Using Technology to Improve Patient Adherence
Disclosures

- None
Objectives

- Discuss the recognition of health literacy in patients and its impact on adherence to treatment plans
- Review tools available for use in clinical practice
- Discuss ways to utilize both social media and mobile devices to improve office and provider efficiency, patient engagement and overall care in the clinical setting
Mrs X is a 45 year old married woman, mother of 3 children

Lifelong history of asthma, environmental allergies

Faithfully attends physician visits

Continues to have 2-3 Emergency Dept visits/yr due to asthma exacerbations
Mrs X has seen several different asthma specialists over the past 10-20 years.

Has been prescribed ‘dozens’ of medications:
- Samples
- Prescriptions

She never appears frustrated or upset regarding suboptimal outcomes.
Despite dozens of encounters with health care professionals, she has never been asked one simple question:

“Mrs X, can you explain back to me what we just discussed?”
What is Health Literacy?

“The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”

www.nnlm.gov
What Does a Patient with Low Health Literacy Experience?

Your naicisyhp has dednemmocer that you have a ypoconsonoloc. Ypoconsonoloc is a test for noloc recnac. It sevlovni gnitresni a elbixelf gniweiv epocs into your mutcer. You must drink a laicps diuqil the thgin erofeb the noitanimaxe to naelc out your noloc.
Poor health literacy is a stronger predictor of a person's health than:

- Age
- Income
- Employment status
- Education level
- Race

Low Health Literacy

- Lower likelihood of getting flu shots, understanding medical labels and instructions, and a greater likelihood of taking medicines incorrectly\(^1\)

- Less likely to use preventative care\(^2\)

- More likely to be hospitalized and have bad disease outcomes\(^3\)

3. Baker et al., 1998, 2002) and (Schillinger et al., 2002)
Not simply the ability to read

Complex set of skills:
- Reading
- Listening
- Analytical
- Decision making skills
Prevalence of Low Health Literacy

- Adults living in the United States

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
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<tr>
<td>26%</td>
<td>did not understand when their next appointment was scheduled</td>
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<tr>
<td>42%</td>
<td>did not understand instructions to “take medication on an empty stomach”</td>
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<td>(Up to) 78%</td>
<td>misinterpret warnings on prescription labels</td>
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<tr>
<td>86%</td>
<td>could not understand rights and responsibilities section of a Medicaid application</td>
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Factors that Impact Health Literacy

- Cultural background
- Belief systems
- Communication style
- Complexity of information/treatment

Populations with lower health literacy:
- Elderly
- Immigrant
- Minority
- Low income
Increased Recognition

Joint Commission
- Patient centered
- Physician centered

Policy change
- Affordable Care Act of 2010
- National Action Plan to Improve Health Literacy
- Plain Writing Act of 2010
Table 7. Behaviors and responses that may indicate limited literacy

**Behaviors**
- Patient registration forms that are incomplete or inaccurately completed
- Frequently missed appointments
- Noncompliance with medication regimens
- Lack of follow-through with laboratory tests, imaging tests, or referrals to consultants
- Patients say they are taking their medication, but laboratory tests or physiological parameters do not change in the expected fashion

**Responses to receiving written information**
- “I forgot my glasses. I’ll read this when I get home.”
- “I forgot my glasses. Can you read this to me?”
- “Let me bring this home so I can discuss it with my children.”

**Responses to questions about medication regimens**
- Unable to name medications
- Unable to explain what medications are for
- Unable to explain timing of medication administration
Most patients try to hide it – DO NOT expect them to volunteer their inability to understand.

Can use visit to assess:

- “How happy are you with the way you read?”
- “What is the best way for you to learn new things?”
- Brown bag test of medications
- Screening tools
Strategies to Enhance Your Patient’s Health Literacy

- Written information – use short words & sentences
- Oral communication – simple, plain language
- Exhibit general attitude of helpfulness
- Review instructions
- Perform ‘Teach back method’ with patient to assess understanding
Six Steps to Improving Communication

1. Sloooowwww dooowwwwnnnn
2. Use plain, nonmedical language
3. Use pictures
4. Limit amount of information provided – and repeat it
5. Use the “teach-back” technique
6. Create shame-free environment: Encourage questions
Clinicians take responsibility for adequate teaching
  • If patients cannot explain/demonstrate, clinicians must assume they did not provide adequate instructions

