

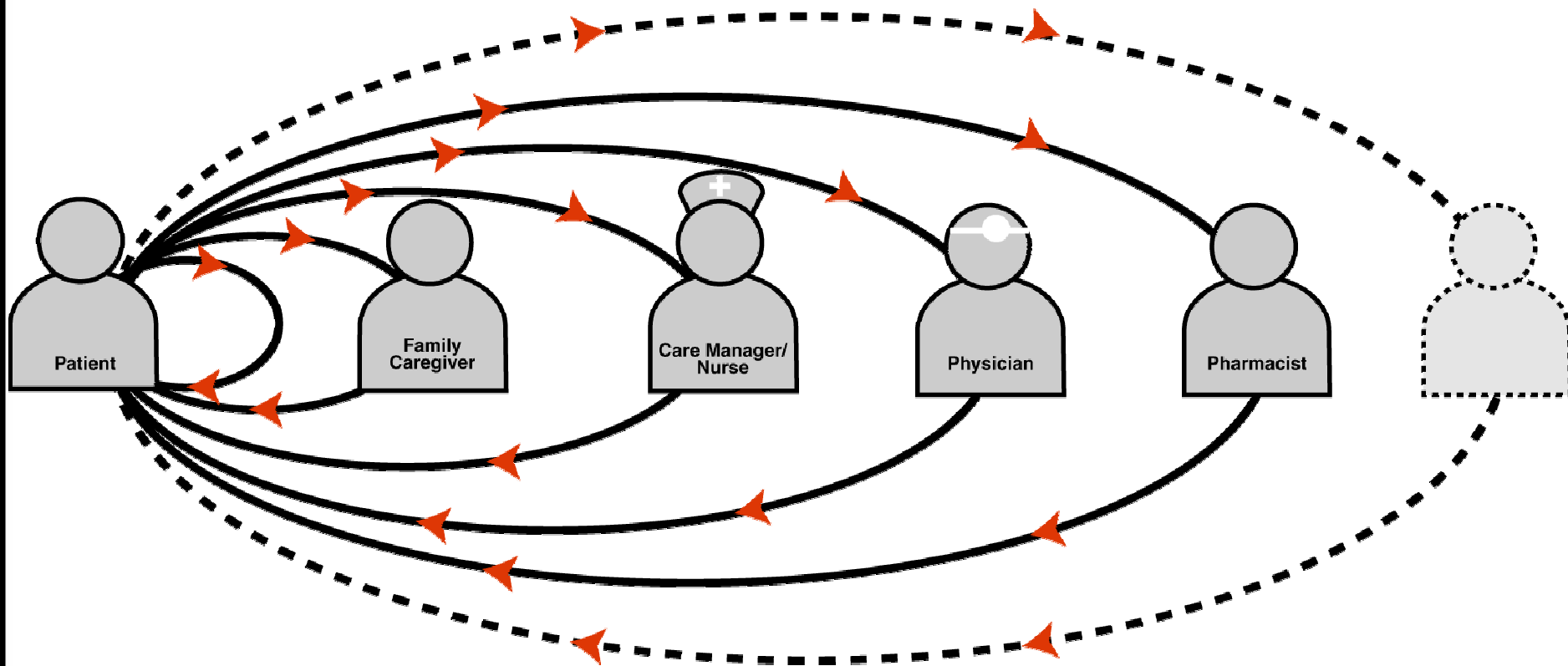


Use of Internet-Based Technology for Remote Patient Monitoring

Geoffrey Clapp
CTO/COO
clapp@healthhero.com

Health Hero[®]
NETWORK

The Continuum of Care

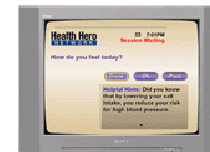


An Internet-based technology platform

Health Hero[®] NETWORK



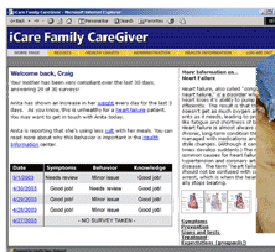
**Health Hero[®] iCare Desktop[™]
Health Care Professionals**



**HEALTH HERO
NETWORK
Secure Data
Center**



Patients



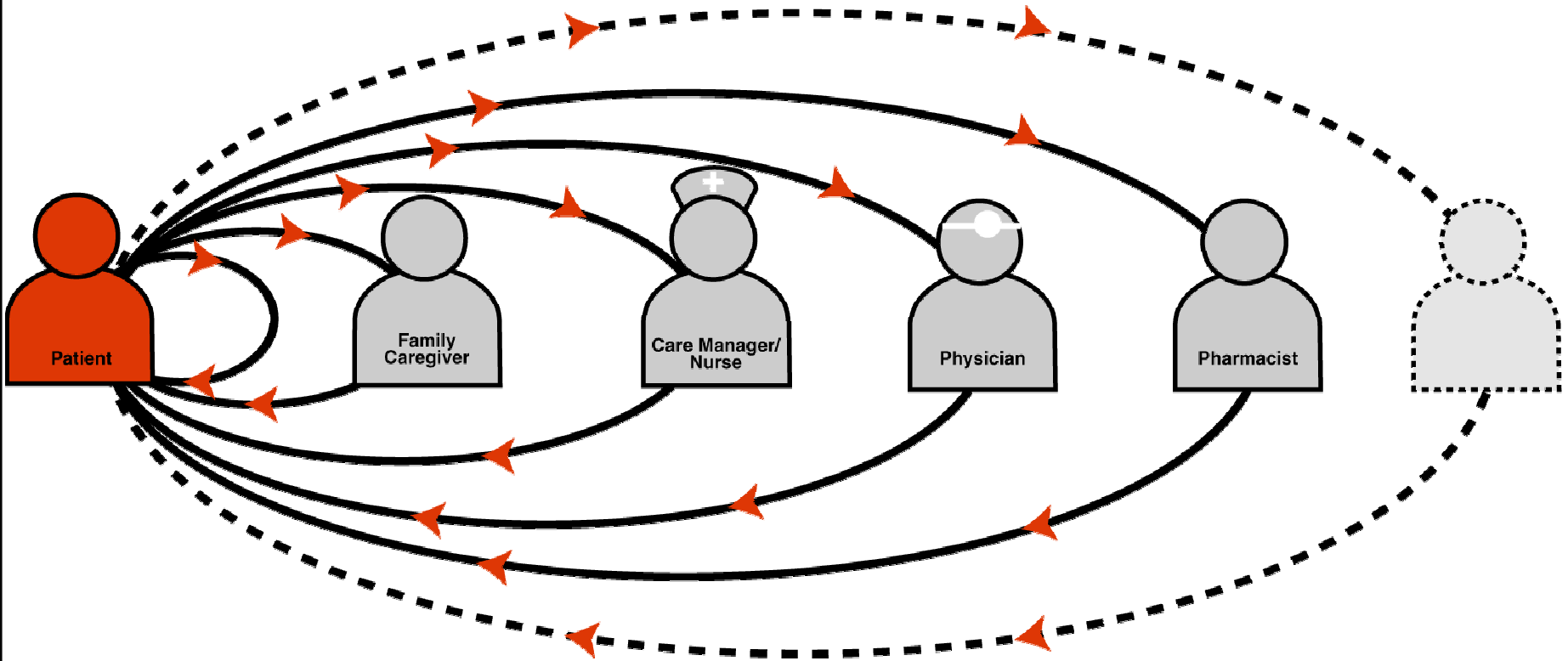
**Health Hero[®] iCare Family CareGiver
Family Members**



www.healthhero.com



Care Continuum - Patients



- **90% of patients search the internet for information on symptoms and treatment**
- **80% of patients want to monitor their health even when they are well**
- **78% of patients over the age of 65 will use the Internet for information on symptoms and treatment**
- **69% of patients want to see the results from their home monitoring activities**

Published: Accenture, Home Healthcare Electronics: Consumers Are Ready, Willing, and Able. Rousel, Nunes, Spring 2002



Hello Mary.
What is your weight today?

