



The Case for Health Engineering

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Motorola – Fort Lauderdale, FL

Framing the Discussion - 01

“..students of medical economics have long realized that what consumers demand when they purchase medical services are not these services per se but rather better health.”

Framing the Discussion - 02

FROM:

“Let’s improve the healthcare system for all Americans”

TO:

“A care system that improves the health of all Americans”

Dysfunctional Health Delivery System

“..The most striking feature of the employed, insured, middle-income system of care is the absence of any formal system. Each family puts together an informal set of services and facilities to meet its own needs. The system, therefore, has no formal structure or organization and is different for each individual or family...each family’s system may vary widely according to the particular situation in which it is used. The only constant feature of this system is the family itself; all other aspects are transient, changeable, and widely varied.”

Evidence-Based Medicine: how to treat sick patients.

Evidence-Based Health (“EBH”): dissemination of best-practices to keep people healthy, prevent illness → Technology Admin.

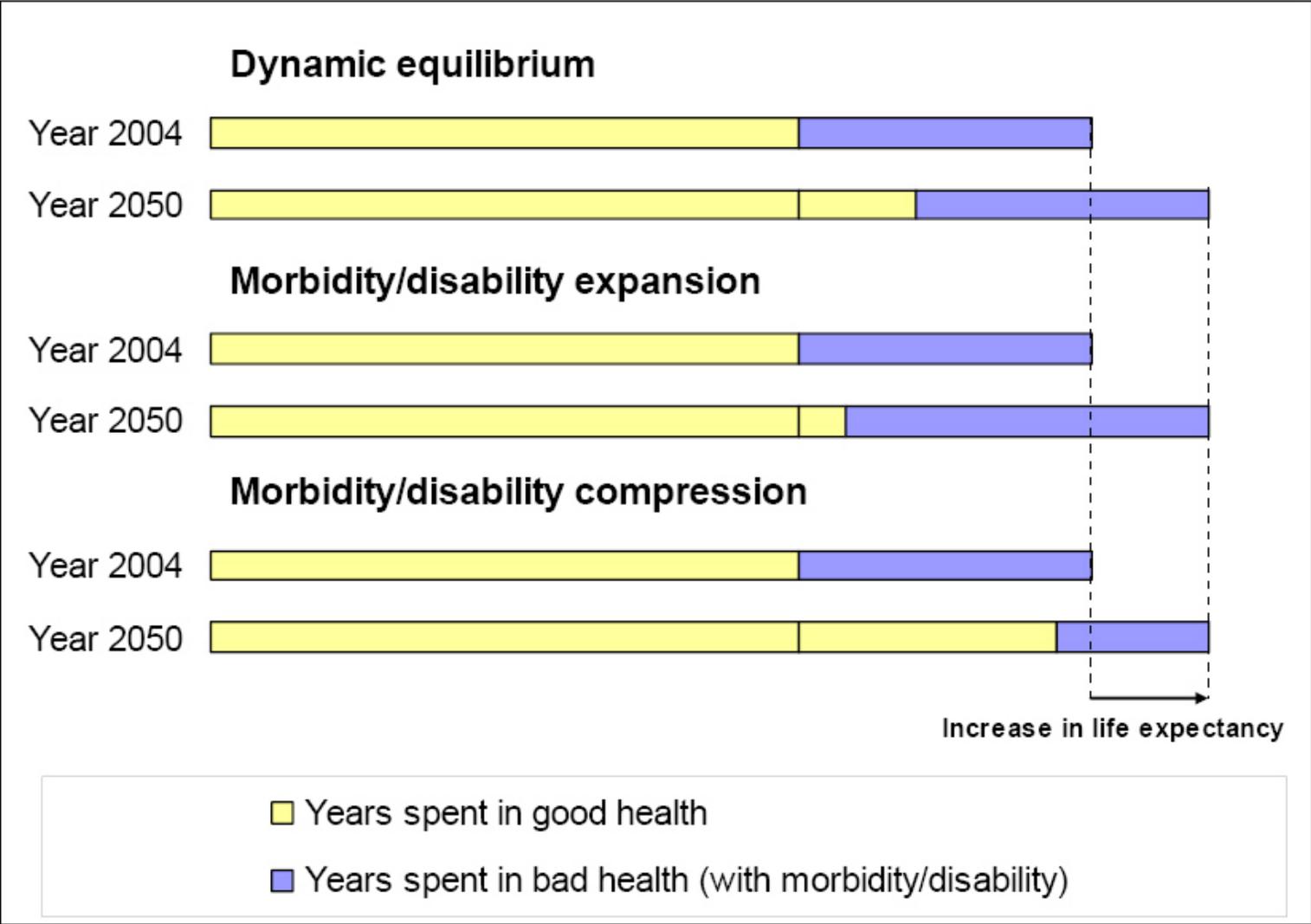
Healthcare system not geared towards optimizing health:

- focused on repairing bodily damage
- few incentives to improve, maintain patients’ health
- dis-organized and not coordinated across providers

Demographic wave:

- push services out of facilities
- imperative to focus on prevention

Morbidity/Disability Compression or Extension?



