



MIT Efficient Healthcare Delivery Research Project

MDISCC 2008

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MIT Efficient Healthcare Delivery Project

- Purpose: Identify strategic healthcare supply chain imperatives for all players
- Technique:
 - Scenario Planning and System Dynamics with broad research to envision plausible futures
 - Propose innovative supply chain management approaches for ‘the winners in the future’

**MEHD will not be limited to ‘discovering new information’
MEHD will develop new frameworks to give new
meaning to new and existing information**

MEHD Framework in a Few Words

- Efficient supply chains in healthcare can help both increase income for companies and decrease costs for payers and patients
- Standard, inwardly focused current supply chain management practices (marginally) meet the needs of physicians who are likely to become more disintermediated from decision-making
- Collaborative, patient centric supply chains designed to fulfill clinical and non clinical needs of new decision makers are imperative
- Personalized supply chains will
 - Significantly reduce total healthcare system costs
 - Increase the sales of new healthcare products and services
 - Improve health outcomes

Today, be a part of our “S&OP”:

- 1. Examine why these “forecasts” might be possible (not how they can’t be true)**
- 2. Consider what this would imply**
- 3. Develop the strategies and tactics to be ready for the future**

A Scenario of the Future

- Ed is 68 and a type 2 diabetic, otherwise he's in good health
- He controls his diabetes with an oral agent
- His life expectancy, by actuarial tables, is 85
- Ed has private insurance to augment Medicare
- He's experiencing swelling of his legs, thirst, morning sickness and anemia

A Story of Future

- Ed has not been feeling well: it's something UT but he'll wait for it to get better
- His regular in-home **T2 Biosystems** test results aren't normal
- He uses his resources to begin improving his health:
 - Loads **T2 Biosystems** results into **Up-to-Date Patient** services and gets the preliminary diagnosis: renal failure
 - Checks his **Aetna** personal formulary to find a diagnostician and schedules an appointment
 - Orders an **Abaxis Piccolo xpress** Mark IV in-home renal function test
 - Orders a **DNADirect** at-home genetic test to check for transplant possibilities
 - Cross-correlates his current medication for side effects in his **GoogleHealth** system: better switch from metformin to an insulin analog
 - **GoogleHealth** directs him to a “Social Network” of others experiencing similar problems
- Bad news: all information confirm kidney failure and a long waiting list for transplants in **UNOS**
- Ed visits his **nurse practitioner**: she corroborates his diagnosis using **Up-to-Date PDA**
- The nurse practitioner presents to the **MD**: she also confirms and prescribes twice weekly dialysis
- Ed and the nurse order the **DaVita** 12000 portable dialysis machine, with the **NxStage Data Registry** option and has **Wal-Mart** switch his diabetes meds...in the office before he leaves
- Of course, the payments are all electronic and immediate, including the **UPS Healthcare Logistics** delivery bill (for the **DaVita** shipped from the factory in **Yingkou, Liaoning**); it was all electronically adjudicated by **Aetna** before the order
- Ed's co-payment bill shows up the next day, along with the **DaVita, Byetta** and an in-home technician to set up the first dialysis
- Ed and Emily conduct the twice weekly treatment and daily renal function test, and the data is fed to **NxStage**
- The **DaVita** home monitoring software gives Ed updates to his treatment regime and reorders supplies
- Ed never does get that new kidney and dies at 86, the result of a car accident, after complying with this treatment 98% of the time over 18 years

In that future...

- Healthcare decisions are owned by the patient
- Technology has been miniaturized and made portable (DaVita, Abaxis, DNADirect)
- The MD is disintermediated from most decisions
- Diagnostics procedures are commodities (T2 Biosystems)
- Supply chain data is integrated (UpToDate, GoogleHealth, United Network for Organ Sharing, NxStage, Aetna)
- Supply Chains are global (Yingkou, China; Ranbaxy, India)
- Payment is electronic
- Supply chain activities are seamless (DaVita, UPS and Wal-Mart)

MEHD views this as a reasonable medical scenario in which supply chains can be expected to provide value

Research Details

- MIT Research Approaches
 - Scenario analysis and planning
 - Healthcare System Analysis
- The Winning Supply Chains
- Strategies and Tactics for Winning
- Future MEHD activities

Scenario Planning

“In a scenario process, managers invent and then consider, in depth, several varied stories of equally plausible futures. The stories are carefully researched, full of relevant detail, oriented toward real life decisions, and designed (one hopes) to bring forward surprises and unexpected leaps of understanding....