120

Less More

OK

Reminder: A weight gain may be a sign of fluid retention. Be sure to take your medicines and call Dr. Jones if your weight goes up more than 3 pounds.

OK

Daily Health Quiz: What is the best way to avoid feeling thirsty?

1. Drink water constantly
2. Save your fluids for mealtime and when you are feeling very thirsty
3. Eat more salt

1 2 3

- **Structured data collection is the key to any successful remote patient management system, independent of which technology implemented**
- **Patients require non-intrusive, easy to use collection methods**
- **Technology must adapt to the PATIENT in the form of SOLUTIONS**





- **Simple to install, set up, and use**
- **Collects structured data**
- **Fits into the a chronically ill patient's lifestyle**
- **Promotes extremely high compliance**
- **Stresses education and behavior modification**



Health Buddy Web - Microsoft Internet Explorer

Health Buddy Web Health Hero NETWORK

MY HOME PAGE MY SURVEY MY RESULTS MY HEALTH CHARTS MY INFORMATION HELP CENTER LOG ME OUT

You are now taking your Health Buddy Web Survey, which was prepared by your health care provider.

You will be asked a series of questions to determine your care needs and health conditions. This data will be sent to your health care provider.

Health Buddy Web - Microsoft Internet Explorer

Health Buddy Web Health Hero NETWORK

MY HOME PAGE MY SURVEY MY RESULTS MY TREND CHARTS MY INFORMATION HELP CENTER LOG ME OUT

VIEW LATEST RESULTS VIEW MONTHLY RESULTS

Did you

You are now viewing your daily results. These are results to questions you answered on October 23, 2002.

You can go forward and back a day using the arrows on both sides of the date below. Clicking on the right arrow will move you forward a day, the left arrow will move you back a day.

◀ OCTOBER 23, 2002 ▶

YOUR QUESTION	YOUR RESPONSE
What was your most recent blood sugar? (0-69, 70-130, 131-239, 240-999)	0-69
A fasting blood sugar under 70 is considered to be too low. Remember to eat a sugar source when your sugar is low, take your medicine, and eat your meals and snacks as recommended by your doctor	Continue
Do you understand the schedule for your diabetes medicine or insulin, as your doctor has ordered it?	No
Sometimes schedules for medicines can be confusing, but it is important that you know when you should have your medicine. Call your doctor today to get this important information, and write it	Continue

Causes, incidence, and risk factors:

- To understand diabetes, first consider the normal process of food metabolism. Several things happen when food is digested:
- A sugar called glucose enters the bloodstream. Glucose is a source of fuel for the body.
- An organ called the pancreas makes insulin. The role of insulin is to move glucose from

Insulin pump Endocrine glands
Type 1 diabetes Diabetic blood circulation in foot

Powered by Health Hero Network Technology Solutions For Health Monitoring

- Intended for web-savvy patients
- Allows the patient to report information to professionals as well as self-monitor and educate
- Enhances the user experience through graphics, text, and other information



HealthBuddyWeb Veterans Integrated Service Network (VISN) 8 

MY HOME PAGE TAKE MY SURVEY VIEW MY RESULTS CREATE MY REPORTS VIEW MY TREND CHARTS LOG ME OUT

MONTHLY DAILY DECEMBER 21, 2000 GENERAL BEHAVIOR SYMPTOMS KNOWLEDGE

You are now Viewing Your Daily Results. These are the actual results to questions answered by you on the specified date.

Got a question about Viewing Your Daily Results? Ask the Nurse below!

You can go forward and back a day using the arrows on both on the right arrow will move you forward a day, the left arrow To view another category for this day, click on the arrows on through your results for General, Behavior, Symptoms and K

HealthBuddyWeb Veterans Integrated Service Network (VISN) 8 

MY HOME PAGE TAKE MY SURVEY VIEW MY RESULTS CREATE MY REPORTS VIEW MY TREND CHARTS LOG ME OUT

PROGRESS INDICATOR 1 2 3 4 5 APPROXIMATE TIME REQUIRED: 3 MINS.

RISK	YOUR QUESTION
medium	Did you check your feet and ankles for swelling today? It is important for you to check your feet and ankles daily for swelling. Swelling is an early warning sign of congestive heart failure. Please check your feet now.
low	Do you have any changes in your ability to do routine activities (cooking, dressing, bathing) today?
medium	Did you weigh yourself today? Although it is important to weigh yourself every day, some patients

Powered by Health Hero Network VISN 8 Home & Co

You are now Taking Your Health Buddy Survey. These are the questions prepared for you by your care provider.


Got a question about Taking Your Health Buddy Survey? Ask the Nurse below!

You will be asked a series of questions from four categories: General and Knowledge. Please answer these as accurately as possible used by your care provider to chart your progress and may help of treatment.

Last night, did you need to increase the number of pillows you slept on because of trouble breathing?

BACK TO PREVIOUS QUESTION

Powered by Health Hero Network VISN 8 Home & Co

HealthBuddyWeb Veterans Integrated Service Network (VISN) 8 


MY HOME PAGE TAKE MY SURVEY VIEW MY RESULTS CREATE MY REPORTS VIEW MY TREND CHARTS LOG ME OUT

RISK PLOT WEIGHT DYSPNEA ORTHOPNEA EDEMA

You are now Viewing Your Trend Charts. These charts are created from the results of questions you've answered over time.

Using the trend charts, you can chart your progress over a period of time. Using weight for example, you can see how your weight has varied within the time span you've specified.

Trend Chart: Weight



Default Specify Span: start to Chart it

Powered by Health Hero Network VISN 8 Home & Community Care Service Line - Leadership & Innovation HELP

Got a question about Viewing Your Trend Charts? Ask the Nurse below!



Health Buddy Web - Microsoft Internet Explorer

Health Buddy® Web Health Hero NETWORK

MY HOME PAGE MY LINKS MY RESULTS MY SEARCH CHARTS MY INFORMATION HELP CENTER LOG ME OUT

VIEW LATEST RESULTS VIEW MONTHLY RESULTS

You are now viewing your daily results. These are results to questions you answered on December 21, 2002.

