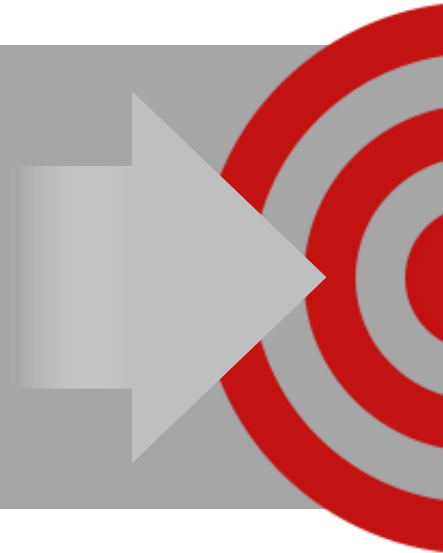


Consumer Enterprise mMashup

Combining consumer



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mHealth Networking Conference



- ▶ I propose to speak about the linkage between mobile health consumer applications and enterprise applications. Specifically, consumer applications help consumers make healthcare decisions but they obtain their healthcare and payment for healthcare services from enterprises. How can mobile applications work together with enterprise applications to achieve the goals of both the consumer and the enterprise? I will describe the construct and provide several examples of applications which exemplify this linkage.





- 1. Introduction and definition of this class of mobile applications
- 2. Three case studies of consumer mobile applications that link to and facilitate interaction with enterprise applications
 - a. Hospital (find more patients, treat them more efficiently)
 - b. Insurance Company (find more members, lower their medical costs)
 - c. Government (provide better customer service, lower the cost of serving them)
- 3. Detailed description of how these applications facilitate customer/patient relationships and benefit both the patient and the enterprise
 - a. Diagram of the interaction (customer ↔ enterprise)
 - b. Any-time value (24x7 value)
 - c. Any-place value (Geolocation sensitive)
 - d. Opportunity to resolve urgent/emergent problems before they get worse





- ▶ 4. Seven examples of these applications that are already operational (separate from case study examples)
 - ▶ a. Patient symptoms provide intelligent access to the most appropriate and available hospitals and doctors
 - ▶ b. Mobile take-a-number virtual-queue systems make customer wait time more tolerable and reduce balks
 - ▶ c. Member to insurance company services provide better customer service and more appropriate member behavior
 - ▶ i. In-network providers with locations
 - ▶ ii. Out of pocket cost estimates
 - ▶ iii. Nurse advise lines
 - ▶ d. 911 report an incident applications
 - ▶ e. Rescue beacon
 - ▶ f. Communicate with your physician via text, voice, secure email
 - ▶ g. Mobile monitoring of patient physiological status and data collection





- ▶ 5. Future direction and evolution of this class of applications
 - ▶ a. Demand management from enterprise side (too busy at facility A, send them to facility B)
 - ▶ b. Voice recognition (reaching out to all consumers, not just the tech savvy thumb typers)
 - ▶ c. End user agent with preferred mode of communication (applications that know their user's preferences and capabilities)
 - ▶ d. Photo recognition (communicate with images, not just with text and voice)
- ▶ 6. Questions, answers and discussion



Making Headlines Today!



► What are “Symptom-Driven Mobile Apps?”

- Mobile applications where navigation is controlled by user-entered medical symptoms. The symptoms plus other data are used to provide the user with one or more of the following outputs:
- Recorded symptoms over time
- Trend graphs
- Recommend treatments and diagnostic tests
- Recommended providers or facilities
- Connections with services
- First aid instructions
- Insurance information and estimated cost
- Quality information
- Referral and consultation opportunities

► These applications are being used by consumers every day to help them make critical healthcare decisions!



Today's Presentation

- ▶ Example applications
- ▶ Future developments
- ▶ Barriers to progress
- ▶ Why we should move forward
- ▶ Discussion





iPhone Savior

The Cult of iPhone News and Satire

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Haiti Earthquake Victim Uses iPhone to Survive

When American film producer Dan Woolley, found himself buried alive under the rubble of the Hotel Montana, after the massive 7.0 earthquake that hit Haiti last week, he used his iPhone to serve as a lifesaver during his 65 hour ordeal.

Woolley, from Colorado Springs, first used the light from his iPhone to identify injuries to his leg. He then accessed a medical first-aid app to correctly diagnose his broken foot and get instructions from the app to treat excessive bleeding from cuts on his leg and also on the back of his head. Yep, there's an app for app.