The point is not to “pick one preferred future” and hope it comes to pass...Nor is the point to find the most probable future and adapt to it or “bet the company” on it.

Rather the point is to make strategic decisions that will be sound for all plausible futures.”

Peter Schwartz, “The Art of the Long View”, New York: Currency Doubleday, 1996

The Critical Driving Forces

- Off-shoring manufacturing and healthcare services
- **Uneven and uncertain global economy**
- Healthcare distributors business models: patient persistence services, clinical support
- ‘Retailization’ of healthcare - steady growth of retailers (Wal-Mart) selling healthcare
- Healthcare services pushed to the patient
- Increasing integration of medical devices and drugs to deliver care
- Clinical development employing gene diagnostics and therapy
- **Miniaturization and explosion of ‘intelligent’ medical diagnostic tools**
- **Physicians trends**
- Universal healthcare/increased government intervention
- Consumers will be increasingly responsible for every aspect of their health and expected to start focusing on prevention
- Emergence of new players such as UPS, Microsoft, Liberty Medical, The Scooter Store, Google, UpToDate etc.
- Integration of data and emergence of data-mining techniques
- Emerging consumer economies in BRIC
- **Migration from Acute condition to Chronic condition**

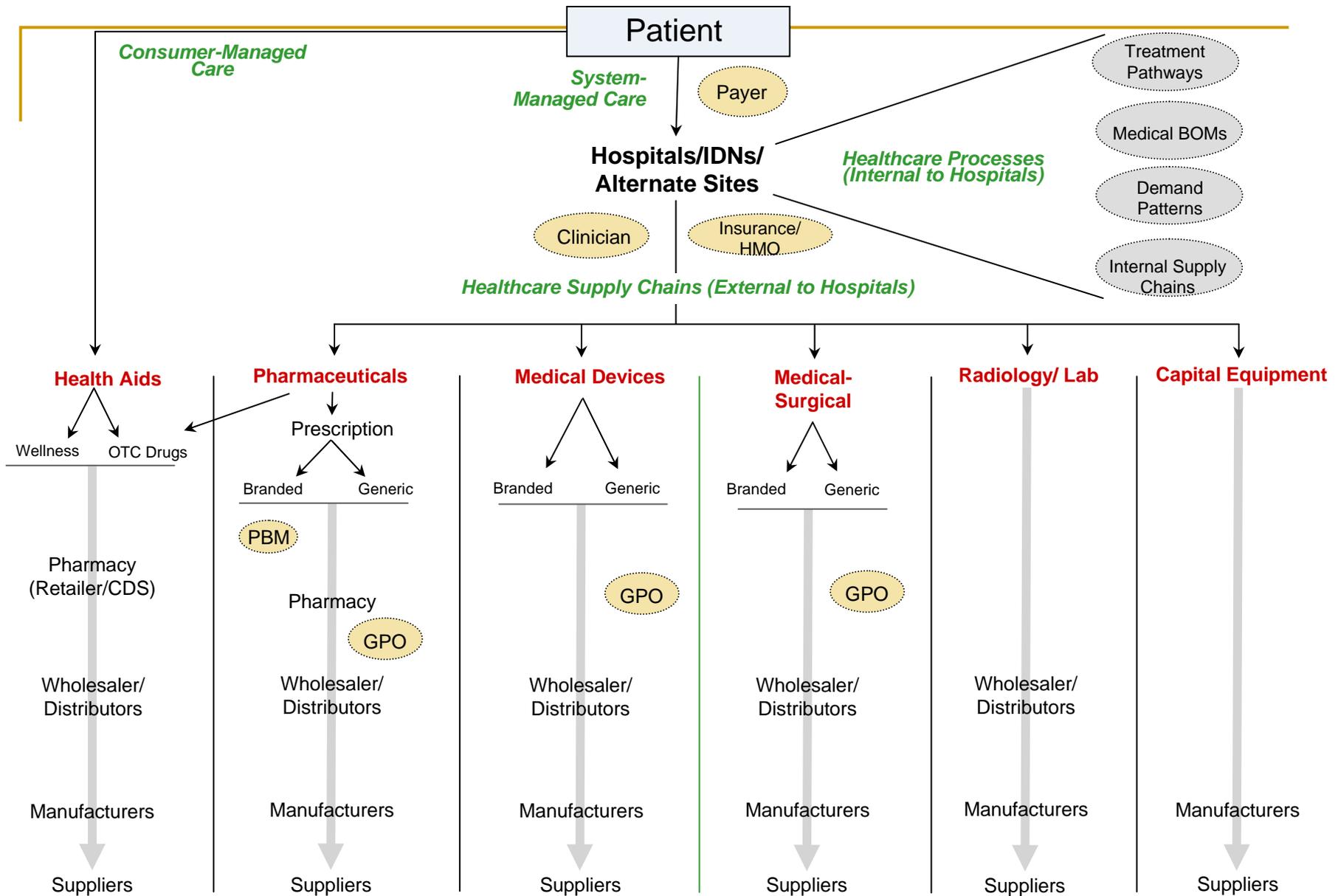
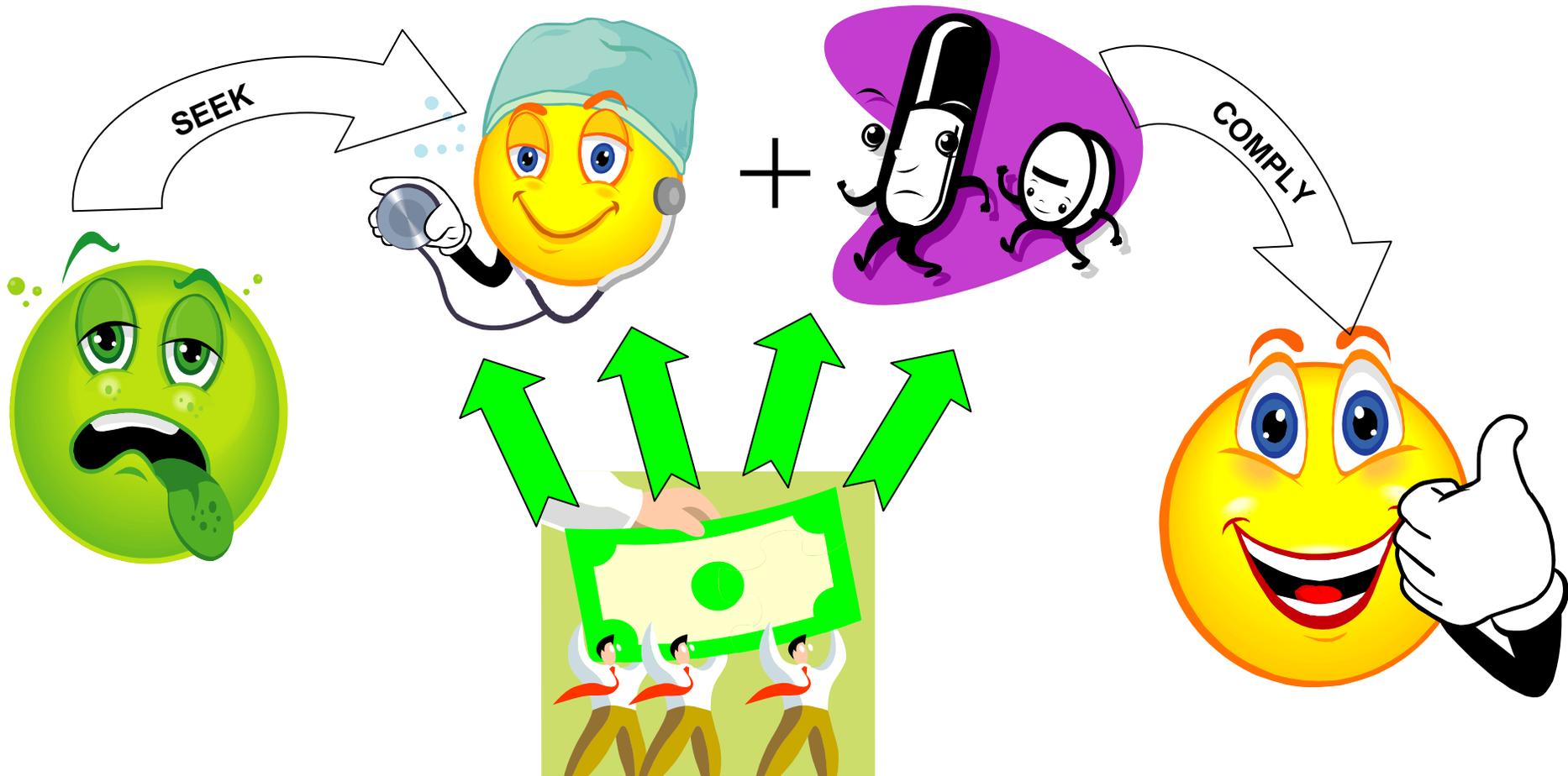