You can go forward and back a day using the arrows on both sides of the date below. Clicking on the right arrow will move you forward a day, the left arrow will move you back a day.

◀ DECEMBER 21, 2002 ▶

YOUR QUESTION	YOUR RESPONSE
Did you check your feet and ankles for swelling today?	No
It is important for you to check your feet and ankles daily for swelling. Swelling is an early warning sign of congestive heart failure. Please check your feet now.	Continue
Do you have any changes in your ability to do routine activities (cooking, dressing, bathing) today?	No
Did you weigh yourself today?	Yes
What is your weight today?	115
Last night, did you need to increase the number of pillows you slept on because of trouble breathing?	No

Causes, incidence, and risk factors:

To understand diabetes, first consider the normal process of food metabolism. Several things happen when food is digested:

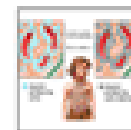
- A sugar called glucose enters the bloodstream. Glucose is a source of fuel for the body.
- An organ called the pancreas makes insulin. The role of insulin is to move glucose from



[Insulin pump](#)



[Endocrine glands](#)



[Type 1 diabetes](#)



[Diabetic blood circulation in foot](#)

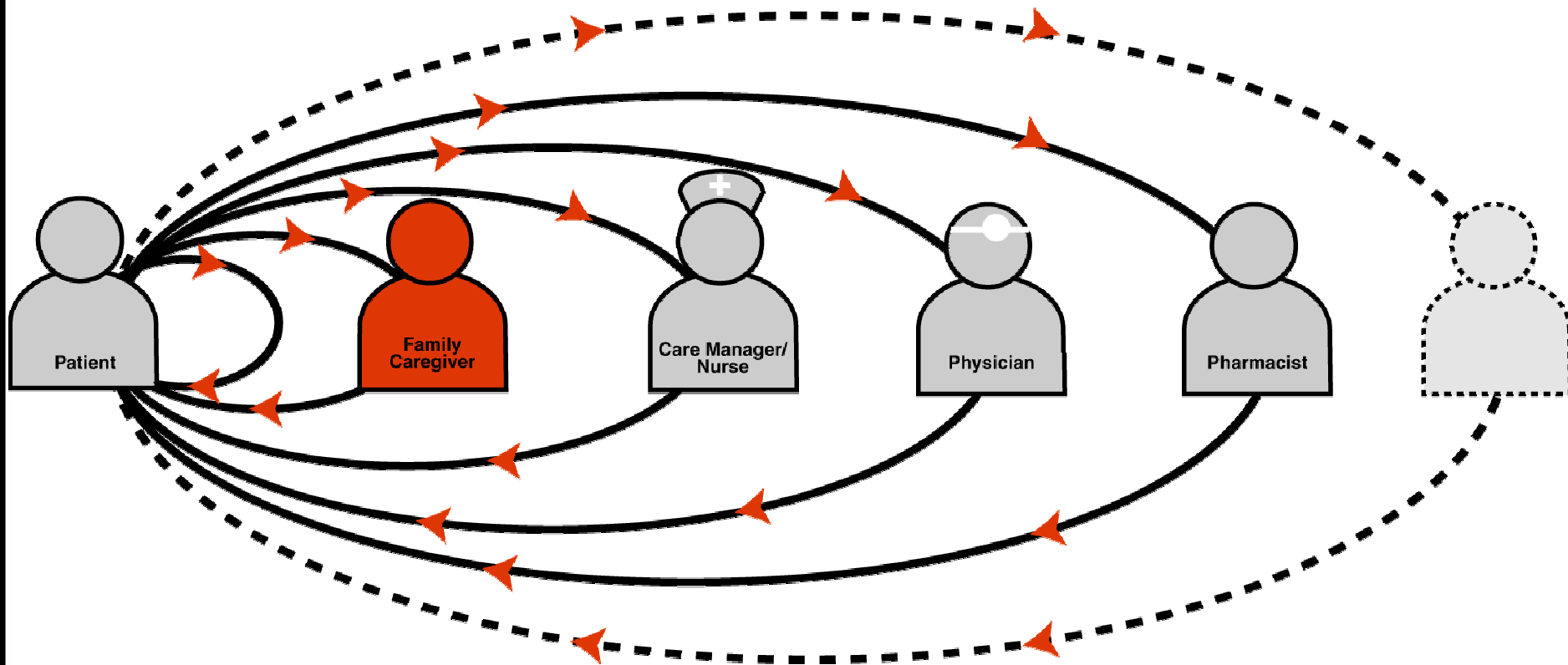
Causes, incidence, and risk factors:

To understand diabetes, first consider the *normal* process of food metabolism. Several things happen when food is digested:

- A sugar called glucose enters the bloodstream. Glucose is a source of fuel for the body.
- An organ called the pancreas makes insulin. The role of insulin is to move glucose from



Continuum of Care – Family



- **81% of survey respondents see the benefit of monitoring the condition of a family member or friend**
- **30% of survey respondents currently monitor the condition of a family member or friend**
- **60% of respondents have elderly parents with chronic disease that are not living with them**

**Published: Accenture, Home Healthcare Electronics:
Consumers Are Ready, Willing, and Able. Rousel, Nunes,
Spring 2002**



Welcome back, Craig
Your mother has been very compliant over the last 30 days, answering 29 of 30 surveys!

Anita has shown an increase in her [weight](#) every day for the last 3 days. As you know, this is unhealthy for a [heart failure](#) patient. You may want to get in touch with Anita today.

Anita is reporting that she's using less [salt](#) with her meals. You can read more about why this behavior is important in the [Health Information](#) center.

Date	Symptoms	Behavior	Knowledge
5/1/2003	Needs review	Minor issue	Good job!
4/30/2003	Good job!	Needs review	Good job!
4/29/2003	Good job!	Minor issue	Good job!
4/28/2003	Good job!	Minor issue	Good job!
4/27/2003	- NO SURVEY TAKEN -		

More Information on... Heart Failure
Heart failure, also called "congestive heart failure," is a disorder where the heart loses its ability to pump blood efficiently. The result is that the body doesn't get as much oxygen and nutrients as it needs, leading to problems like fatigue and shortness of breath. Heart failure is almost always a chronic, long-term condition that is managed with medications and lifestyle changes. (Although it can sometimes develop suddenly.) The most common causes for heart failure are hypertension and coronary artery disease. The term "heart failure" should not be confused with cardiac arrest, which is when the heart actually stops beating.

[Symptoms](#)
[Prevention](#)
[Signs and tests](#)
[Treatment](#)
[Expectations \(prognosis\)](#)

Powered by Health Hero Network

- Intuitive, consumer focused design gives family caregiver easy access to information and tools to understand it
- Summary gives a quick overview of key aspects of the patient's condition
- Content stresses education and behavior modification



iCare Family CareGiver

HOME PAGE RESULTS HEALTH CHARTS ADMINISTRATION HEALTH INFORMATION LOG ME OUT


You are now viewing Anita Turner's results.