Source: DG ECFIN

Medicare: Keeping Them Healthier Longer

EXHIBIT 1

Concentration Of Medicare Spending By Quintiles, 1995–1999

Quintile	Percent of total	Mean spending (\$)
Top quintile	84	24,161
Top 1 percent	17	98,074
Top 5 percent	47	53,538
Top 10 percent	66	37,855
Fourth quintile	12	3,353
Third quintile	3	943
Bottom two quintiles	1	155

SOURCE: Data from a 5 percent random sample of Medicare fee-for-service (FFS) beneficiaries, 1995–1999.

NOTES: Spending is reported in 1999 dollars. Mean total Medicare spending is \$5,753.

*How do we keep people here?
Evidence-Based Health.*

*How do we treat people here?
Evidence Based Medicine.*

How Would You Like a Colonoscopy?



Posted on Tue, Aug. 01, 2006

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Plan seeks better health

Pawlenty launches Q-Care to cut state, insurer costs

BY BILL SALISBURY
Pioneer Press

Gov. Tim Pawlenty on Monday announced a new program to provide "performance pay" to doctors and hospitals that meet new quality standards for state-purchased health care. He predicted the plan would save the state and health insurance companies more than \$150 million a year.



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Federal Diary

Stephen Barr, Columnist

Bill to Promote Electronic Health Records

By [Stephen Barr](#)

Thursday, March 2, 2006; Page D04

In an effort to dramatically expand the use of "electronic health records," a key House chairman said yesterday that he will propose legislation to promote their use in the federal employee health insurance program.

Consumers really want to **reduce the odds of needing** the procedure.

Summary of Nationwide Health Information Network (NHIN) Request for Information (RFI) Responses

June 2005



PRESCRIPTION FOR CHANGE

FIXING AMERICAN HEALTH CARE



- Monday, October 16**
- What's driving healthcare costs
 - Practicing proven medicine
 - Universal care for everyone
- Tuesday, October 17**
- Are too many Americans getting back surgery
- Wednesday, October 18**
- Building a healthier community
 - Using older drugs that are cheaper, better
- Thursday, October 19**
- Improving end-of-life care
- Friday, October 20**
- Hospitals that get it right

A healthy neighborhood

Public health researchers have found that your neighborhood can make it easier or harder to practice healthy behaviors.



Rollover the numbered boxes for so healthy neighborhood planning

Updated 10/18/2006 1:39 AM ET

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New Rx: Help people to avoid getting sick

By Steve Sternberg, USA TODAY

PHILADELPHIA — With its fried chicken restaurant, wig emporium and half a dozen shuttered shops, Progress Plaza looks more like an urban eyesore than a laboratory on the frontier of public health.

Yet, despite its dilapidated, gap-toothed appearance, the nation's oldest black-owned shopping center is the setting for a landmark study that will test whether having easy access to

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By Eileen Blass, USA TODAY



Laws, policies curb bad habits
[Newest drugs not always the best](#)

Healthcare-designed Automobiles

Listing of best body shops in your area.

Posted on Tue, Aug. 01, 2006

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Pawlenty l

BY BILL SALISE
Pioneer Press

Gov. Tim Pawlenty is expected to announce a plan to provide "performance pay" to doctors and care. He predicts more than \$150 million a year.

Repair shops would be reimbursed even if car is not fixed.

er costs

provide "performance pay" to state-purchased health insurance companies

All consumers would pay the same rate, regardless of driving record.



NEWSLETTERS

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Commonwealth Fund

How Much More Cost-Sharing Will Health Savings Accounts Bring?



OVATIONS PROGRAMS & C

ire

Massive social investments to develop car repair tools, equipment.

Publish guidelines for evidence-based vehicle repair.