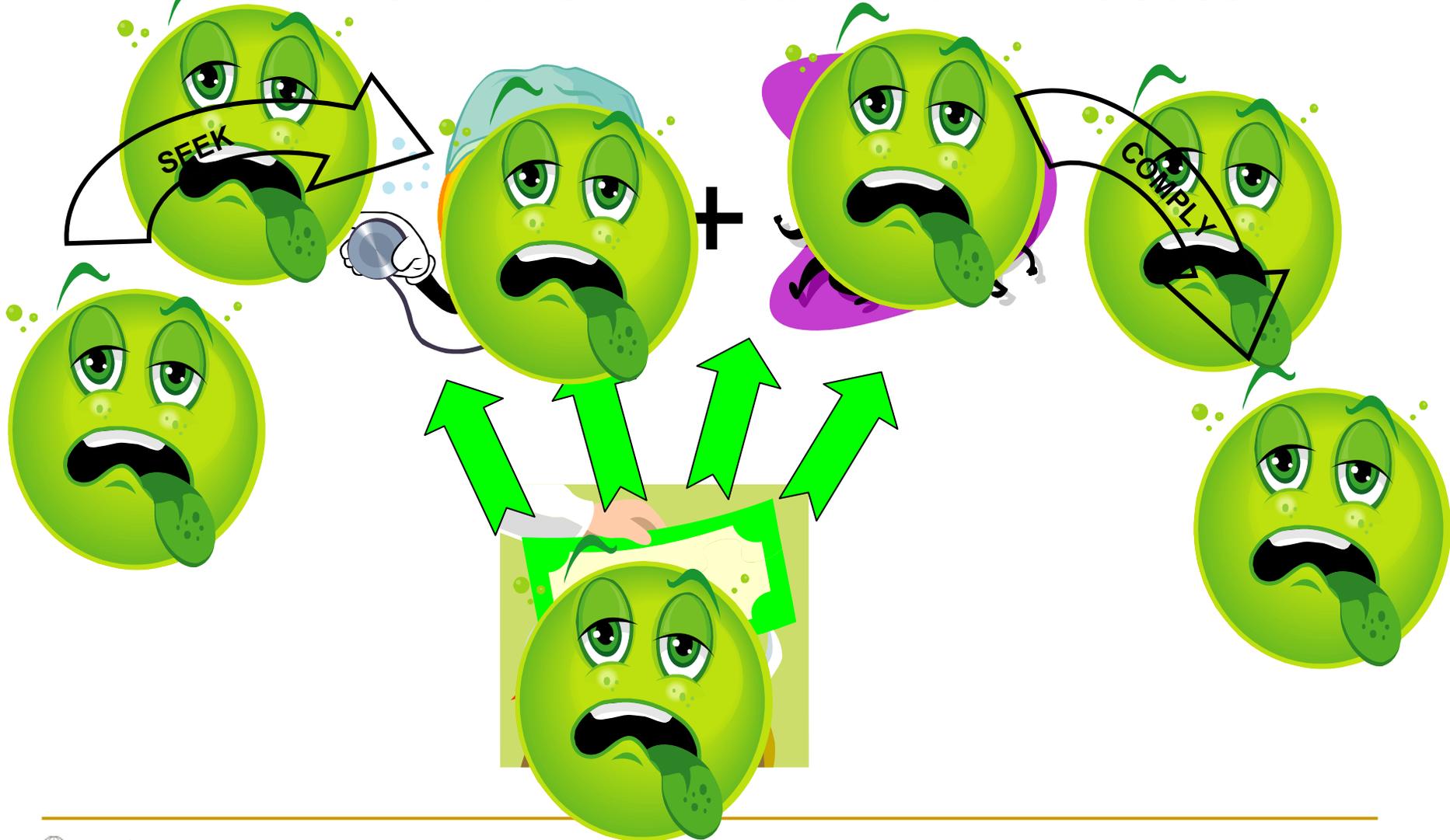
Figure: Simplified Model of Demand Flow in the Healthcare Supply Chain

