Appendix

Evolution and Development of the 3.0 Transformation Framework

Lester Breslow observed, at the beginning of the 21st century, that we were moving toward a third revolution in promoting health. (1,2) Breslow contended that while the first era concentrated on acute and infectious diseases and the second emphasized chronic non-communicable conditions, the third era would increasingly focus on optimizing population health. (1,2) Halfon, Long and colleagues built on Breslow’s analysis, using the 1.0, 2.0, 3.0 versioning vernacular to describe each era’s organizational design and operating logic, and to consider how new design concepts might catalyze innovations and purposefully encourage systems-level transformation. Exhibit 1 provides a schematic representation of the three eras, their characteristics and goals. Exhibit 2 illustrates how the CMM CMMI population health team adapted the 3.0 TF for purposes of providing a schema for how the health system could be transformed.
These era-to-era system transitions involve changing societal contexts, new challenges from within the health system and external pressures for change. The recent revolution in life-course health sciences provides a stronger rationale for systems capable of targeting and addressing upstream social, behavioral, economic and developmental determinants of health outcomes and long-term health disparities. (3-5) This comes at a time when the explosion of new medical technologies is changing the way we address disease; the digital revolution is empowering patients by making health information easily available and connecting them to others; and mounting economic concerns are forcing a rethinking of the current pay-for-volume system – and the pursuit of a new set of fiscal incentives to drive the system toward value-based care. (6,7)

Following is a brief summary of how the 1.0, 2.0 and 3.0 health systems have evolved:

1.0

Version 1.0 of the U.S. health system came of age at the beginning of the 20th century with the rise of science-based medical care to diagnose and treat acute conditions and
infectious diseases. With average U.S. life expectancy in 1900 spanning 47 years, the defining health goal of the era was to extend survival. Guided by the increasingly robust biomedical model of disease causation, the 1.0 health system operationally defined health as the absence of disease. Applying germ theory, it assumed that exposure and disease were contemporaneous or incubated over hours, days or weeks. The 1.0 system evolved to address the acute manifestations of chronic diseases such as stroke, heart attack and kidney failure. Artisan physicians in private offices and newly developed clinics and hospitals became the dominant production units of what would develop into an industrial model of producing health care services. With physicians in control of the units of production, their role was largely one as healer of the sick, counselor to the dying. Indemnity health insurance was developed to cover the costs of hospitalization and increasingly expensive technological dependent care. Public health was concerned primarily with infectious disease surveillance and control; maintaining population safety through sanitation and water treatment; imposing quarantines; and restricting access to unsafe environments.
With the great epidemiologic transition that took place in the first half of the 20th century, the rate of infectious diseases declined and non-communicable chronic diseases grew in prevalence and importance. (11) By 1950, life expectancy was 68 years. (12) The emerging 2.0 focus on prolonging life and reducing disability meant a greater emphasis on chronic disease management and secondary prevention. The Framingham and other epidemiologic studies shifted the model of disease causation from biomedical (a simple culprit such as a virus or gene) to a biopsychosocial perspective focusing on multiple interacting determinants (social, behavioral, environmental). (13,14) The time frames for effective intervention also shifted, from treating acute illness over days and weeks to managing chronic conditions over years and decades. Accordingly, the 2.0 payment mechanisms evolved from indemnity insurance for unexpected costs to prepaid health benefits to finance necessary preventive care, routine risk factor screening and the increasingly predictable management of chronic disease. The 2.0 patient care model emphasizes a medical home for organizing care that is designed for improving the vertical integration of
services between tertiary, secondary and primary care. As a much more complicated system, the health provider’s role is augmented from able healer, to capable manager of increasingly complex treatment protocols, office staff, and care teams. Value is no long simple construed as reducing morbidity and mortality but also focuses on producing high quality health care services at the low possible cost. In order to organize care into high performing vertically integrated delivery systems, medical homes become the hub of care management and coordination that are vertically linked to higher cost specialty, subspecialty and hospital services. Corporate production and delivery models in the form of Health Maintenance Organizations, Preferred Providers Organizations and Accountable Care Organizations begin the dominant model of organizing care, as smaller solo and group practice become less viable. Accountable provider networks, that share financial risk, employ more sophisticated business management tools, are enabled by newly available information technology that can be used to streamline business models and improve care management. Preventive and public health services focus more on screening and behavior modification to reduce negative health behaviors, such as smoking.
Though the 1.0 and 2.0 systems increased life expectancy, over the past 20 years the United States has dropped to 26th among 34 OECD countries in terms of Health Adjusted Life Expectancy. (15) Rising rates of chronic disease and disability (16–19), as well as the persistent and growing disparities (20,21), underscore the 2.0 system’s failure to adequately address early, upstream and developmental determinants of life long health and well-being.