Clearinghouse



Federal Diary

Stephen Barr, C

Bill to Promote I

By [Stephen Barr](#)
Thursday, March 2, 2006;

In an effort to dramatically promote their use in the federal employee health insurance program.

Repair shops will tout their "Electronic Car Record."

Summary Information Request for Response:

Repair shops will connect to a car- RHIO.



June 2005



Average cost of car repairs across state.

Engineering-designed Automobiles

◀ Start Bosch

Automotive Technology

▶ Overview

Fields of application

▶ Safety

▶ Emissions

▶ Fuel consumption

▶ Driving pleasure

Subjects

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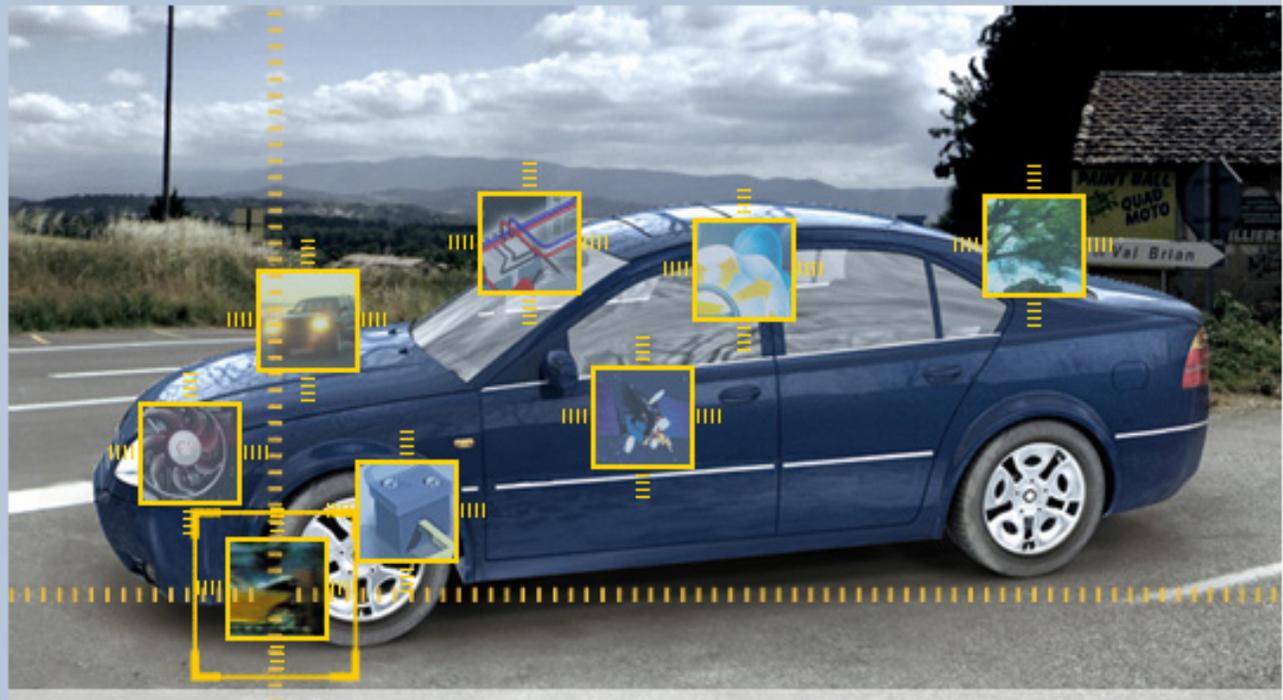
Company

▶ Automotive divisions

▶ Automotive Technology worldwide

▶ Locations worldwide

▶ Jobs and careers



Accident-prevention concepts

Steer, accelerate, brake, maintain an adequate distance to the next vehicle - our goal in the active safety sector is to apply pro-active vehicle-intervention technology to prevent accidents from happening. The ultimate objective is to develop a comprehensive assistance system that will provide the driver with the best possible information and support under any and all conditions.