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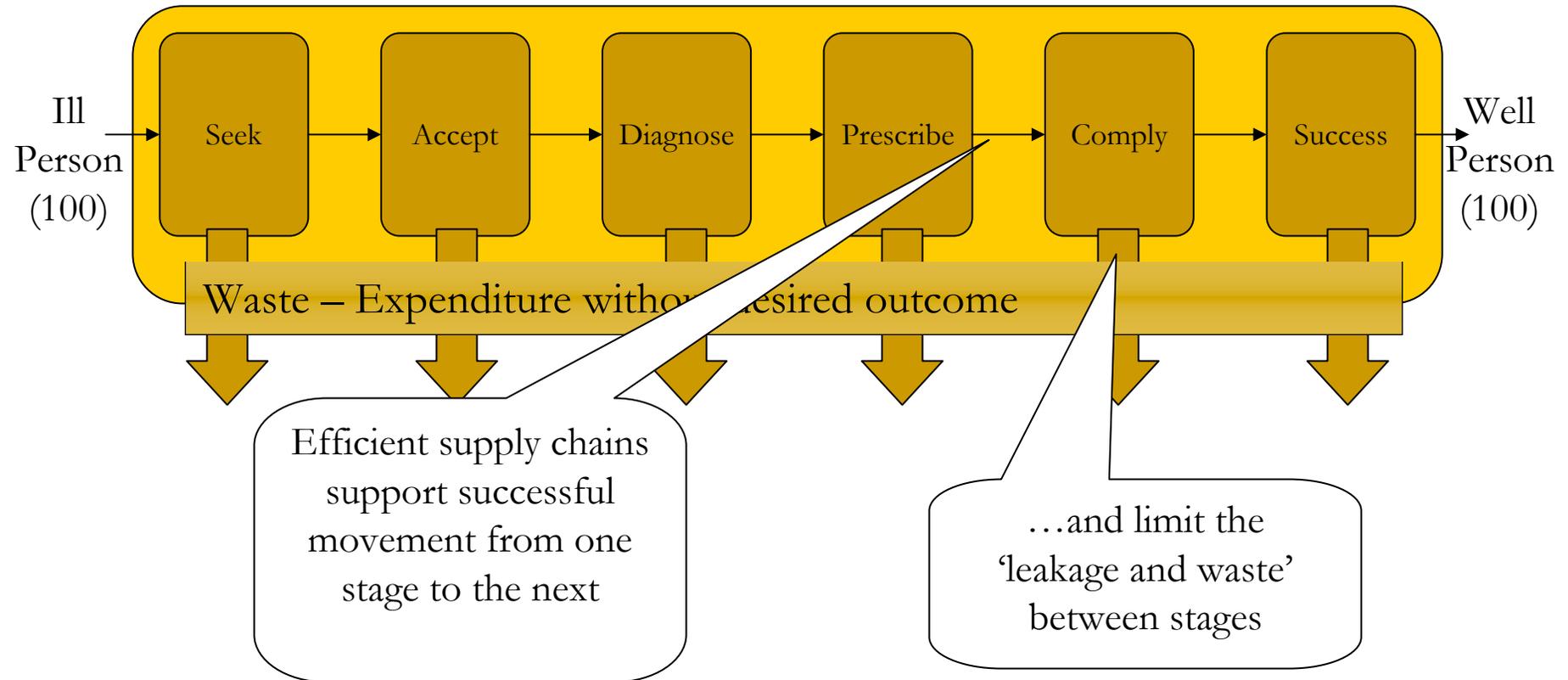
MEHD on Cost and Waste: Healthcare as a Production Process



MEHD on Cost and Waste: Healthcare as a Production Process



Supply Chain Value Proposition



When a person 'drops out of the flow' without achieving wellness the supply chain could be at fault or could be the solution

Efficiency Paradigm

- Healthcare system optimization
 - Achieve “100% Yield”
 - Lowest cost to the system by eliminating
 - Expenditure with no benefit
 - Additional costs of secondary health and economic effects
- Intra company and inter- company optimization
 - Reduce operational (“fixed”) costs (for example, excess inventory, additional freight charge, reverse logistics)
 - Represents incremental decreased costs
 - Any cost resulting in less than 100% yield is 100% waste
 - Typically cost reductions do not correlate directly with successful health outcomes

Reducing system costs enable more ill people to “enter the process”

