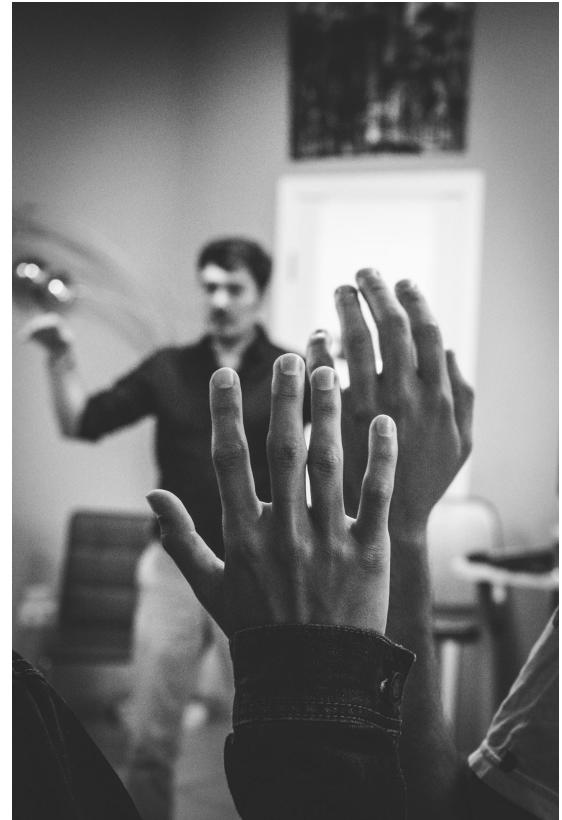
# Questions

*“What was the biggest anti-climax of the significantly Effective mHealth app?*



# Questions

*“How can one ensure long-term use of these kinds of apps?”*



# Questions

*“What extra functionalities/features would you  
Recommend for the application ?*