You can go forward or back a day using the arrows on either side of the date below. Clicking on the right arrow will move you forward a day, the left arrow will move you back a day.

◀ FEBRUARY 18, 2003 ▶

	QUESTION	RESPONSE	INFO
	Welcome back, Anita! Thank you for using the Health Buddy. Begin whenever you are ready.	continue	
Good job!	Did you weigh yourself today?	Yes	
	What is your weight today? (Use the arrows to indicate weight)	118	
Needs review	This is higher than your usual weight. This could be a sign that your body is retaining fluid. One cause of fluid retention is eating foods that contain too much salt.	Okay	
	Remember to limit your salt intake and take your medications as prescribed by your doctor. Also, weigh yourself every day, at the same time, wearing the same amount of clothes.	continue	
Needs review	Did you wake up because of shortness of breath last night?	Yes	
	Waking up with shortness of breath at night can be a symptom of heart failure getting worse, or other medical problems.	continue	

Powered by Health Hero Network

- Data presented in a simple, non-clinical manner
- Results are presented with follow-up indicators, not risk levels
- Info icon  promotes learning for the patient and provider



iCare Family CareGiver - Microsoft Internet Explorer
Back Forward Stop Home Personal Bar Search Favorites

iCare Family CareGiver

HOME PAGE
RESULTS
HEALTH CHARTS
ADMINISTRATION
HEALTH INFORMATION
LOG ME OUT

You are now viewing Anita Turner's results:

You can go forward or back a day using the arrows. The right arrow will move you forward a day, the left arrow will move you back a day.

◀ FEBRUARY 18, 2003 ▶

QUESTION	ANSWER
Welcome back, Anita! Thank you for using the Buddy. Begin whenever you are ready.	
Good job! Did you weigh yourself today?	What is your weight today? (Use the arrows to indicate weight)
Needs review	This is higher than your usual weight. This is a sign that your body is retaining fluid. One cause of fluid retention is eating foods that contain too much sodium. Remember to limit your salt intake and take medications as prescribed by your doctor. Also, weigh yourself every day, at the same time, wearing the same clothes.
Needs review	Did you wake up because of shortness of breath at night? Waking up with shortness of breath at night can be a symptom of heart failure getting worse or other medical problems.

Powered by Health Hero Network




More Info - Microsoft Internet Explorer
Back Forward Stop Home Personal Bar Search Favorites

iCare Family CareGiver

HOME PAGE
RESULTS
HEALTH CHARTS
ADMINISTRATION
HEALTH INFORMATION
LOG ME OUT

More Information on... Heart Failure

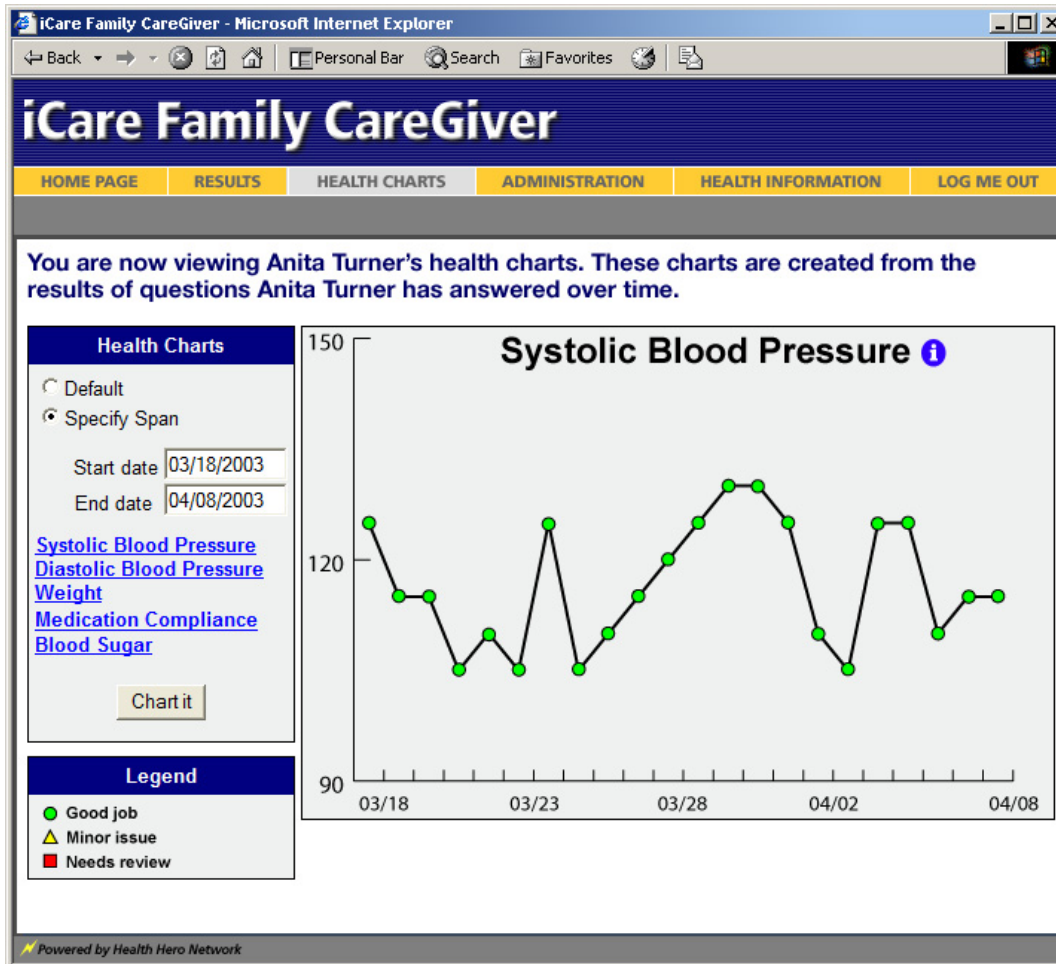
Heart failure, also called "congestive heart failure," is a disorder where the heart loses its ability to pump blood efficiently. The result is that the body doesn't get as much oxygen and nutrients as it needs, leading to problems like fatigue and shortness of breath. Heart failure is almost always a chronic, long-term condition that is managed with medications and lifestyle changes. (Although it can sometimes develop suddenly.) The most common causes for heart failure are hypertension and coronary artery disease. The term "heart failure" should not be confused with cardiac arrest, which is when the heart actually stops beating.