Winning: customize the supply chain

- The most basic idea is that a monolithic supply chain consisting of
 - Manufacturer to
 - Wholesaler to
 - Retailer or hospitalis not a robust enough strategy.
- Customized supply chains must be designed and implemented to more efficiently meet therapeutic and non therapeutic needs
- By running supply chains that more holistically meet non therapeutic needs, healthcare players will help patients comply with treatment and achieve well being
- This is even more true because of four emerging driving forces
 - The shift of disease treatment from acute to chronic conditions
 - The miniaturization of diagnostic and treatment equipment
 - The uneven global economy
 - Physician as a team member

The First Driving Force: A2C Shift

- ❑ In 2003, an expected 109 million Americans suffered from eight most common diseases - *stroke, hypertension, cancer, diabetes, heart disease, pulmonary conditions, and mental disorders*^[1].
- ❑ The estimated annual cost of treatment for these diseases was *\$277 billion* accompanied by a productivity loss of nearly *one trillion dollars*^[1].
- ❑ “For the first time, it appears *more than half* of all insured Americans are taking prescription drugs regularly for *chronic care* health problems”^[2].
- ❑ By 2020, it is expected that *half of the US population* will suffer from chronic disease and represent *80% of health care spending*.

[1] Plunkett's health care industry research center. (2007)

[2] Associated Press, May 20th, 2008

A2C Shift

- ❑ The change in demand suggests a deep rooted shift that is causing significant problems for the healthcare system in terms of rapidly increasing cost and general dissatisfaction with system performance.
- ❑ Historically, the healthcare system has serviced the acute care needs of the patients. The whole system was event driven (infrastructure, medical practice, reimbursement etc.)
- ❑ The shift from ACUTE TO CHRONIC care (*A2C*) is a significant development, since we are now burdening the existing healthcare system with a new set of demand that is, both, extremely high in volume and different in nature and expected to grow rapidly.
- ❑ Consequently, the current system, not having been designed for the new reality, is strained and requires rethinking and redesign.

The Second Driving Force: Technology

- ❑ Technology is at the heart of low cost products at the core of our daily life
- ❑ Technology eventually leads to lower costs as products enter maturity stage of the life cycle
- ❑ Healthcare has not witnessed technology driven cost reduction in general
- ❑ Deployment of expensive technologies --X-ray machines costing \$175,000 are replaced with CT Scanners costing \$1 million and PET and SPECT imaging machines costing more than \$2 million each -- has led to increase in cost of care without adding to the quality of care in many cases
- ❑ New technology often increases the number of people treated due to “treatment expansion effect” which in turn increase the cost

The Second Driving Force: Technology

- ❑ The important point to note is this: So far, health related technological innovations have focused mostly on *helping doctors* do their job better, resulting in better care but more than proportionate increase in cost
- ❑ The recent technological innovations are focused on *helping patients* care for themselves through in-home diagnostics, health informatics etc
- ❑ The impact of this new trend is likely to dis-intermediate medical practitioners from the daily health care need perspective and eventually lower cost of care for the system and individual

New portable technology

- In home dialysis (DaVita)
- In home monitoring (NxStage)
- In home diagnosis (Up to Date)
- Portable IR
- Portable Defibrilator (Philips Healthcare)
- In home testing (T2 Biosystems)

The cost effect is to drive healthcare costs lower: portable technology doesn't carry the infrastructure and staff costs

Health Effects of Uneven Economy

- Increased government share of total cost minimizes tiered national and global pricing
- “Discretionary” spending on chronic conditions results in increase in secondary health effects
- Shift in basis of payment
 - From volume of treatment to outcome based
 - From treatment to prevention
 - From innovation to reliability
- Emergence of supply chain management in clinical settings
 - Application of classic techniques: standardization, strategic sourcing, postponement, green

Physician trends

- Earlier retirement
- Part-time practices
- Limited localized supply
- Employees, not owners
- Reflect US demographics (older)
- Specialization