Health Improvement as Engineering Challenge

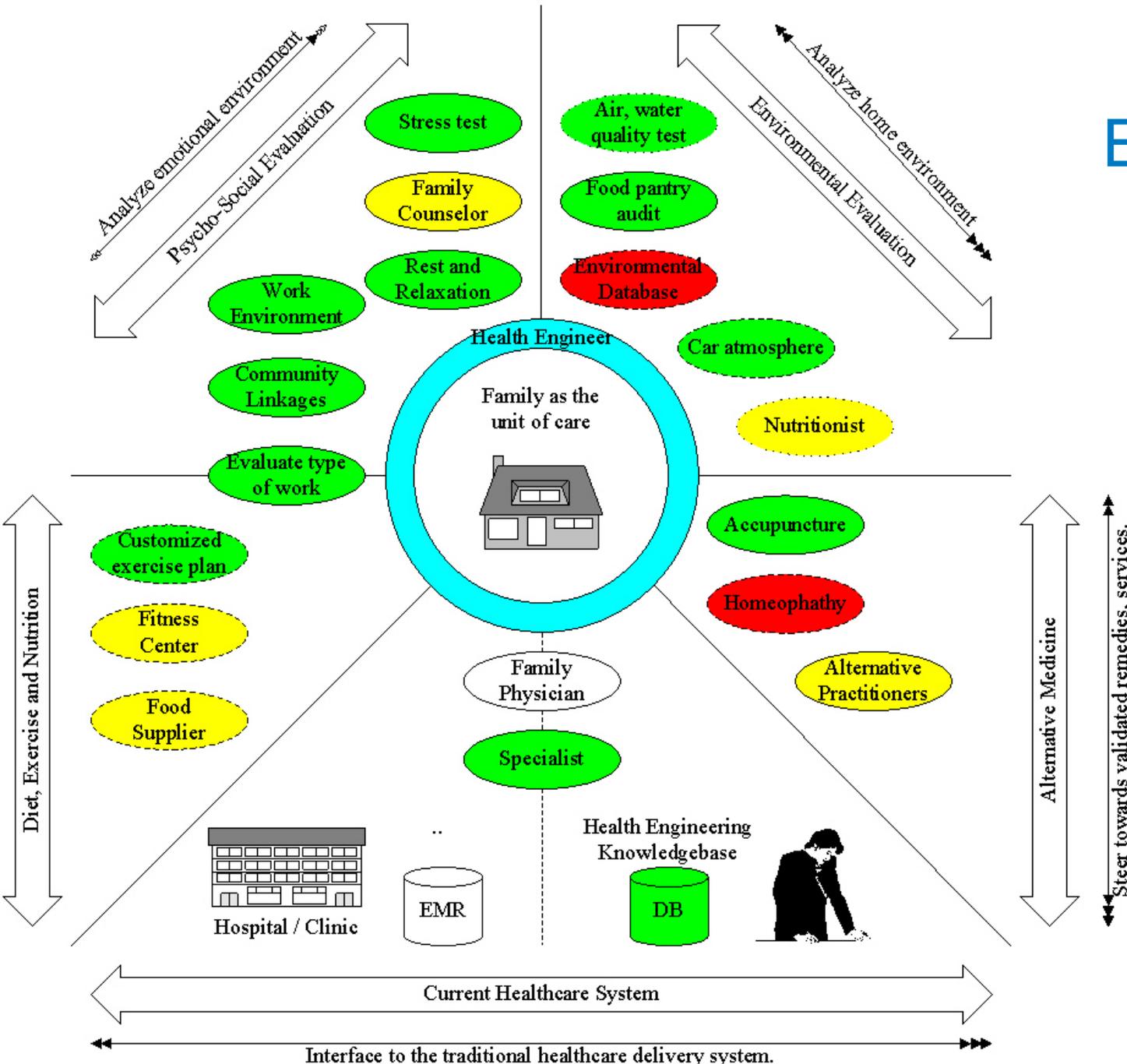
Once an individual falls ill, or a disease manifests itself, the best treatment plan is definitively a highly personalized intervention. On the other hand, preventive health measures and those that promote health (such as physical activity, living conditions, nutrition, etc.) can be generic and very broadly applied across large groups of people. Those measures are highly predictive of health outcomes, and lend themselves to an engineering approach on a large scale, population-wide.

Can we prevent illness or death? Most definitively not. But we can certainly look at the immense amount of data already available to try to “engineer health” by testing, publishing, and promoting “best practices” for the maintenance and enhancement of every individual’s health.

Lets apply the same Engineering tools and methodologies that build complex, reliable systems to maintaining our bodies in top operating capability.

Health Engineering

The scientific application of Engineering principles to maintaining and improving an individual's health through the judicious use of Information and Communication Technologies ("ICTs"). And by networking individuals to facilitate the research, development, and exchange of relevant content, best practices, and methodologies.



Certified Health Engineers

Personal Health Engineer

A person devoted to working with individuals and their families to help them attain and maintain the highest possible level of health and well-being. There is an opportunity to lead the market by bringing certification expertise to the personal health coach arena.