[Symptoms](#)
[Prevention](#)
[Signs and tests](#)
[Treatment](#)
[Expectations \(prognosis\)](#)
[Complications](#)

CLOSE WINDOW

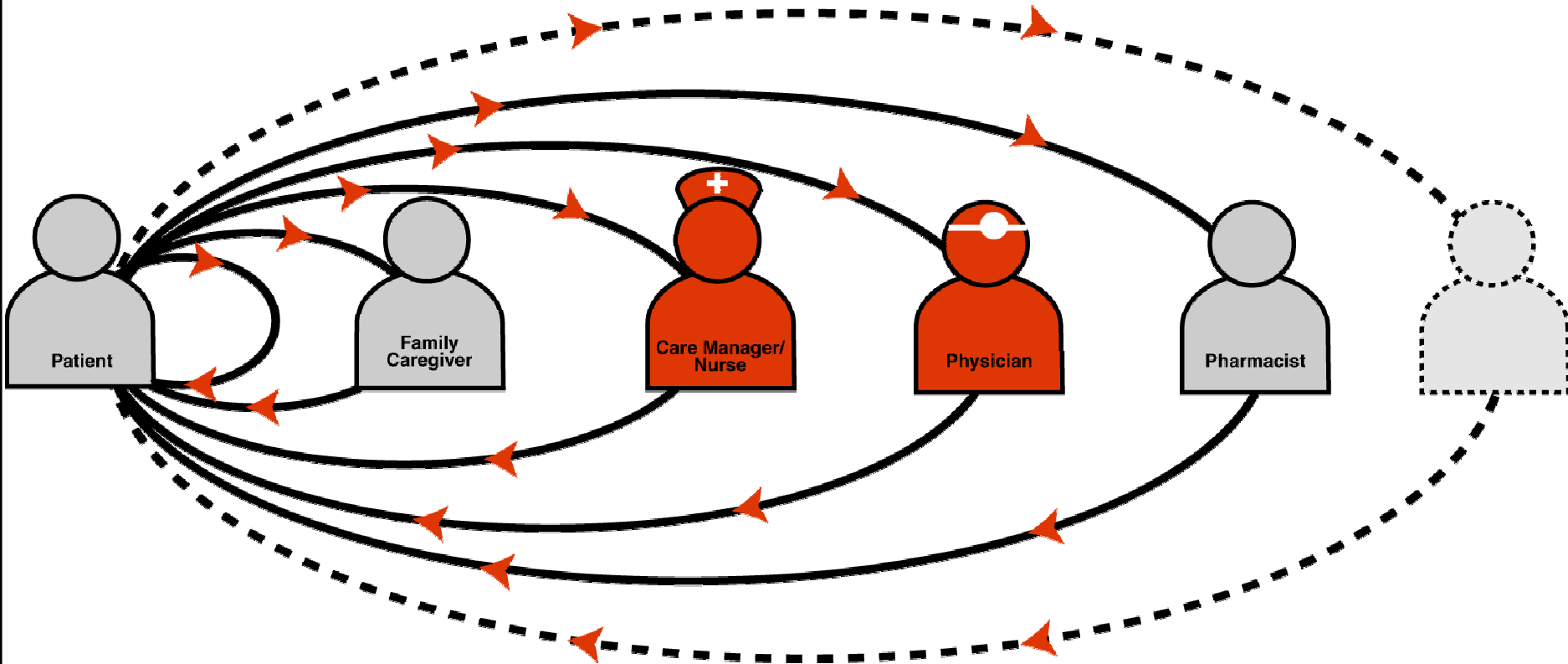




- Graphical representation of results
- Color-coded indicators for easy to read, “one-look” interface



Care Continuum - Professional



- Inherently, professional interfaces provide tools for analyzing collected data, and where appropriate, indicate opportunity for professional intervention
- Professional interfaces for analyzing data must fit into existing workflow, or enhance the provider workflow significantly
- Professional interfaces must use existing standards for data definition and interchange
- Professional interfaces must use these standards to promote secure and HIPAA-compliant data exchange



Responses on Tuesday, November 19, 2002

Patient	Response Time	Sympt.	Blvr.	Kwdg.	Gen.
Lang, Nancy	08:38 AM PST	High	High	Low	Low
Cherry, Julie C.	08:41 AM PST	High	Low	Low	None
Beninger, Jennifer	11:15 AM PST	Low	High	Medium	None
Messing, Mel	10:16 PM PST	Low	Medium	None	None
Lapp, Mary	09:38 AM PST	Low	Low	Medium	None
Coll, Laurie	10:09 PM PST	Low	Low	Low	Low
Hoff, Jane	11:14 AM PST	Low	Low	Low	None
Man, Marie	09:12 AM PST	Low	Low	Low	None

- HIPAA-compliant population management tool
- Adaptable to any disease state
- Facilitates monitoring and management of patient
- Fully audited review tools within the clinical information system



Geoffrey Clapp
Wed, November 26, 2003

Find Patient:
(Last Name) [Contact Health Hero](#) [Help](#) [Log Out](#)

[Home](#) [Patient](#) [Reports](#) [Enrollment](#) [Disenrollment](#) [Schedule](#) [Setup](#)

You have 8 unreviewed in box items: **1 Escalation, 6 High Risk Results, and 1 Note overdue.**

iCare Inbox

	Date	Category	Subject
<input type="checkbox"/>	07/21/2003	Escalation	2 pound weight gain for patient Gill, Hal
<input type="checkbox"/>	07/21/2003	Note Due	Call patient on 7/21
<input type="checkbox"/>	07/21/2003	Results	High Risk Symptoms for Patient Luna, Craig
<input type="checkbox"/>	07/20/2003	Results	High Risk Symptoms for Patient Clapp, Geoff
<input type="checkbox"/>	07/20/2003	Results	High Risk Symptoms for Patient Coll, Laurie
<input type="checkbox"/>	07/19/2003	Results	High Risk Symptoms for Patient Cherry, Julie
<input type="checkbox"/>	07/19/2003	Results	High Risk Symptoms for Patient Mann, Marie
<input type="checkbox"/>	07/19/2003	Results	High Risk Symptoms for Patient Wo, Dave

- Email style inbox for patient results, escalations, and other workflow tasks
- Built-in, customizable workflow tools
- Configurable to clinical standing orders or operating procedures
- Can be integrated into existing care management systems



Professional – Disease Specific

TheraSense® FreeStyle CoPilot™
Web-Based Data Management System

Management Summary Report

Dr. J. K. Smith May 08, 2003 - June 07, 2003				Self-Monitored Blood Glucose				ADA Practice Recommendations Readings					Risk Management Medications				
Type	ID #	First Last (age) (sex)	Home Tel.#	Sev. Hypo. mg/dL	Sig. Hypo. mg/dL	Freq. Hyper. mg/dL	Total	Eye	Foot	U-Alb	HbA1C	Lipid	BMI	ACE/ARB	Statin	ASA	B-Block
1	6915	Kathy Murphy (40) (F)	303-781-9001														
2	2770	Art Pierce (42) (M)	309-529-9305														
1	6521	Yolanda Miles (40) (F)	210-957-3785														
1	7298	Joe Roberts (15) (M)	415-657-3900														
1	7299	Billy Simpson (41) (M)	415-582-8990														
2	4612	Jim Nelson (28) (M)	916-340-2199														
1	6644	John Smith (55) (M)	339-555-7844														
GES	2839	Ann Bender (22) (F)	664-310-0997														
2	2842	John Bender (27) (M)	664-310-0997														
1	2691	Rick Campbell (60) (M)	214-555-7893														
1	2840	John Doe (60) (M)	314-789-5767														
2	2939	Mary Garcia (16) (F)	498-456-9008														
2	2840	Kim Gates (55) (F)	825-555-8785														
1	2834	Tim Jackson (58) (M)	714-845-2337														
1	2936	Beth Jones (29) (F)	654-239-2327														
1	2424	Jane Rogers (42) (F)	926-452-6325														
2	2677	Matt Pleins (32) (M)	916-883-0993														
GES	2790	Ellie Yim (40) (F)	212-801-1234														
2	2011	Joe Robert (28) (M)	664-455-8766														

TheraSense | FreeStyle CoPilot™

FreeStyle CoPilot™ Web-Based Data Management System

Managing data online... as simple as checking e-mail.