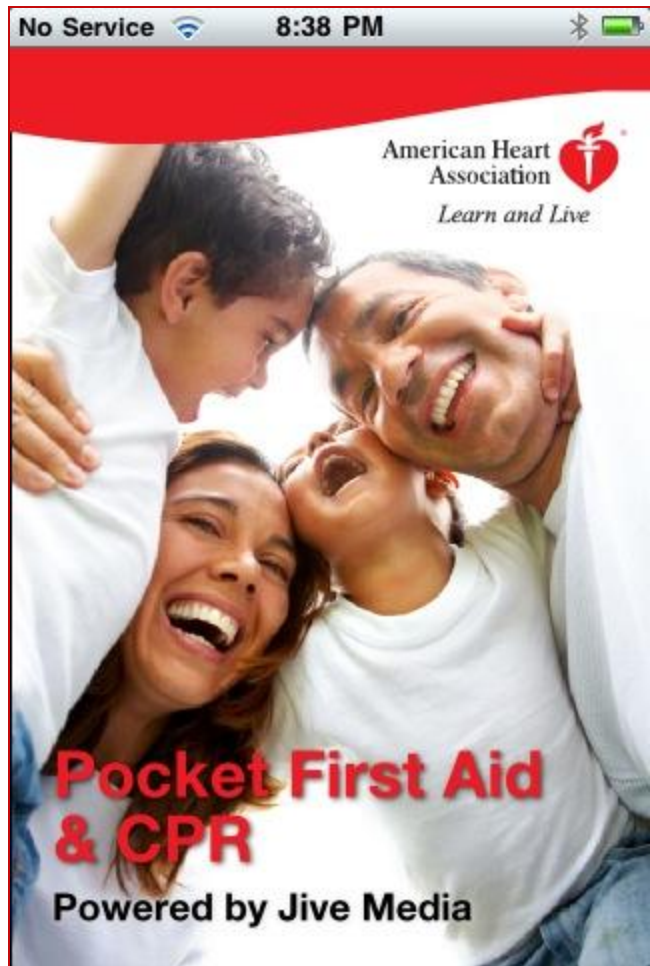
"I had my iPhone with me and I had a medical app on there," Woolley told [NBC 6 Miami](#), "So I was able to look up treatment of excessive bleeding and compound fracture."



Thanks to <http://www.iphonesavior.com/>



Pocket First Aid & CPR



Doug Kent
Jive Media

Developed App

Teamed with
American
Health
Association

Documented
use in toughest
possible
situation





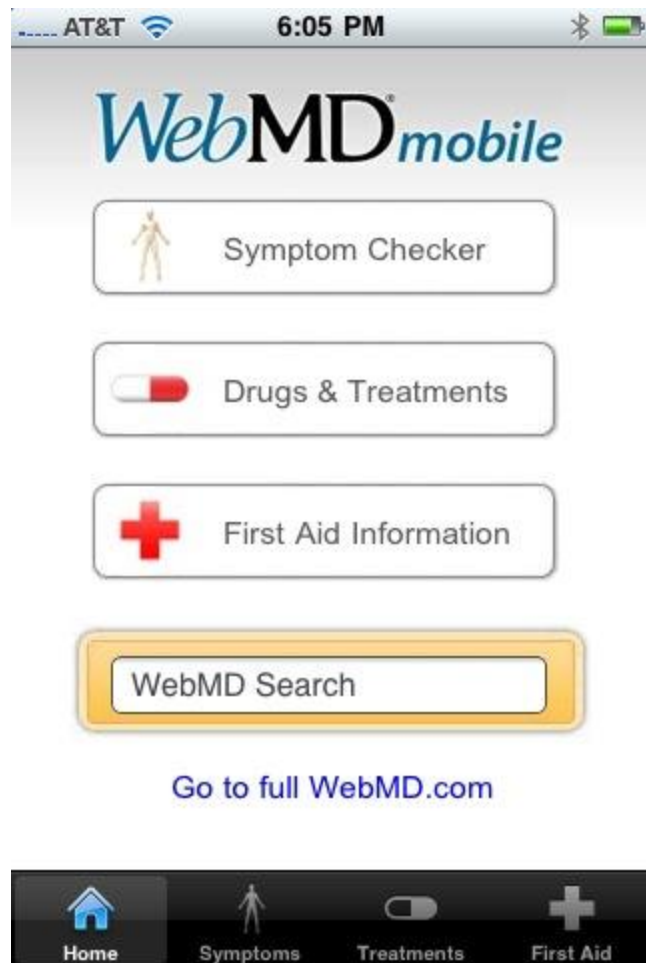
- ▶ WebMD Mobile (Free)
- ▶ iTriageHealth (Free)
- ▶ Pocket First Aid & CPR (\$3.99)
- ▶ Medscape Mobile (Free)
- ▶ Diagnosaurus DDx (\$0.99)
- ▶ Swine Flu Scanner (Free or \$0.99)
- ▶ Symptoms TakTools (\$1.99)
- ▶ iHeadache (Free or \$4.99)
- ▶ SignsSx Handbook of Signs and Symptoms (\$46.99)
- ▶ Symptom Mate (Free)
- ▶ Differential Diagnosis i-pocket (\$9.99)
- ▶ STATworkUP (\$24.99)
- ▶ eRoentgen Radiology DX (\$29.99)
- ▶ Symptom Minder (Free)