Try again using different approach

Avoid:
  • Appearing rushed
  • Annoyed
  • Bored
“Many people have difficulty reading and understanding the medical information I give them, so please feel comfortable asking questions if there’s something you don’t understand.”
Write at or below the 6th grade level
  • Microsoft Word – Options → Proofing → Check grammar with spelling → Show readability statistics
  • Flesch-Kincaid grade reading level
    • Take this medication every 12 hours. → 10th grade
    • Take 1 pill in the morning and 1 pill at night. → 1st grade

Use large font (minimum 12 pt)

Use Serifs:  Non Serif / Serif

DO NOT USE ALL UPPER CASE TEXT
Streptococcal pharyngitis (strep throat)

Your doctor has diagnosed you as having streptococcal pharyngitis, or “strep throat.” Strep throat is caused by Group A beta hemolytic streptococcus, a common bacteria in the nose and throat that can cause sore throats (pharyngitis) and skin infections. Symptoms of strep throat include pain and redness in the throat, difficulty swallowing, fever, and swollen glands in the neck. Sometimes there is a rash going along with the sore throat, in which case patients are said to have “scarlet fever.” Strep throat occurs most commonly in children.

The symptoms of strep throat go away by themselves, even without treatment. Without treatment, however, a small percentage of patients with strep throat will develop rheumatic fever, a serious disease of the heart and heart valves. When patients get rheumatic fever, heart valves may be damaged, and in the future, the patient may need open heart surgery to replace a heart valve. Although rheumatic fever is uncommon, in recent years there have been more cases reported.

The treatment for strep throat involves taking penicillin, an antibiotic that kills the streptococcus bacteria. The reason for treating strep throat is not to make the sore throat get better quicker. Rather, the reason for treating the strep throat is to prevent the development of rheumatic fever. Treatment with penicillin for 10 days almost always prevents rheumatic fever. It is important that you take the penicillin for the full 10 days, even if you are feeling better before the medicine is used up. That’s because taking the penicillin for less than 10 days may not protect you against rheumatic fever. Patients allergic to penicillin can take one of several other medications.

(274 words; 10th-grade reading level)
Figure 8B. More appropriate detail and prioritization of information in a patient education handout

Treating strep throat

- Take your pills 2 times each day (once in the morning and once in the evening).
- Take the medicine every day for 10 days—even if you feel better before then.
- Stopping the pills before 10 days can result in serious heart problems.

(43 words; 6th-grade reading level)
Table 20. Checklist for patient understanding

At the end of each office visit, a patient should be able to answer the following questions.

- What is my main problem?
- What do I need to do (about the problem)?
- Why is it important for me to do this?
- Where do I go for tests, medicine, and appointments?
- How should I take my medicine?
  - When do I take it?
  - What will it do?
  - How do I know if it is working?
  - Whom and when do I call if I have questions?
- Other instructions
  - What to do?
  - How to do it?
  - When to do it?
- Next steps
  - When do I need to be seen again?
  - Do I have another appointment? If so, what is the date and time of the appointment?
  - Are there phone numbers to call?
“Drugs don’t work in people who don’t take them”

- C Everett Koop, former US Surgeon General
Adherence to Medications

- **compliance** (k m-pl ns) n.
  a. The act of complying with a wish, request, or demand; acquiescence.
  b. *Medicine* Willingness to follow a prescribed course of treatment

- **adherence** ( d-hîr ns, -h r -) n.
  1. The process or condition of adhering.
  2. Faithful attachment; devotion:
Stepwise Approach to Asthma

Step 1
Preferred: SABA PRN
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 2
Preferred: Low-dose ICS + LABA
Alternative: Medium-dose ICS OR Low-dose ICS + either LTRA, Theophylline, or Zileuton

Step 3
Preferred: Medium-dose ICS + LABA
Alternative: Medium-dose ICS + either LTRA, Theophylline, or Zileuton

Step 4
Preferred: High-dose ICS + LABA AND Consider Omalizumab for patients who have allergies

Step 5
Preferred: High-dose ICS + LABA + oral corticosteroid AND Consider Omalizumab for patients who have allergies

Step 6
Preferred: Step up if needed (first, check adherence, environmental control, and comorbid conditions)