Managing your diabetes requires making decisions about insulin dosages and other medication, about diet, about exercise. These decisions are guided by data from blood glucose tests and other relevant information, and by the patterns that can be seen by you and your Health Care Providers when the data is presented in organized and graphical formats. The FreeStyle CoPilot System makes managing data the easiest part of managing diabetes.

Simple. Secure. Flexible. Free.

Free

Take Control Now

Home
Corporate
Investor Relations
FreeStyle™
FreeStyle Tracker™
FreeStyle CoPilot™
Overview
Sign-Up as User
User Log-in
Privacy & Security
Customer Care
Diabetes News
Ask the Educator
Community
Jobs
Order
TheraSense Canada

The Technology of Caring™

- **CoPilot™ - Diabetes Monitoring by TheraSense**
- **Provides secure on-line data access and clinical reporting**
- **Clinically specific, alternate view on data collected using remote patient monitoring technology**



Improves Productivity/Efficiency

Measure	Traditional	Health Hero
Patients Managed Per Care Manager (n)	133	133
Average # Calls/Day	27 (based on 1/wk/pt)	10
Average Length of Out Bound Call	20 min	2 min 41 sec
Total Time / Day for CM	9 hours	53 min
Estimated Nurse:Patient Ratio	1:100	1:500
Frequency of Monitoring	WEEKLY	DAILY



- Congestive Heart Failure
- Coronary Artery Disease
- Co-Morbid Congestive Heart Failure/Diabetes
- Co-Morbid Hypertension/Chronic Obstructive Pulmonary
- Hypertension
- COPD
- Diabetes
- Co-Morbid Diabetes/Hypertension
- Co-Morbid CAD/Angina
- Pediatric Asthma
- Adult Asthma
- Depression
- Bi-Polar Disorder
- Senior Wellness
- Cystic Fibrosis



Success measurements for Remote Patient monitoring technology must consider:

- Clinical Effect
- Financial Effect
- Patient Satisfaction
- Provider Satisfaction



- **Veterans Health Administration Community Care Coordination Service, Florida**
- **Telemedicine-based care coordination demonstration project**
- **791 chronically ill veterans enrolled for 1 year, compared to comparison group data**
- **Elderly, high-risk, high-cost veterans with hypertension, heart failure, COPD, and diabetes**



- **Mercy Health System in Laredo, Texas**
- **Home-based telemedicine program for uninsured, high-risk, underserved population with diabetes and heart failure**
- **One year study period using comparative cohort data from previous calendar year**
- **Total of 169 patients - 130 females and 39 males with average age of 53 years in both genders (diabetes); 57 heart failure patients**



- **40% reduction in emergency room visits**
- **63% reduction in hospital admissions**
- **60% reduction in hospital bed days of care**
- **64% reduction in nursing home admissions**
- **88% reduction in nursing home bed days of care**
- **Significant improvement in Quality of Life SF36V**
- **Published in Disease Management, Volume 5, Number 2, 2002**



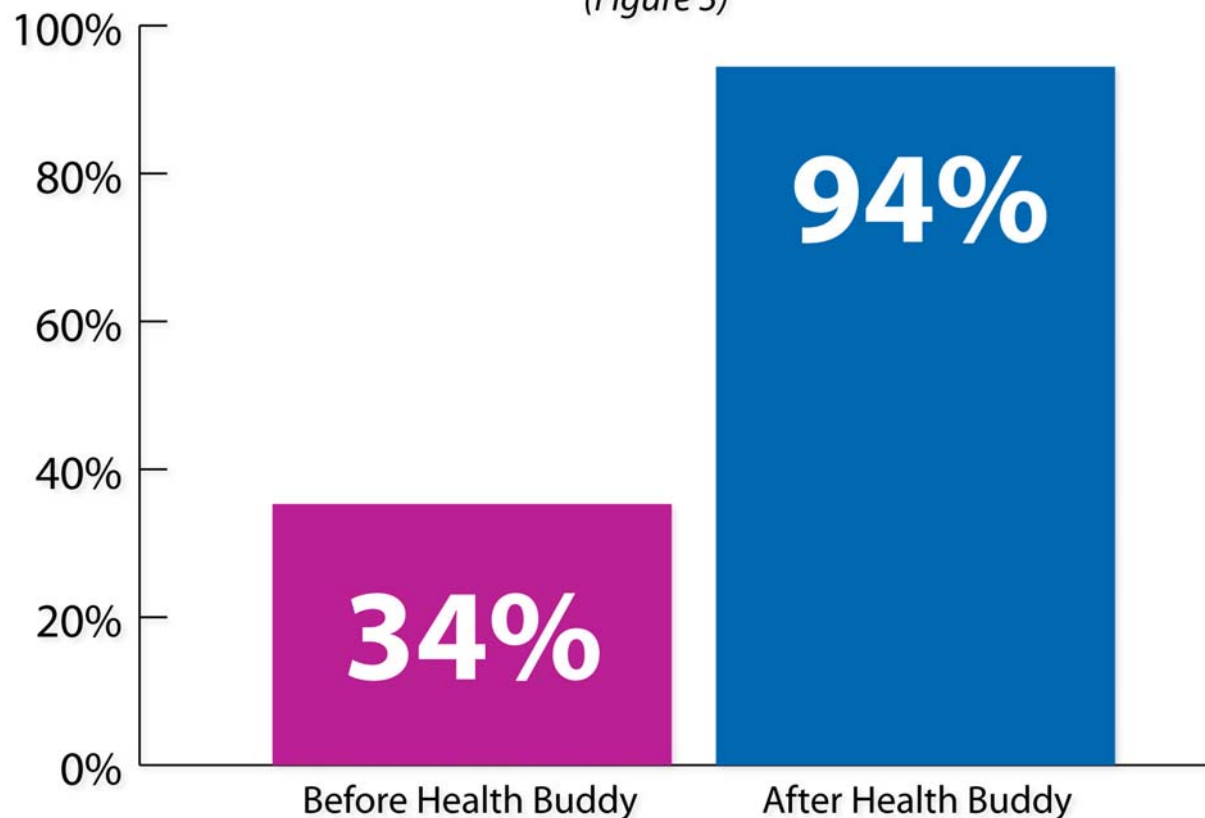
- **Inpatient admissions reduced 32%**
($p < 0.07$)
- **Emergency room encounters reduced 34%**
($p < 0.06$)
- **Outpatient visits reduced 49%**
($p < 0.001$)
- **Published in Diabetes Technology & Therapeutics Journal, December 2002**