Symptom-Driven Apps
from Apple Apps Store

Image from: <http://www.mactropolis.com/images/blog/iphone-doctor.jpg>





Notes

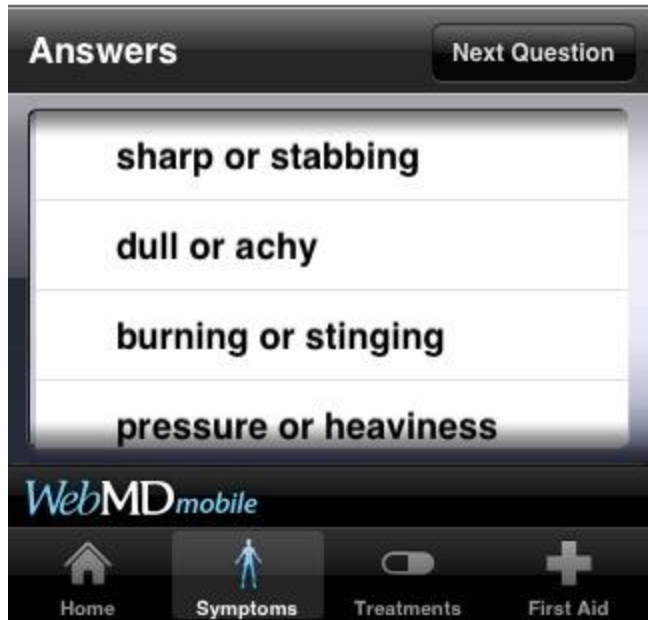
WebMD CEO Wayne Gattinella on Q3 2009 earnings call:

“We’re also investing in new markets for the future as we see the market going more mobile and more global. Our WebMD mobile health applications for consumers launched on the iPhone less than a year ago and they’ve already generated over 1 million downloads consistently ranking at the top of the App Store for health applications.”





How would you describe your pain or discomfort?



WebMD Symptom Checker

“The WebMD Symptom Checker helps people pinpoint potential conditions associated with their physical symptoms. WebMD developed a tool that combines graphics with a series of prompts that allows users to select a variety of symptoms and delivers back possible conditions or ailments based on the symptoms. The information can also be used to better inform the doctor visit. WebMD’s Symptom Checker was created by an experienced group of WebMD physicians, using the latest standards of evidence-based medicine, and an easy to user, patent pending interface making entering symptoms a snap.”

Courtesy Kate Hahn, WebMD PR





Healthagen

Founded by ER physicians who saw many inappropriate patients in their Emergency Departments

Partners with TelaDoc, Coalition America and HealthGrades

Disclosure: I have provided advisory services to Healthagen





iTriageHealth

User follows symptoms to “Possible Cause” then selects description, tests, symptoms, treatment, search web or find a provider

Available on other mobile platforms and the desktop

www.itriagehealth.com



Notes

Geolocation used to promote participating:

- Hospitals
- Physicians
- Urgent Care
- Centers
- Retail Clinics

Helps health plans control costs





Home Care Advice for Mild Chest Pain

1. **Fleeting Chest Pain:** Fleeting chest pains that last only a few seconds and then go away are generally not serious. They may be from pinched muscles or nerves in your chest wall.
2. **Chest Pain Only When Coughing:** Chest pains that occur with coughing generally come from the chest wall and from irritation of the airways. They are usually not serious.
3. **Cough Suppression Medications:** The most common cough suppressant in over-the-counter cough medications is dextromethorphan. An example is Robitussin DM. You should not try to suppress coughs that produce mucus and phlegm. Dextromethorphan is best used in the late stages of a respiratory infection when the cough is dry and hacking.
4. **Expected Course:** These mild chest pains usually disappear within 3 days.
5. **Call Your Doctor If:**
 - o Severe chest pain
 - o Constant chest pain lasting longer than 5 minutes
 - o Difficulty breathing
 - o Fever
 - o You become worse

Additional Internet Resources

1. **Heart Attack Symptoms and Warning Signs:**
 - o The American Heart Association provides helpful information about heart attack, stroke and other diseases.
 - o Available online at: <http://www.americanheart.org/presenter.jhtml?identifier=4595>
2. **Women and Heart Disease:**
 - o [Womenshealth.Gov](http://www.womenshealth.gov) provides answers to a number of frequently asked questions.
 - o Available online at: <http://www.4woman.gov/faq/heartdis.htm>.