Six Sigma for Health

Could the principles of Six Sigma be applied to enhancing an individual's (and an entire population's) health? This would be a great research challenge.

Community Health Engineer

Professional focused on community-level issues (epidemiologic studies; support for immunization and sanitation campaigns; etc.) where there are not enough suitable Master's in Public Health professionals available.

In the past 50 years life expectancy rose 30 years, mostly due to prevention and public health interventions. Over 700 medical schools worldwide, only 71 schools of Public Health.

Provide Credibility to Allied Health Professionals

There are thousands of non-physician professionals that are personally committed to improving and maintaining individuals' health. From exercise coaches, dietitians, nutritionists, to organic food store clerks, there is an opportunity to both professionalize and provide a formal support structure to all these individuals passionate about health, wellness.

Steps Towards Health Engineering

- **Listing Treatment Costs, Options** → **Promote Value of Prevention**
- **Guidelines for Treatment** → **Guidelines for Prevention**
- **Massive Investments on Devices** → **Invest in Public Health**
- **Paying for Performance** → **Paying for Healthy Living**
- **Personalized Pharmaceuticals** → **Personalized Nutrition**
- **Networking Medical Records** → **Networking Health Knowledge**
- **Postponing Death at the End** → **Enhance Life, Shorten Death**

One Step: IEEE2407 Standard. Create Consumer-side Health IT Systems.

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IEEE P2407 Standard for Personalized Health Informatics

Text Size: A A A

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IEEE P2407

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- [Tools Used by IEEE P2407](#)
- [Discussion Forum - PENDING](#)
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Who Are You?

- [Academic Researcher](#)
- [Community Advocate](#)
- [Consumer of Health Services](#)
- [Content Provider](#)
- [Government Agency](#)
- [Health Provider](#)
- [Service Provider](#)
- [Software Developer](#)

IEEE P2407: Personalized Health Informatics.

The current healthcare paradigm is illness-centric: once you are sick, we'll throw the book at you (technologically speaking) to try to fix your condition. That's where the current provider-patient axis comes in. Most of the current US healthcare dollars go into this bucket.

In parallel (not in competition), we see consumers (that 90%+ of the population that is healthy at any one point) very interested in staying healthy. In this model, the traditional "healthcare provider" might not even be involved. Specially in the US, where healthcare providers (PCPs and such) are seldom compensated for preventive services.

Then, our theory is that we could build a provider-agnostic health-improvement system that places the individual (and her family) at the center. And bring to her an array of IT-mediated services (nutrition, health information, evidence-based guidelines, etc.) designed to keep the consumer healthy. And where all health-related data is owned by the consumer, not by the provider. In our mind, companies such as financial institutions (banks) would be the ideal hosting providers for this info, and they already have the consumer's trust and brand awareness.

<http://www.IEEE2407.org/>

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New Care Plan

First Name:

Last Name: *

Phone:

Email:

My Upcoming Appointments through (2005-12-10)

Close	Subject	Date	Accept?
<input checked="" type="checkbox"/>	Call speech therapist.	2005-11-30 12:00	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input checked="" type="checkbox"/>	EHR Symposium at CGU.	2005-12-02 20:00	Accepted

My Top Open Bills & Claims

Bill / Claim	Provider Name	Amount	Close
Pediatrician: reimbursement.	Seitz Pediatrics, LLC	\$ 123	2005-12-12

My Open Cases

Start Previous (1 - 1 of 1) Next End

Close	Num.	Subject	Account Name	Priority	Status
<input checked="" type="checkbox"/>	1	Marco's speech therapy plan.	Bethesda Speech Specialists	Medium	New

My Leads

Start Previous (0 - 0 of 0) Next End

Name	Date Created
------	--------------

My Open Tasks

Start Previous (0 - 0 of 0) Next End

Close	Subject	Priority	Due Date
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November 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Previous Month Next Month