Medication Compliance Before and After Health Buddy

Medication Compliance

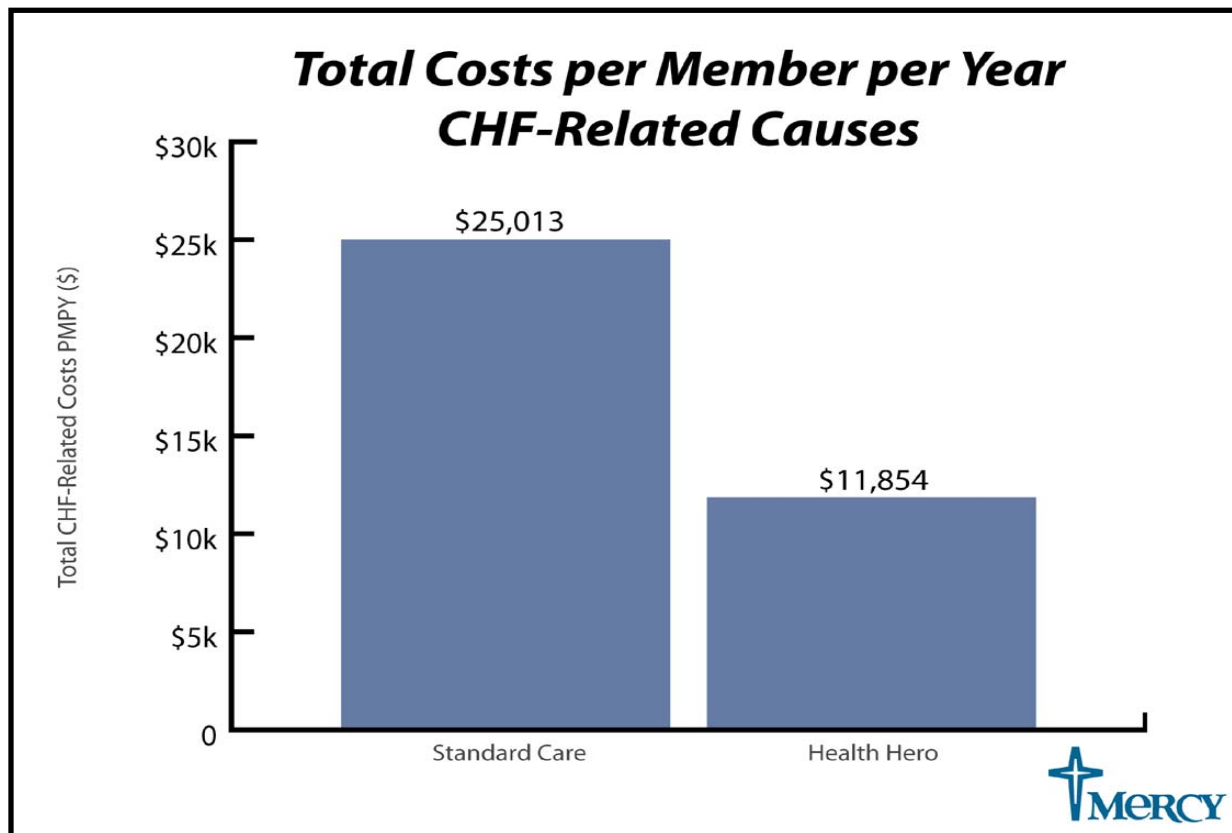
(Figure 3)



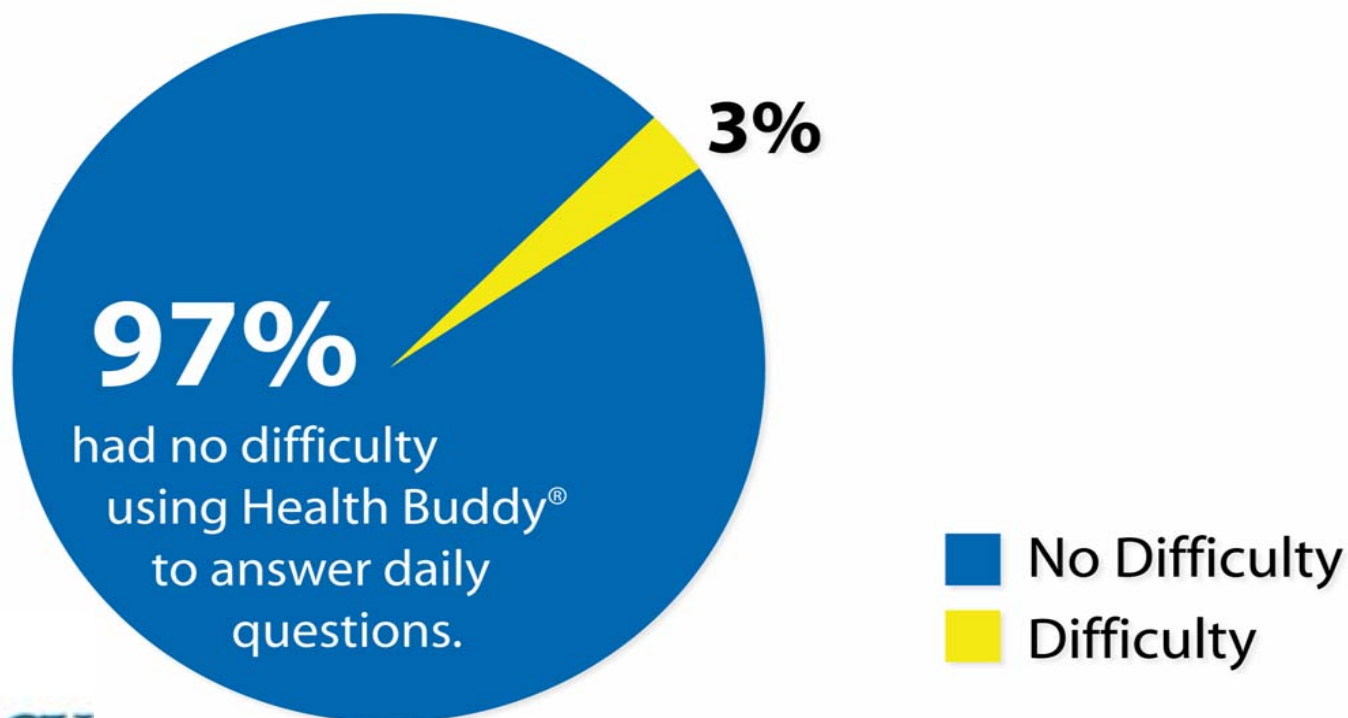
Graphs show percentage of patients who take medication regularly