And remember, contact your doctor if you develop any of the "Call Your Doctor" symptoms.





Capabilities

Tracking tool (Journal)

Helps identify Migraine triggers

Presents treatment options

Helps user communicate with physician



Notes

Sponsored by Merck & Co., Inc.

Example of a Disease-specific application





Capabilities

Tracks symptoms for up to 4 people

Graphs data

Communication tool

- Graphic output
- CSV output

No diagnostic or clinical rules or knowledgebase

The screenshot shows the 'Info' screen of the TakTools app. At the top, it says 'No Service' and '8:22 PM'. Below the status bar is a 'Search' button and the word 'Info'. The main content area has a 'Person_A' label, an 'Add new records' button, and a 'Done' button. Below this is a date and time selection interface with a table:

Thu Oct 8	8	50	
Fri Oct 9	9	55	AM
Sat Oct 10	10	00	PM
Sun Oct 11	11	05	
Mon Oct 12	12	10	

Below the table, it shows 'Body Temperature 36.0°C (96.8°F)' with a slider. Underneath are three toggle switches for 'Headache', 'Dizzy', and 'Throwingup', all currently set to 'OFF'. At the bottom of the main area are icons for 'Head', 'Nose/Throat', and 'Body'. The bottom of the screen features a navigation bar with icons for 'Featured', 'Categories', 'Top 25', 'Search', and 'Updates'.

Notes

Produced by TakTools

Example of a very basic data recording and communications app



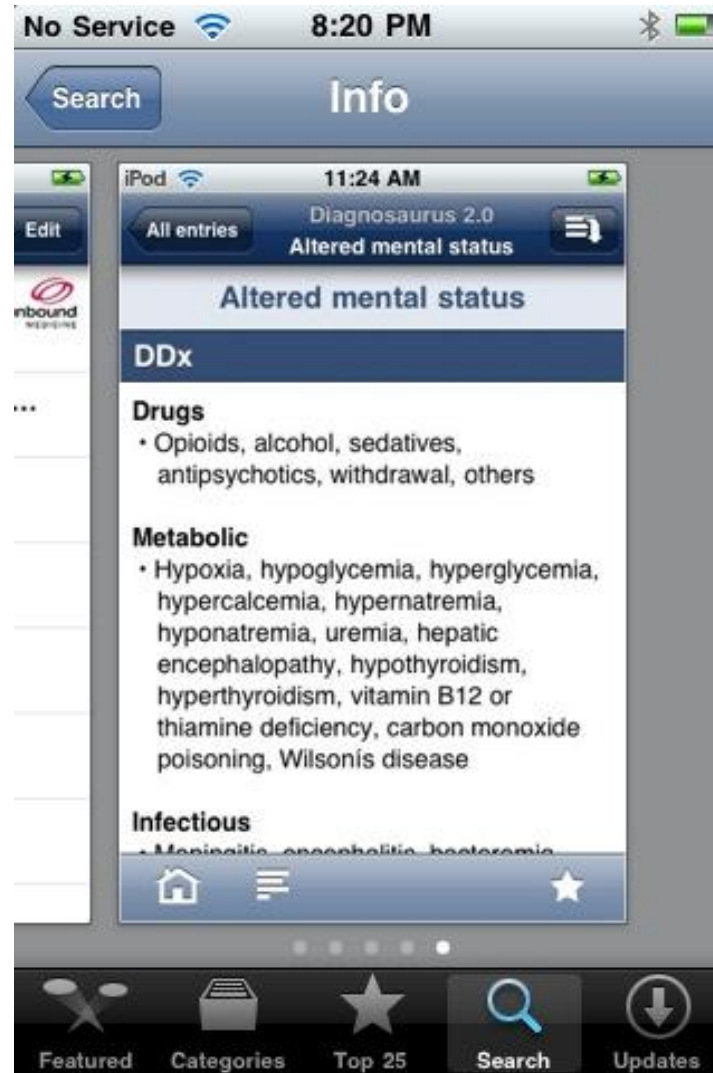


Capabilities

“Quick reference tool for healthcare professionals”