Mom, the Chief Medical Officer

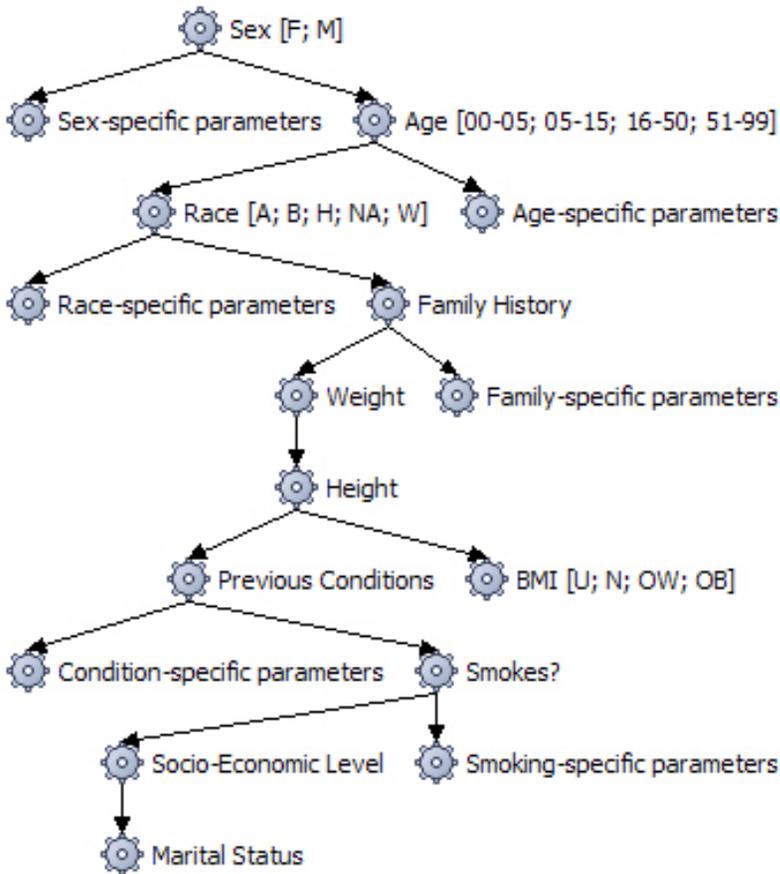
Family health dashboard: dependents' status:

- Summary of bio-physical readings
- Readings from sensors in parents' home
- Summaries from all published research
- Recommended dietary guidelines
- Storage of family's medical records
- Latest evidence-based guidelines published
- Available via cellphone, PDA, office, home

Everything is technologically possible NOW. The question is why isn't this level of service and patient-centered focus available to consumers today.

CRM for Family Health Improvement

Creating a Family Profile



Name	Jose	Lorraine	Boy_01	Boy_02	Girl_01	_Dad	_Mom
Sex	M	F	M	M	F	M	F
Age	41	3x	9	4	3	7x	6x
Race	H	W	H	H	H	H	H
Family History	No	No	No	No	No	No	No
Weight	6'						
Height	160						
* BMI	21.7						
Prev. Conditions	No	No	No	No	No	No	No
Smoking	No	No	No	No	No	No	No
Socio-Economic	Middle	Middle	Middle	Middle	Middle	Middle	Middle
Marital Status	Married	Married	Single	Single	Single	Married	Married
Health Index	Exc.	Exc.	Exc.	Exc.	Exc.	Good	Good
Phys. Activity	Low	Low	Middle	Middle	Low	Low	Low
Issues	Commute	Stress	None	None	None	None	None
Environment	No	No	No	No	No	No	No

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New RSS News Feed

RSS URL:

Paediatr Anaesth. 2005 Jun;15(6):515-8.



Severe hemoptysis in a child after the Fontan procedure.

Deisenberg M, Stayer SA.

Department of Anesthesiology, University of Munich, Munich, Germany.

Summary There is an increased incidence of pulmonary hemorrhage and hemoptysis among patients with congenital heart disease (CHD). The pathophysiology of pulmonary hemorrhage in CHD includes pulmonary hypertension, pulmonary venous congestion, aorto-pulmonary collaterals, pulmonary arteriovenous malformations, and dilated bronchial arteries. We present the case of a 6-year old boy who required treatment for massive hemoptysis after staged palliation for hypoplastic left heart syndrome (HLHS). Effective management of this life threatening entity is described as well as the anesthetic implications of performing rigid bronchoscopy in a patient with the Fontan circulation and massive hemoptysis.

