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Better Health Care and Lower Costs: Accelerating Improvement through Systems Engineering

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U.S. Health Care System: Motivation for Improvement

- **Affordable Care Act Success**: More than 8 million Americans signed up for health insurance between October 2013 and April 2014; millions more gained coverage through Medicaid or their parent's health plan.

- **Expanded access to U.S. health care system**: health care must not only be high quality and affordable, but also centered around patients and families.

- **Rising costs impact U.S. fiscal future**: health care costs now approach a fifth of the economy, yet a significant portion of those costs do not lead to better health or better quality care.[1]

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U.S. Health Care System: Challenges

- **Safety**: 20-33% of all hospitalized patients experienced a medical error; ~50% of those incidents were likely preventable.[2]

- **Quality**: errors of omission, missed diagnosis, lost follow-up, outcomes not as reliably good as possible.

- **Waste in cost and worker time**: Up to 33% of health-care costs are waste; [3] ~33% of front-line health care worker time is wasted.[4]

- **Patient-involvement/awareness**: patients are not routinely involved in decisions about their treatments or managing their condition; 50% of patients report that information necessary to their care was not available when needed.[5]

- **Payment system structure**: No incentive to be efficient in the fee-for-service payment model—pays for volume over value. Alignment of incentives helps to protect/serve patients.

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Systems engineering in health care: What is it and why is it important?

- Systems engineering is an interdisciplinary approach to analyze, design, manage, and measure a complex system with efforts to improve its efficiency, productivity, quality, safety, and other factors.

- Systems engineering provides a suite of tools for improvement, which have been successfully used in manufacturing, aviation, and other industries.

- **These tools have been used to good effect in health care, but too rarely and not spread widely.**

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Examples: What can be achieved when systems tools are used in health care?

Denver Health: By redesigning operations in 2006, saved a total of $200M.

Assessing what worked → Defining the problem

Improving care for patients and families

Implementing options

Modeling the system

Analyzing alternatives

Kaiser Permanente: identified 3x as many sepsis cases; cut mortality rates due to sepsis by 50%.

Virginia Mason: lowest rates of serious hospital infections and falls; reduced medical malpractice liability by almost 40%.

Vermont Blueprint for Health: achieved favorable outcomes for patients helped by medical homes and community health teams—lower health care expenditures

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What are the barriers to widespread adoption of systems engineering principles in health care?

- Misaligned incentive structure— predominant fee-for-service payment system

- Availability of data and relevant analytics

- Limited technical capabilities, especially in small practices (~60% of physicians are still in practices of 10 or fewer physicians)

- Leadership and culture

- Workforce competencies—limited knowledge about systems engineering tools and best practices

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Overarching Goals: Potential actions for the Federal Government

1. Accelerate alignment of payment systems with desired outcomes: better care at lower cost

2. Increase access to relevant health data and analytics

3. Provide technical assistance in systems engineering approaches

4. Involve communities in improving health care delivery

5. Share lessons learned from successful improvement efforts

6. Train health professionals in new skills and approaches

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Goal 1: Accelerate alignment of payment systems with desired outcomes: better care at lower cost

Recommendation 1: Focus payment incentives and reported information to pay for better outcomes for individuals and broader populations.

1.1: Public and private payers should be convened to discuss how to accelerate and align improvements in payment, promote transparency, and provide tools and supports for practice transformation.

1.2: Outcome measures for patients and populations, which can be readily assessed using current and future digital data sources, should be preferentially adopted, and where there are gaps needed measures should be developed.

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Goal 2: Increase access to relevant data and analytics

Recommendation 2: Accelerate efforts to develop the Nation's health data infrastructure.

2.1: A robust health data infrastructure should be created through widespread adoption of interoperable electronic health records and health information. Specific actions in this vein were proposed in the 2010 PCAST report on health information technology and the related 2014 JASON report to ONC.

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Goal 2: Increase access to relevant data and analytics

Recommendation 3: Provide national leadership in systems engineering by increasing the supply of data available to benchmark performance, understand a community's health, and examine broader regional or national trends.

3.1: A senior leadership position within the Administration should be created to focus on health care transformation. HHS can be the source of information and analytics as a major resource for benchmarking, provider and community engagement and improvement

3.2: The release of public and private provider-level data on quality, safety, and cost should be accelerated to increase transparency and enable patients to make more informed decisions.

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Goal 3: Provide technical assistance in systems engineering approaches

Recommendation 4: Increase technical assistance to health care professionals and communities in applying systems approaches.

4.1: A large-scale initiative is needed and should be launched to provide hands-on support to small practices to develop the capabilities, skills, and tools to provide better, more coordinated care to their patients. It could build on existing programs within CMS and ONC.

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Goal 4: Involve communities in improving health care delivery

Recommendation 5: Support efforts to engage communities in systematic health care improvement.

5.1: State and local efforts to transform health care systems should continue to be supported.

5.2: Future Federal programs centered around health care innovation should, as appropriate, incorporate systems engineering principles at the community level; set, assess, and achieve population-level goals; and encourage providers to engage stakeholders outside of the traditional health care system.

5.3: Existing Federal community-health needs assessment and planning processes should be leveraged to promote systems thinking at the community level.

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Goal 5: Share lessons learned from successful improvement efforts

Recommendation 6: Promote awards, challenges, and prizes to promote the use of systems methods and tools in health care.

6.1: The Federal Government should build on existing awards programs (e.g. the Baldrige awards) to recognize health-care providers successfully applying system engineering approaches.

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Goal 6: Train health professionals in new skills and approaches

Recommendation 7: Build competencies and workforce for redesigning health care.

7.1: A wide range of funding, program, and partnership levers should be used to educate clinicians about systems-engineering competencies for scalable health-care improvement.

7.2: Best practices in curricular and learning activities should be collected, cataloged, and disseminated. Knowledge sharing through regional learning communities should be encouraged.

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Goal 6: Train health professionals in new skills and approaches (cont'd)

Recommendation 7: Build competencies and workforce for redesigning health care.

7.3: Grant programs for developing innovative health professional curricula that includes systems engineering and implementation science should be created; grant products should be disseminated broadly.

7.4: Systems engineering centers of excellence should be funded to build a robust specialty in Health Improvement Science for physicians, nurses, health professionals, and administrators.

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Summary and Conclusions

- Systems engineering is an important tool to help the Nation achieve safe, high quality, and affordable health care.

- PCAST identifies a comprehensive set of recommendations to encourage the use of systems engineering in health care by:

    ❖ Accelerating alignment of payment systems with desired outcomes,
    ❖ Increasing access to relevant health data and analytics,
    ❖ Providing technical assistance in systems engineering approaches,
    ❖ Involving communities in improving health-care delivery,
    ❖ Sharing lessons learned from successful improvement efforts, and
    ❖ Training health professionals in new skills and approaches.

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