Over 1,000 differential diagnoses for medicine and surgery

Search by organ system, symptom or disease



Notes

Developed by McGraw-Hill

For use primarily by medical professionals

Many external links





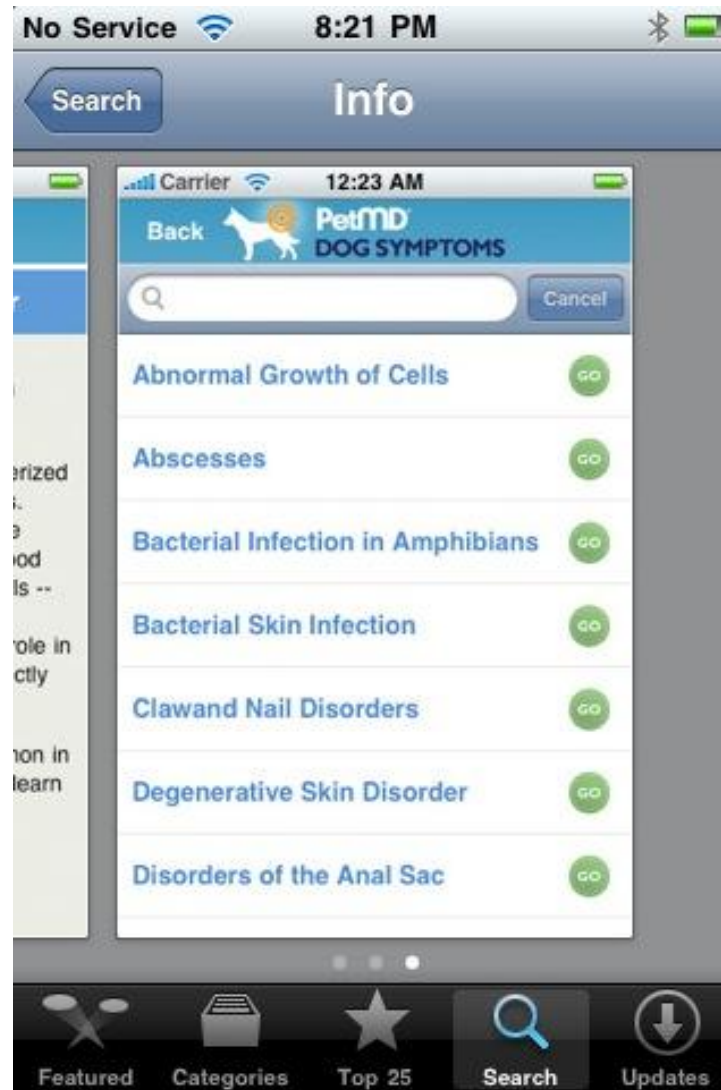
Capabilities

Exclusively for Dog Health

Recommends treatment options

Has “finder” app to locate veterinary clinics

Dog first aid, too!



Notes

Could serve as prototype for human diagnostic tools without the encountering the same political and regulatory obstacles.

Not yet available for direct use by dogs.