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Japanese Heart Journal

Vol. 45 (2004) , No. 2 pp.265-273

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**Effect of Patient Age at Surgical Intervention on Long-Term Right Ventricular Performance in Atrial Septal Defect
A Pulsed Wave Tissue Doppler Echocardiography Study**

Seden Celik¹, Batuhan Ozay², Bahadır Dagdeviren¹, Sevket Gorgulu¹, Aydin Yıldırım¹, Nevzat Ushu¹, Bülent Ketenci², Mehmet Eren¹, Haldun Akgoz¹, Murat Demirtas² and Tuna Tezel¹

1) Department of Cardiology, Siyami Ersek Cardiovascular and Thoracic Surgery Center

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- [Are We Really Better Off With HIPAA?](#) Mon, 21 Nov 2005 12:00:00 EST

Brief Summary
GUIDELINE TITLE**Management of grown up congenital heart disease.****BIBLIOGRAPHIC SOURCE(S)**

Deanfield J, Thaulow E, Warnes C, Webb G, Kolbel F, Hoffman A, Sorenson K, Kaemmer H, Thilen U, Bink-Boelkens M, Iserin L, Daliento L, Silove E, Redington A, Vouhe P, Priori S, Alonso MA, Blanc JJ, Budaj A, Cowie M, et al. Management of grown up congenital heart disease. Eur Heart J 2003 Jun;24(11):1035-84. [22 references] [PubMed](#)

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Subject: *

Type:

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Release:

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BRIEF SUMMARY CONTENT

[RECOMMENDATIONS](#)

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[IDENTIFYING INFORMATION AND AVAILABILITY](#)

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Transition from paediatric to adult care

- ◆ Paediatric cardiologists should begin to inform patients and families regarding transition from around the age of 12, with a flexible policy of transition at age 14 to 16 years. Subsequent transfer to the adult service can again occur at a flexible age of approximately 18 years. Each paediatric cardiac unit should



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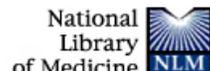
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Severe hemoptysis in a child after the Fontan procedure.

Deisenberg M, Stayer SA.

Department of Anesthesiology, University of Munich, Munich, Germany.

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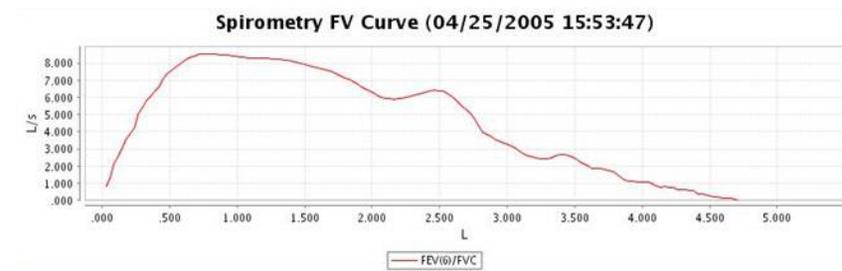
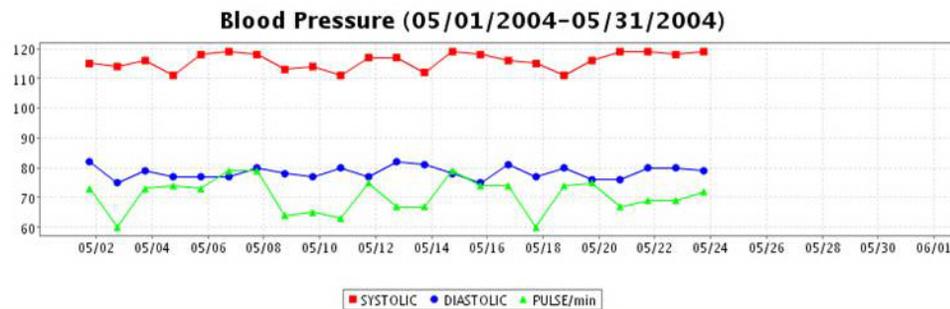
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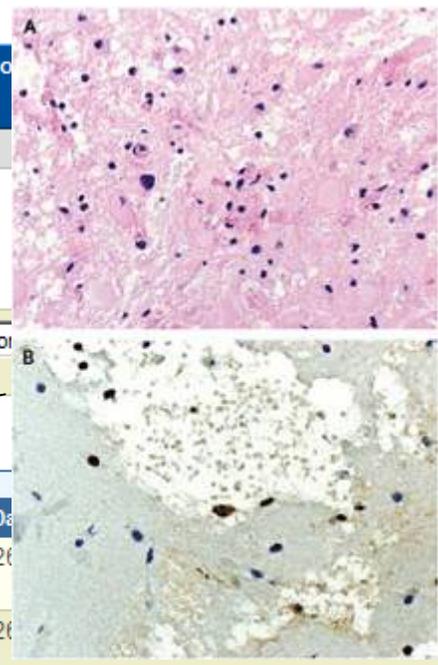
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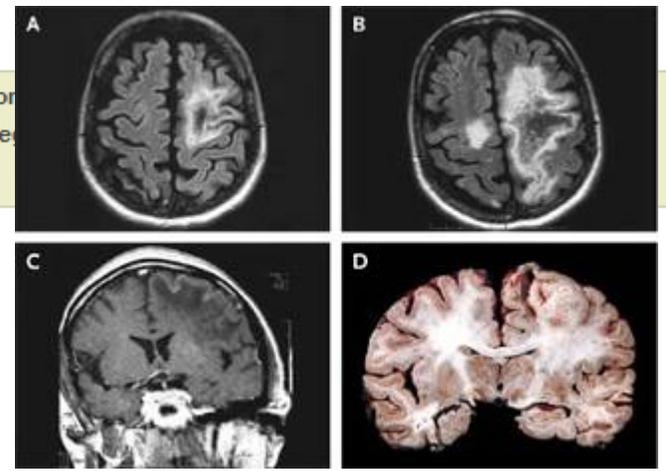
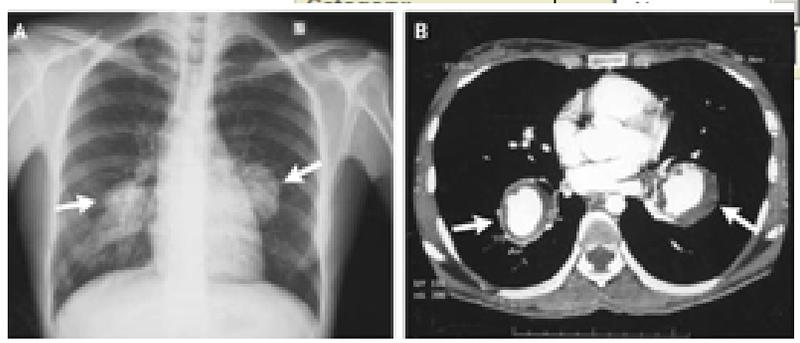
<input type="checkbox"/>	Document	Category	Sub Category	Revision	Published By	Revision Date
<input type="checkbox"/>	Brain Biopsy Specimen	Marketing	Marketing Collateral	1	Jose C. Lecal Lecal	2005-11-26 17:40
<input type="checkbox"/>	Head x-rays	Marketing	Marketing Collateral	1	Jose C. Lecal Lecal	2005-11-26 17:40
<input type="checkbox"/>	Thoracic x-rays	Marketing	Marketing Collateral	1	Jose C. Lecal Lecal	2005-11-26 17:41