Assess control

Step down if possible (and asthma is well controlled at least 3 months)

Each Step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).
Step up if needed
(first, check adherence, environmental control, and comorbid conditions)

Assess control

Step down if possible
(and asthma is well controlled at least 3 months)
Understanding Adherence

- Important to differentiate:
  - Treatment failure vs Non-adherence

- If adherent to therapy:
  - Step up treatment
  - Address environmental controls and co-morbid conditions

- If non-adherent to therapy:
  - Education
  - Counseling
The Many Faces of Non-Adherence

- Missed physician appointments
- Failure to obtain medication from pharmacy
- Missed doses of medications
- Improper medication administration
  - Poor inhaler technique
- Ongoing exposure to known triggers
GINA 2008 Factors Involved in Non-Adherence

Drug Factors

- Difficulties with inhaler devices*
- Awkward regimes* (e.g., four times daily or multiple drugs)
- Side effects*
- Cost of medication*
- Dislike of medication*
- Distant pharmacies*
GINA 2008 Factors Involved in Non-Adherence

Non-Drug Factors

- Misunderstanding or lack of instruction*
- Fears about side-effects*
- Dissatisfaction with health care professionals*
- Unexpressed/undisclosed fears or concerns*
- Inappropriate expectations*
- Poor supervision, training, or follow-up*
- Anger about condition or its treatment*
- Underestimation of severity*
- Cultural issues
- Stigmatization
- Forgetfulness or complacency*
- Attitudes toward ill health*
- Religious issues

* Factors Addressed in AsthmaPACT™ 2011
Suboptimal adherence to controller medications results in:
- Poor disease control
- Increased risk of hospital admission
- Asthma related mortality

Unrecognized non-adherence by physicians
- Increases cost and complexity of medication regimens
- May skew results in research trials towards null hypothesis

Studies reveal 50-77% adherence to medications
- Likely overestimates general population
Improved education and adherence for chronic disease can improve health outcomes and lead to cost savings\(^1\)

Meta-analyses have supported the value of educational interventions for improving patient adherence with asthma self-management practices\(^2\)

Low health literacy correlates with poor self management\(^3\)

Why Worry About Adherence?

- You can do a great job with
  - Establishing an accurate diagnosis
  - Prescribing an effective medication regimen
  - Educating patients about their condition
  - Establishing routine follow up visits

- But...
  - If your patients are not using their medication correctly, they will not optimize their care
How Do We Measure Adherence?

Assessing Adherence

Direct methods:
- Observation
- Measure levels of a medicine (blood/urine)
- Measure biological marker attached to the medicine
- Conduct unannounced spot checks to patients at home/clinic
- Measure clinic attendance

Indirect Methods
- Question the patient
- Ask patient to complete questionnaire
- Evaluate patient diaries for completeness
- Assess adherence based on response to treatment
- Conduct pill counts
- Use electronic monitors
- Determine prescriptions filled at pharmacy

Patient adherence by diary = 95%
Patient adherence by electronic monitoring < 60%

To improve adherence, we need to change the behavior of our patients

But first, we need to be able to assess and discuss adherence

Then we need to assess and discuss reasons for non-adherence

Then we need to try and improve adherence
Traditionally, patient education in the outpatient and hospital setting occurs primarily through direct interaction with physicians and ancillary staff

- Verbal communication
- Written handouts

Paternalistic model of care in which patient involvement is usually limited to following physician recommendations.\(^1,2\)

Videos, multimedia displays, interactive devices starting to emerge

Patients are increasingly conducting internet based searches for health information
- May receive incorrect information
- Avg adult visits MD 3 times/yr but spends 52 hours/yr researching health info on internet

Children and teenagers rely on mobile devices for daily interaction
- Across all demographics, ~70% use devices regularly
Around 51% of British adults claim to own a smartphone and 10% are thought to own a tablet.

In the United States, approximately 56% of all adults now own a smartphone.

Similarly, approximately 34% of American adults own a tablet computer.

Worldwide, approximately 16.7% of the six billion mobile subscriptions correspond to smartphone subscriptions.

Smartphone Apps

- App specific aspects that make them attractive:
  - Accessibility
  - Perceived convenience

- Most people tend to carry their mobile phones with them at all times, leaving them on even at night\(^1\)

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The rapid evolution of technology over the past few decades provides new opportunities for the design and delivery of self management initiatives within existing healthcare systems.