Swine flu symptoms checker



iHealth Ventures

H1N1 flu symptom checklist

Log symptoms with notes

Email symptoms to your doctor directly from app

Support@ihealthventures.com



Notes

Another example of a disease specific application

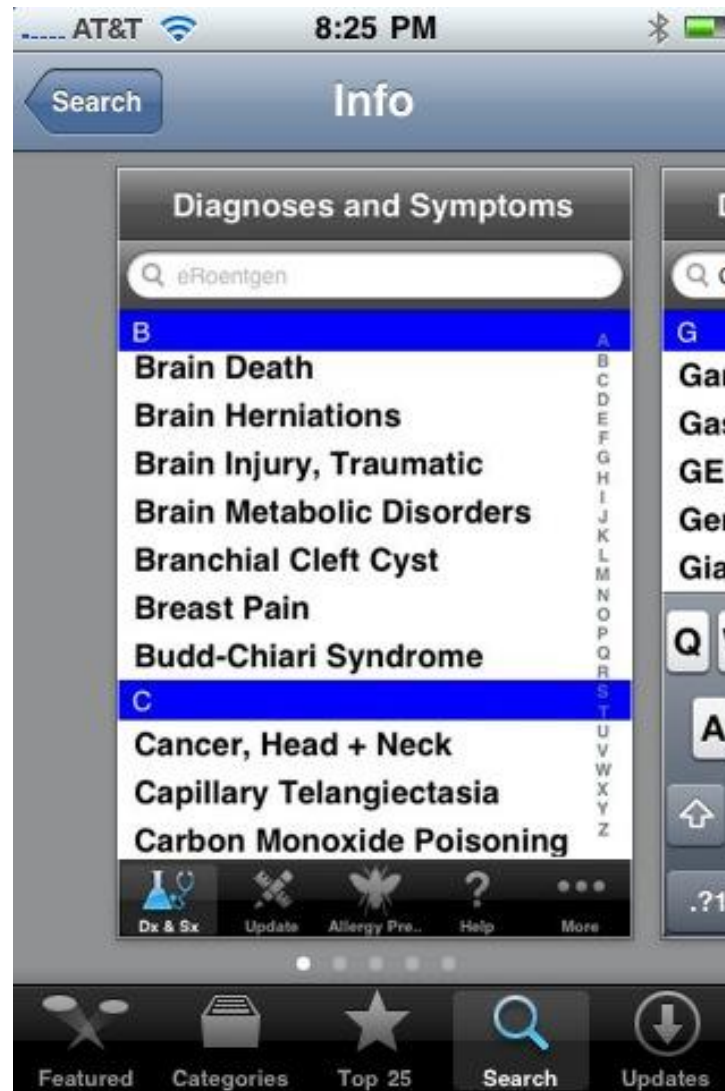




Capabilities

Specifically to help determine most appropriate radiology test

Intended to supplement other diagnostic apps



Notes

Provided by Iatros Software

Primarily for clinicians' use.

Example of modality-specific application.



Futures

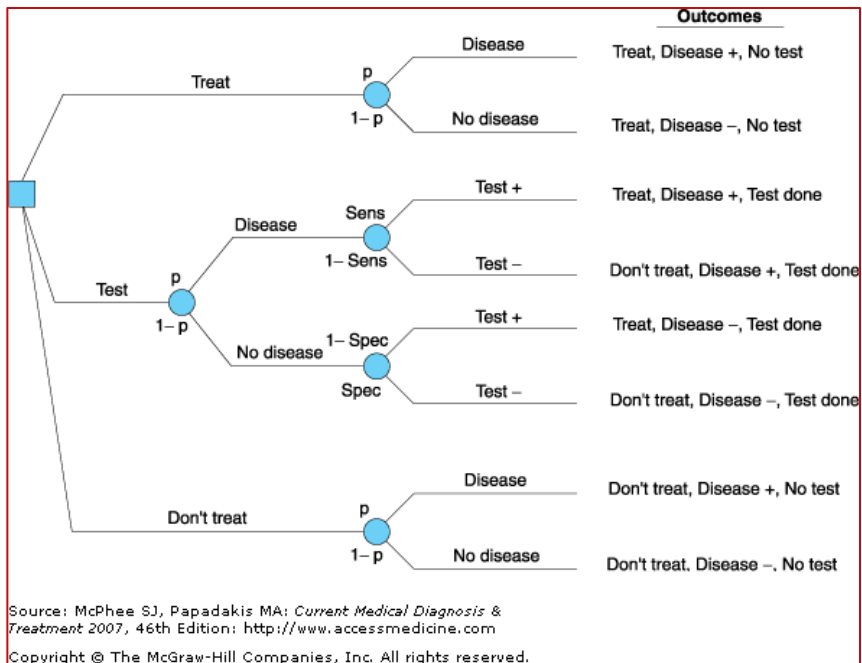
*Symptom-Driven Consumer Mobile Apps
5 - 10 years out*



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Future Features

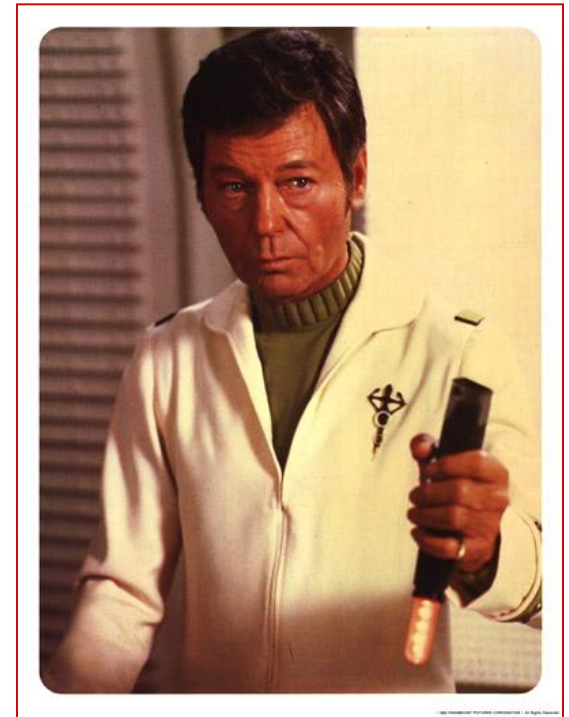
- ▶ Follow symptom tree to establish diagnosis
 - ▶ Use input and data to establish a diagnosis with treatment options