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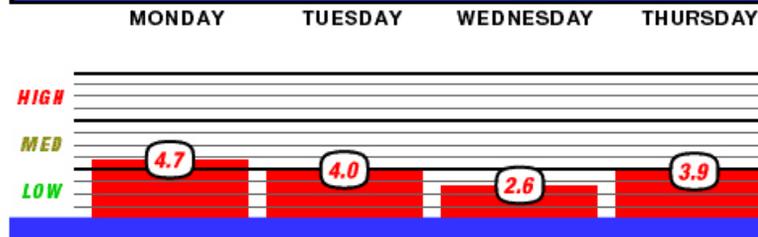
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The four-day forecast for BOYNTON BEACH , FL is:

Allergy Alerttm

Four day forecast



Predominant pollen: Palm.

Air Quality for Ontario

For Monday, November 28, 2005, 4:00 PM

Air Quality for Ontario November 28, 2005, 4:00 PM			
Station Name	AQI	Category	Cause
<i>Click on the Station Names for more information and historical data.</i>			
BARRIE	11	 	Ozone (O₃)
BELLEVILLE	15	 	Ozone (O₃)
BRAMPTON	14	 	Fine Particulate Matter (PM_{2.5})
BRANTFORD	17	 	Ozone (O₃)
BURLINGTON	12	 	Fine Particulate Matter (PM_{2.5})
CHATHAM	18	 	Ozone (O₃)
CORNWALL	22	 	Fine Particulate Matter (PM_{2.5})
GUELPH	11	 	Fine Particulate Matter (PM_{2.5})

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NUTRIENT DATA LABORATORY

 Agricultural Research Service

USDA National Nutrient Database for Standard Reference Release 16-1

NOTE: The [USDA National Nutrient Database for Standard Reference, Release 18](#) is now available and supersedes previous releases. Access to Release 16-1 of the USDA National Nutrient Database for Standard Reference is provided here for those users who may wish to use it for historical reasons.

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