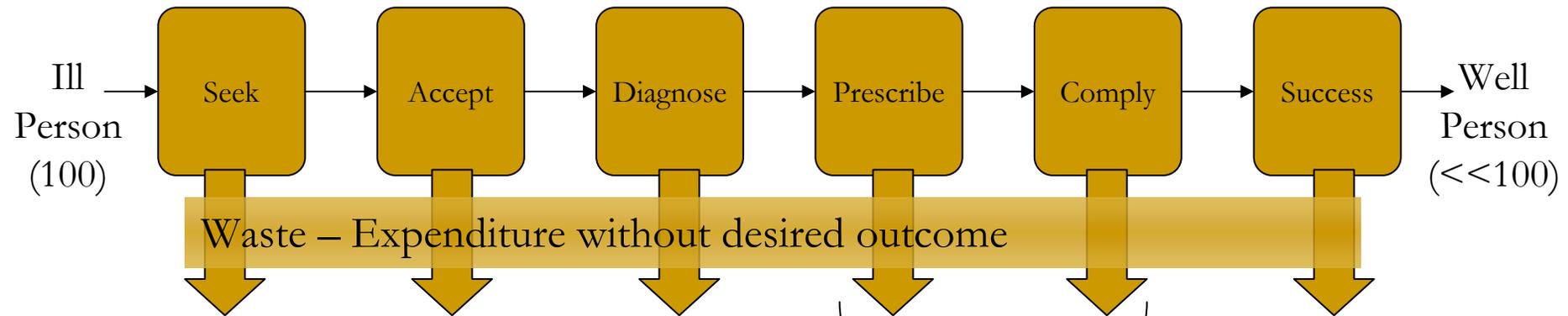
In many potential futures, the physician controls the purchasing decision of a very small portion of the healthcare spend

Combining Driving Forces

- Continued disintermediation of physician at all stages and locations
 - Changing professional face of medicine
- Focus on cost efficient prevention or treatment of chronic conditions
 - Diagnosis
 - Administering treatment
 - Monitoring and interpreting results
 - Continuity or adjustment decisions
- Shift from hospital- centric to out patient, non clinical settings
- Decisions controlled the patient, outcomes rewarded by payers

Remember that story about Ed? It's bigger than just dialysis

Supply Chain Value Proposition: Acute



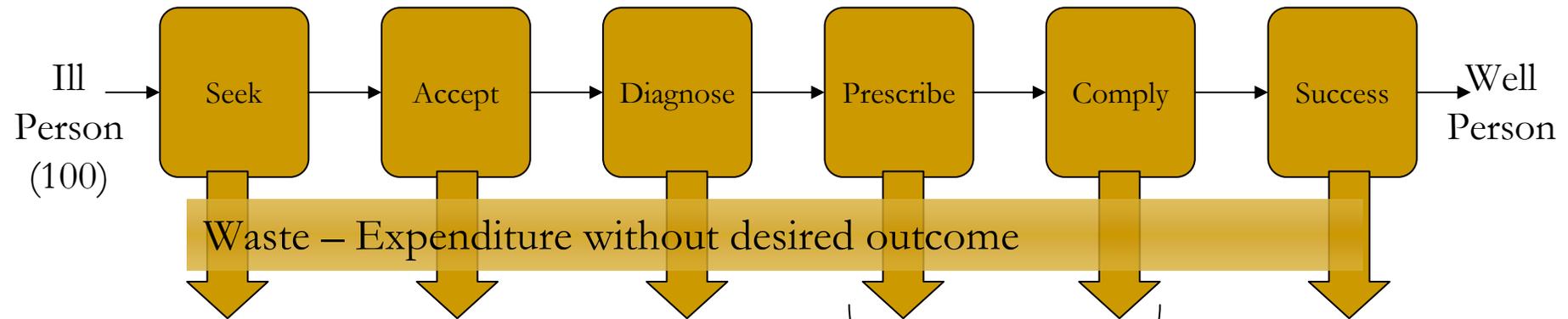
Acute supply chains (most healthcare supply chains)

- Focus on the provider
- “one approach fits all” strategy.
- focus on economy of scale for product movement
- move products through a limited number of channels to the point of dispensing
- new product is fed into the same supply and distribution channel, differentiating flow only at the patient level.
- All patients with the same acute condition are seen as interchangeable, with the same need.

Acute demand

- time-bound, with a well-defined beginning and end of treatment for each patient, often lasting a few minutes or hours
- it is initiated and most often completed in a controlled healthcare facility
- delivered by trained healthcare professionals.