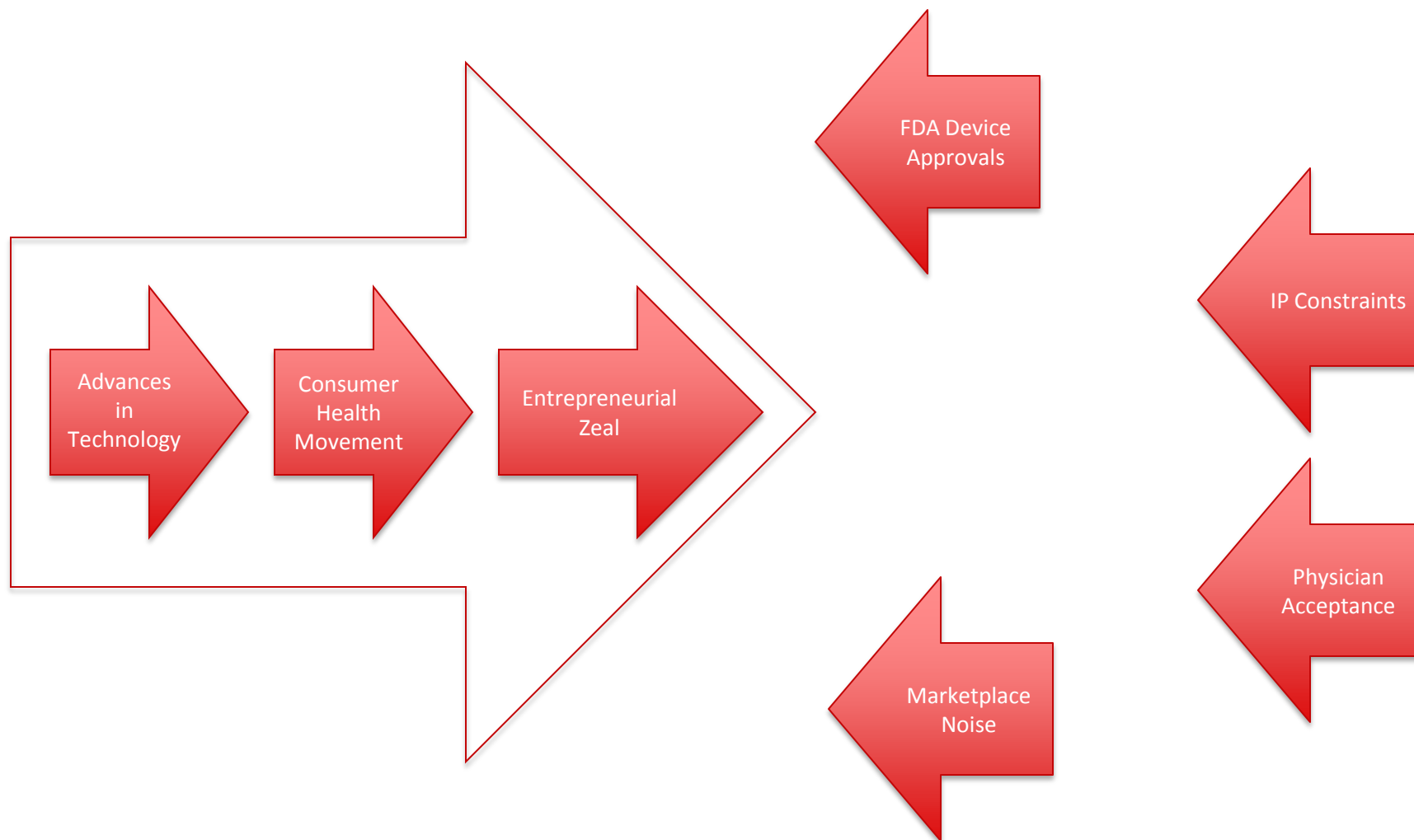
More Future Features



- ▶ Voice/SMS/MMS
 - ▶ Complemented by shared data display
 - ▶ Connect real time with most appropriate local or distant physician or medical facility
- ▶ Connection to products and services
- ▶ Embedded PHR
- ▶ Real Time Interoperability
 - ▶ PHR, EMR and HIE
- ▶ Biosensors
 - ▶ COPD, CHF, intoxication
- ▶ Geolocation
 - ▶ Altitude sickness, infectious outbreaks, indigenous parasites, biological / chemical agent surveillance
- ▶ Accelerometer
 - ▶ Falls, Activity Levels



Rapid Evolution of Applications soon to encounter resistance



Barriers

IP Obstacles

Patents and Copyrights



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Example Patent – Interactive first aid information system



United States Patent
Sullivan , et al.