Specific areas amenable to technology:

- Education (videos, interactive formats)
- Medication technique (inhaler videos)
- Reminder systems
- Pharmacy refills
- Self monitoring of symptoms
- Individualized action plan
Using Technology for Education

- Multiple resources available
  - YouTube videos
  - Websites
  - Cartoons
- Pathophysiology
- Signs/symptoms
- Medication technique
- Triggers
Asthma Quest for the Code

- Lung Simulation
- Peak Flow Meter
- Game tips
- Asthma Arcade
- Quit

Office

Pen

Bedroom

Bathroom

Garage

Kitchen

Living Room
Huff and Puff: An Asthma Tale

The Big Bad Wolf huffs...and puffs...and has an asthma attack! Follow him on a journey of discovery as he learns what asthma is and how to control it in order to get his huff and puff back. Watch all 7 episodes.

Want more? Click the Vimeo icon below.
Medication Related Assistance

Non-adherence with medications is often complicated but frequently comes down to lack of a structured systematic approach

- Forgetfulness
- Chaos
- Poor understanding of benefit
- Side effects
Electronic Monitoring Devices

**FIGURE 1.** Images of some electronic monitoring devices discussed in this article.
Benefits:
- Patient centered – reminders & feedback
- Clinician – monitor adherence

Limitations:
- Cost
- Supportive technology
- Diverse software platforms
- Data assessment/analysis
- Unfamiliar clinicians

Can directly measure patient adherence through dose counter

- Considered ‘gold standard’ for measuring adherence

- Metered dose inhaler = $150
- Dry powder inhaler = $195
  - Plus software, cables, etc.
Works through broadband AT&T connection
Light and sound escalate from medication bottle
Remote monitors throughout house also alert
Push of a button sends pharmacy refill information
  • Automatic callback to confirm prescription
$59.99-79.99 plus monthly AT&T fee
GlowCap® – Remembering so you don’t have to.

GlowCap® fits most prescription bottles and uses light and sound reminders to signal when it is time to take your medications. Inside the cap, a chip monitors when the pill bottle is opened and wirelessly relays alerts, through the AT&T Mobile Broadband Network, to you or your caregiver. A push button at the base of the lid makes refills easier than ever.

LEARN MORE ➤
It's Easy to Manage Your Child's Asthma Medication

**Track** your child's inhaler every time they use it, **play** with them to encourage better use, and have the **control** you always wanted over the disease.

Follow us for all recent updates:
GeckoCap

- Small glowing button that fits on top of MDIs
- Alerts when time to take medicine
- Can communicate with IPhone, Ipad to deliver information about when inhalers are used
  - Parents, caregivers, physicians can track adherence
- Start up – limited availability $39/cap
1. An intuitive solution designed for kids

GeckoCap is a small glowing smart button that can be easily added to any asthma inhaler. The fun, colorful, and durable design is made for kids. There are no batteries to replace, cables, or hassle. It is intuitive: the GeckoCap will glow when the next dose is due.

2. Monitor your child’s health and take the stress out of asthma management

Thanks to GeckoCap’s mobile technology, you can easily monitor your child’s medication usage. The notification system lets you know when each inhaler was used, or when their inhaler is running low. Data is securely stored on the cloud, meaning you can access your child’s information anywhere, and share access with your doctor.

3. Empower children and encourage healthy habits

GeckoCap empowers children. With a unique reward system, GeckoCap gets kids involved in their own treatment. Parents can set goals and give prizes via GeckoCap’s interface to teach kids healthy habits and increase their asthma awareness.
Formerly Asthmapolis
Sensor attaches to MDI
Transmits data to smartphone
Provides data regarding inhaler use & location
Can transmit info to clinician
Used for research, epidemiology
$220/inhaler
Asthmapolis is now Propeller Health.
The leading mobile platform for respiratory health management.

SEE HOW IT WORKS

OUR SOLUTION

BETTER MANAGE YOUR ASTHMA AND COPD
Experts recommend that people with asthma and COPD track their symptoms, triggers and use of medications. The Propeller sensor and mobile application can help you learn more about and better manage your asthma and COPD.