Reduced charges by \$13,159 PPPY, compared to standard care program

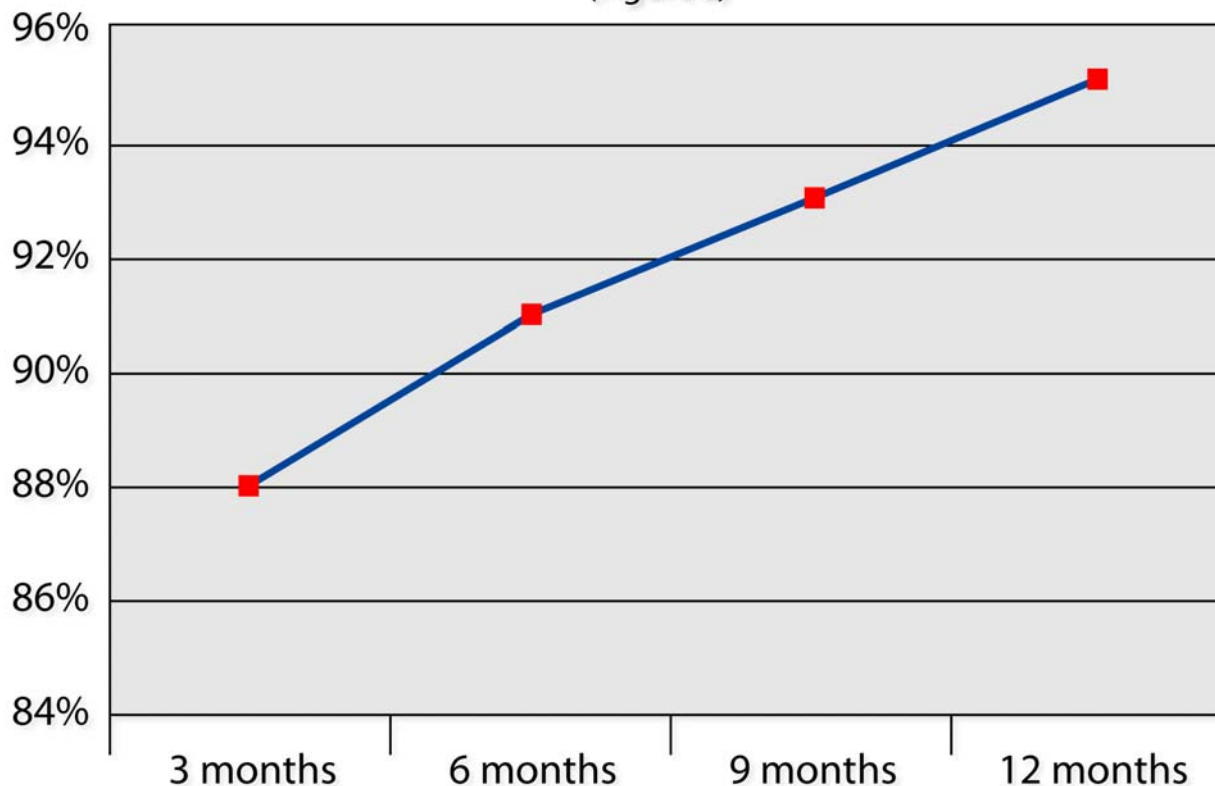


Most Patients had no difficulty using the Health Buddy[®] to answer daily questions.



Over time patients feel more connected to their doctors, nurses and the hospital.

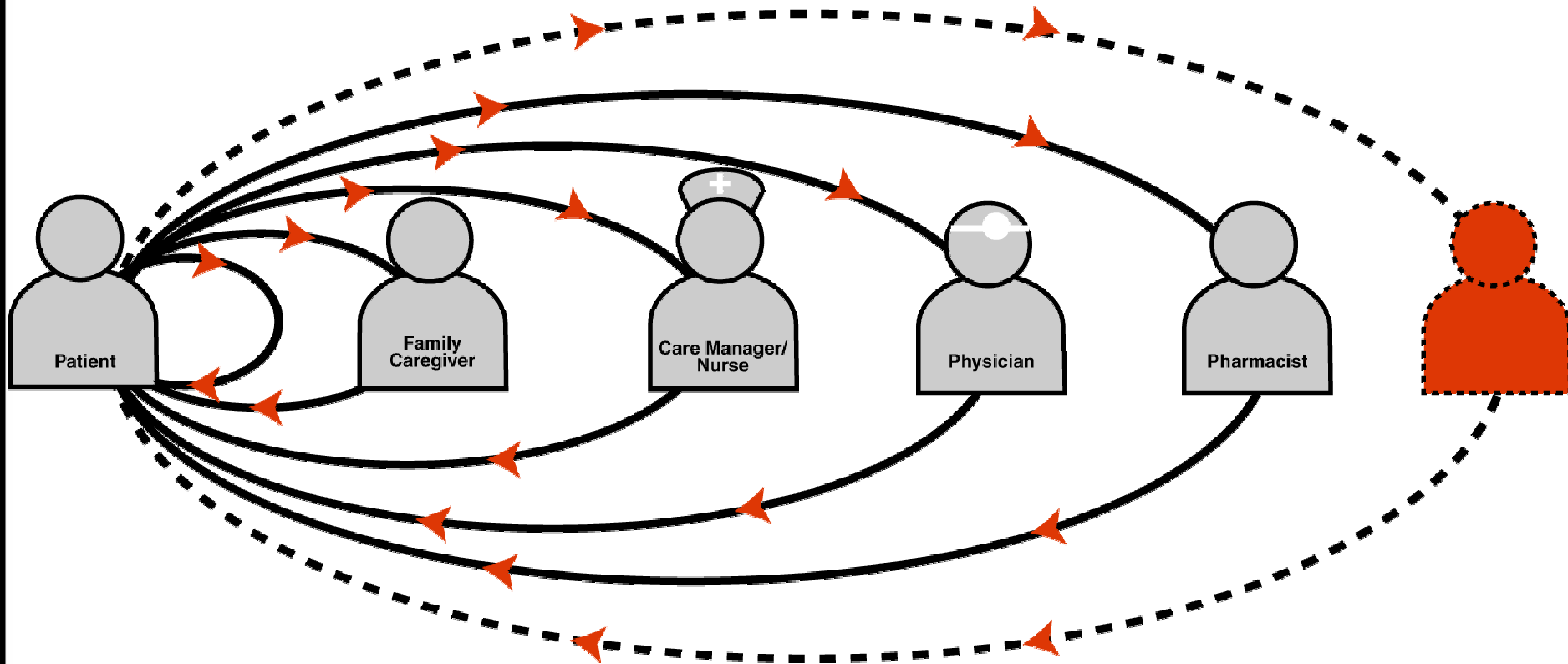
(Figure 2)



- **90% of providers reported that communication between themselves and the care coordinators was timely and appropriate**
- **92% of providers believed the program was beneficial to their patients**
- **95% of providers would refer patients to the program**
- **Published in: Telemedicine Journal and e-Health, Volume 9, Number 1, 2003**



The Continuum of Care



How do you feel today?

Great

OK

Poor

Health Hero
NETWORK

www.healthhero.com