7,623,915
November 24, 2009

Interactive first aid information system

Abstract

In general, the invention is directed to techniques for determining appropriate first aid and applying first aid that is appropriate. A first aid system receives patient status information from an input device or a sensor, and presents first aid information as a function of the received patient status information. The first aid system may be incorporated with an external defibrillator. The first aid system may acquire patient status information through an interaction with an operator, in which the first aid system asks the operator to supply patient status information. In one embodiment of the invention, the operator may supply patient status information by touching a diagram representing at least a portion of a human body.

Inventors: Sullivan; Joseph L. (Kirkland, WA), Nova; Richard C. (Kirkland, WA), Owen; James M. (Redmond, WA)
Assignee: Medtronic Physio-Control Corp. (Redmond, WA)
Appl. No.: 10/620,742
Filed: July 16, 2003

Current U.S. Class: 607/5 ; 128/920; 600/300; 705/2; 706/924
Current International Class: A61N 1/39 (20060101); A61B 19/00 (20060101); A61H 31/00 (20060101)
Field of Search: 607/1-5 600/300,301 128/897,898,903,904,920,922-925 601/15,41 705/2-3 434/262,265 706/11,45,47,924 715/700

References Cited [Referenced By]

U.S. Patent Documents

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4353359	October 1982	Milbauer
4610254	September 1986	Morgan et al.
4619265	October 1986	Morgan et al.



Barriers

Regulation



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- ▶ **Further advances in these symptom-driven applications takes them closer and closer to FDA Regulation**

- ▶ **“How to get FDA to clear a mobile health app”** by Bradley Merrill Thompson, Partner, Epstein Becker & Green

- ▶ <http://mobihealthnews.com/5626/how-to-get-fda-to-clear-a-mobile-health-app/>

- ▶ **Which applies to your mobile app?**

- ▶ Software that does NOT meet the legal definition of a device and is not regulated by FDA.
 - ▶ Software that does meet the legal definition of a device but is currently not actively regulated, and FDA is unlikely to require pre-market review.
 - ▶ Software that does meet the definition of a device and FDA is actively regulating and would require a pre-market review.

- ▶ **Evaluate the risk to your investment – don't be surprised**



What makes your app or device subject to FDA regulation?



- **Connection with biosensors and manipulation of biosensor data increases likelihood of FDA concerns**
- **Complex analysis leading to diagnosis, treatment or testing recommendations increases concerns**
- **Software intended to provide cure, mitigation, treatment, or prevention of disease increases concerns**
- **If you have any concerns at all or plans that encroach in these areas consult with an attorney experienced in working with the FDA**



Barriers

Acceptance by the Medical Establishment

Fear of false claims and inappropriate use will slow physician endorsement of use by consumers



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Why move forward?

Costs versus Benefits



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Given those barriers, why move forward?



- ▶ Improved quality of care
 - ▶ Catch problems right then when they happen
 - ▶ Earlier detection/understanding by consumer can lead to more effective action
- ▶ Reduce cost of inappropriate care
 - ▶ Reduce use of high cost Emergency Department for minor care
 - ▶ Reduce use of under-equipped under-qualified providers for acute need
- ▶ Mass availability to those who don't have access or won't avail themselves to hands-on face to face care
 - ▶ More people in the world have mobile devices than have face-to-face access to a knowledgeable care provider
 - ▶ Some people will be more willing to access information on their own device rather than make face-to-face contact with a care provider
- ▶ Evidence-based consumer-oriented clinical decision support versus unproven advice from unproven sources
 - ▶ If some entity is willing and able to enforce truth-in-labeling consumers will be able to self-select applications which provide evidence-based medical advice



Why move forward? (continued)



- ▶ Mobile devices may one day have better memories, better access to user's clinical data, better access to clinical knowledge, better clinical decision algorithms and better analytic capability than alternative sources
 - ▶ Knowing when and where and if this is true will be critical for regulation
 - ▶ Fear of false claims and inappropriate use will slow physician endorsement of use by consumers
- ▶ The really big reasons? Potential for:
 - ▶ Higher Quality
 - ▶ Improved Safety
 - ▶ Better Access
 - ▶ Lower Cost
 - ▶ Financial success for those who:
 - Develop
 - Deploy
 - Support





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