REMOTE MONITORING AND MANAGEMENT
Healthcare providers who remotely monitor asthma and COPD symptoms and the use of medications by their patients can better identify those in need of additional attention before they suffer an exacerbation or return for additional care.

REDUCED COSTS AND IMPROVED QUALITY
Asthma and COPD are the 5th and 6th most costly conditions in the US estimated at $50 billion annually each. Improved self-management reduces the cost of treating asthma and COPD by eliminating unnecessary hospitalizations, ED visits and office visits.
Interactive Voice Recognition

- Large RCT trial adult asthmatics
- Received reminder calls if ICS was not refilled
  - Only ~50% of calls were answered
- Small but significant increase in adherence
- No significant difference in asthma control, SABA use, exacerbations

Am J Manag Care. 2011;17(12 Spec No.):SP79-SP87
Studied for various chronic conditions
Variable results
  - Most effective for smoking cessation
  - Heterogeneity of studies, populations, diseases
No significant impact on health outcomes
May benefit specific subset of patients

Text messaging service
Anyone can input reminders
Scheduled texts
Different layouts
oh, don’t forget...

create a simple text reminder, always free!

**cell number**

**date & time**

**text message**

Examples:
123-456-7890
123-456-7891

Examples:
new, today 2pm, tomorrow 9am
9/17/12 4pm, next 9:30am

Examples (please review our content policy):
get milk and bread
happy birthday buddy! From Adam
honey, please make a donut apple!

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**Ad-free texts with ODF Premium**

**schedule text messages**

Text messages queued up with Ohdon’tforget.com will be delivered at the date and time specified, unless you specify "now", which will send the message instantly.

**creative uses**

Remind anyone about an event at a specific date and time. Queue up birthday reminders months in advance. Have your to-do items sent to you throughout the day.

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**features**

- free text messaging
- no ads
- use all 160 characters
- recurring reminders
- account management
- address book

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**features**

- Free text messaging
- No ads
- Use all 160 characters
- No monthly fees
- Priority reminder delivery
- Priority support

---

**25 Text Message Reminders**

$0.99

**250 Text Message Reminders**

$4.99

**Buy Now**
Mobile health (mHealth) is growing exponentially worldwide

- Very few are designed by medical experts
  - < 50% have any clinical background at all

- Almost all utilize basic functions directed at:
  - Education of the disease and/or medications
  - Symptom/medication diaries
  - Simple reminders (text, automated recordings)

- Too numerous to display
Currently Available “Asthma Apps”

- 164 listings under asthma in Apple App Store

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Proceed with CAUTION!

An appraisal of asthma apps conducted by Huckvale 2012 found:
- 32 out of 72 asthma apps made recommendations that were not supported by current evidence

AsthmaMD™ - Track, Control, Live Better.

Asthma iPhone App Created by a Doctor
For Better Asthma Control

Why AsthmaMD?

Log on the Go

Get alerts for your asthma attacks wherever you go. Customize triggers and medications for quicker entry.

Chart Severity

At-a-glance, graphical view of your PEF and severity.

Send to Physician

One-step process to send your asthma log and peak flow chart to your physician.

Benefit Asthma Research

Anonymous, aggregate data will help correlate asthma with environmental factors, triggers, and climate change.

What our users are saying...

"I love Asthma MD. I am an asthma sufferer. And a lot of times the doctor says how many attacks have you had? I say, maybe one or two in the last week or so. This one lets me track my symptoms. The medication I'm taking and what is actually triggering it so when you go to the doctor you have a clear picture of what is happening."

- CNN Senior Editor Natali Del Conte on CBS The Early Show

"This is the third app for charting peak flow I have tried... best so far... My doctor and I love this app - thank you!"

- Mary (Philadelphia, Texas)

"I love the app! Makes me feel more in control of my son's asthma. I will tell all of my friends and family about it as well."

- User 006

"I like this app out of the many others for its ease of use."

- User Nick

"... useful interface allowing customized way to track Asthma patients away from office."

- User Tom
Conclusions

- Non-adherence to treatment plans are a significant contributing factor for poor health outcomes.
- Health literacy is a vital component to understanding and executing a successful treatment plan.
- Various forms of technology are available and may be useful to help patients better achieve their goals of therapy.
Thank You

- Questions?