3.0

While the U.S. health care system strives to implement a high-performing 2.0 chronic disease delivery system, powered by medical homes and organized into Triple Aim producing ACOs, health system innovators are already rolling out initiatives that form the basis for the next era of innovations in care. Aspiring to do more than extend life and minimize disability, 3.0 design principles focus on optimizing the health of the population through primary prevention, health promotion, and community-integrated health delivery systems, designed to promote wellness and achieve optimal lifelong health trajectories(22). The scientific revolution in life course health is shifting the scientific rational from biopsychosocial to life course health developmental models that focus on the upstream
social and developmental determinants of health while providing a powerful new rational for preventive and preemptive interventions that can modify long-term health trajectories. ACOs are likely to evolve into Community Accountable Health Development Systems that are more horizontally integrated across health care, public health and other sectors, and more longitudinally integrated to optimize population health trajectories. New payment and financing mechanisms will need to evolve to enable investments in the health development of individuals and population over much longer time horizons, and to provide ways of pooling financial resources across different sectors and sharing risk for health and related outcomes.
References


Exhibit List:

Appendix Exhibit 1: Figure (PowerPoint)
Title: The Evolving Health Care System: 3 Eras >> 3 Operating Systems
Source: Authors analysis

Appendix Exhibit 2: Figure (PowerPoint)
Title: US Health System Evolution (critical path)
Source: Adapted from CMS CMMI Population Health Team
Exhibit 1: The Evolving Health Care System: 3 Eras >> 3 Operating Systems

**The First Era (Yesterday)**
- Focused on acute and infectious disease
- Biomedical Model
- Short time frames
- Acute Medical Care
- Insurance-based financing
- Industrial Production Model
- Reducing Deaths

**Health System 1.0**

---

**The Second Era (Today)**
- Increasing focus on chronic disease
- Biopsychosocial Model
- Longer time frames
- Chronic Disease Mgmt & Prevention
- Pre-paid benefits
- Corporate Production Model (ACOs)
- Prolonging Disability free Life

**Health System 2.0**

---

**The Third Era (Tomorrow)**
- Increasing focus on achieving optimal health
- Life Course Health Development Model
- Lifespan/ generational
- Health Promotion &Optimization
- Investing in population-based prevention
- Network Production Model (Health Development Systems)
- Producing Optimal Population Health

**Health System 3.0**

*Source: Authors Analysis*
Exhibit 2: US Health System Evolution

Health System Transformation Critical Path

Sick Care System 1.0
- Acute Non Integrated Medical Care
- Acute Care and Infections Disease Focused
  - Episodic and sick care focus
  - Uncoordinated care
  - High utilization of emergency and hospital based services
  - Multiple patient clinical records
  - Focus on treatment of illness and life threatening conditions
  - Protect society from spread of disease
- No organized integrated care networks
- Specialty care and medical technology dominated
- Significant variations in cost and quality

Coordinated Health Care System 2.0
- Outcome Accountable Health Care
- Patient/Person Centered
  - Integrated chronic care management oriented
  - Early intervention and secondary prevention
  - Patient and care giver engagement in care
  - Shared decision making
- Organized around integrated accountable care networks
  - Value based shared performance and financial risk and reward
  - Integrated HIT
  - Focus on care management
  - Improve individual health outcomes
  - Cost and quality performance accountability and transparency

Community Integrated Health System 3.0
- Population Health-Optimizing Services
- Population and Community Health Centered
  - Community Health Linked
  - Population based cost, quality and health performance transparency
  - Accessible Healthcare Choices
  - HIT, E-health and telemedicine capable
- Community health systems with integrated networks
- Healthy community focused
- Learning Organization
- Population outcome value based reimbursement
- Community Health Improvement Focus
  - Healthy community investment
  - Community health capacity development
  - Community and health resource integration
  - Community engagement and shared responsibility

Source: Adapted from CMMI