Supply Chain Value Proposition: Chronic



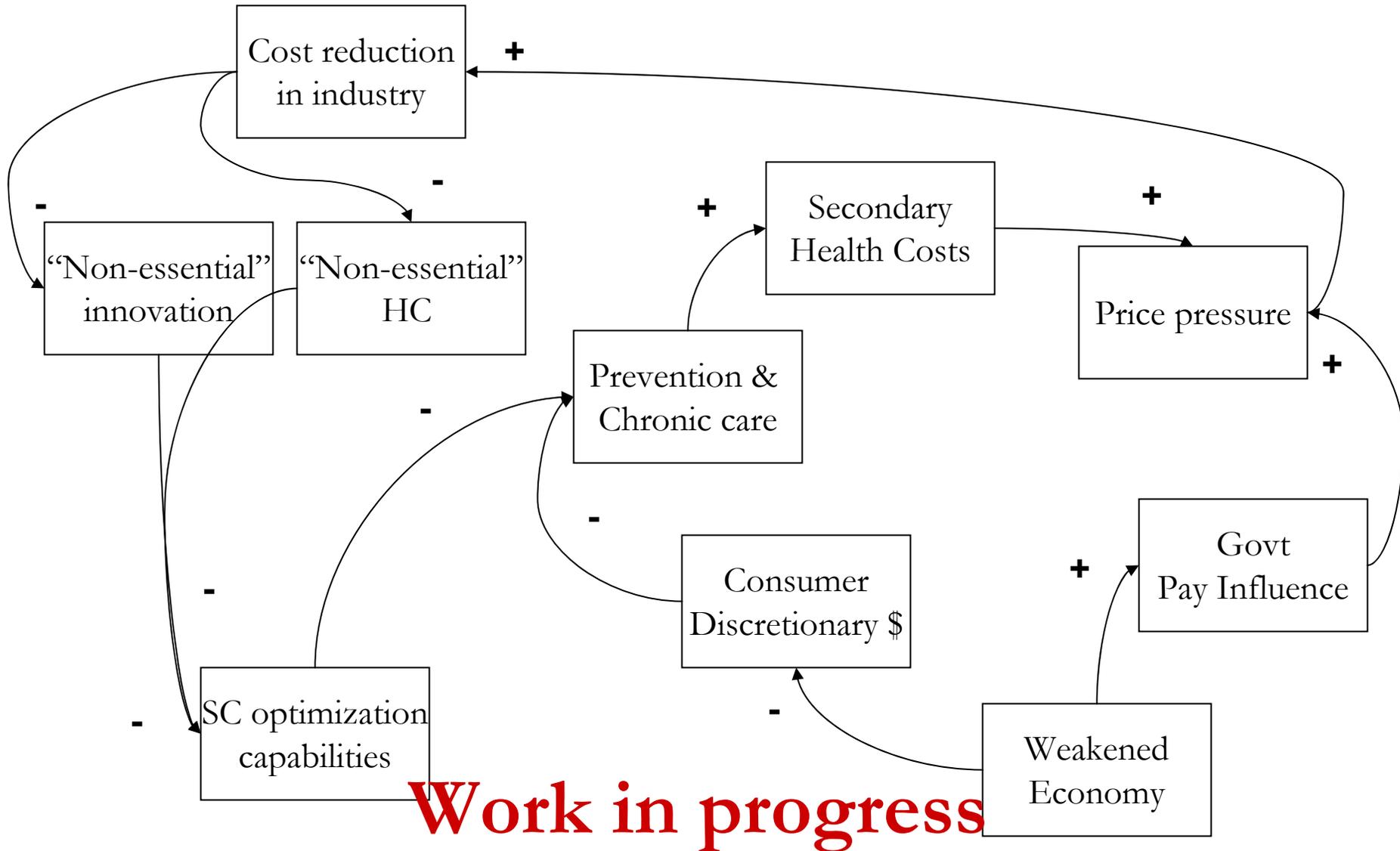
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System dynamics + scenario plan



Winning



“We must all hang together, or most assuredly we shall all hang separately.”

- The feedback loop for high system costs will negatively effect all players in the system
- Focus the efficiency in producing desired outcome for the patient (“100% yield”)
- Focus on the entire system, where failures occur and how to play a part in correcting “zero yield events”
- Supply chain management plays a role in “improving yield” and decreasing overall system costs.
- Internal efficiency is necessary but not sufficient
- Collaboration is the precursor to efficient supply chains

How...

- To become really good at supply chain management basics (do you run a collaborative S&OP?)
- To focus supply chains on enabling health outcomes
- To revise models of collaboration
- To micro segment decision maker's therapeutic and non therapeutic needs
- To engage new 'healthcare companies' and technologies to fulfill unmet needs
- To embrace global supply chain design and management skills as strategic competency

More research will delineate the details of the “so what?” & “hows”

Join MEHD

If you are interested in more info on becoming an active member of consortium please see Mahender or Ken and visit <http://ctl.mit.edu/mehd>

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