Evaluation Plan
2007-2011

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Executive Summary

CareSpark is a regional health information organization serving 750,000 residents in the multi-state Tri-Cities TN / VA region, where disparately poor health outcomes and high costs for health care services pose burdens for patients and purchasers alike. CareSpark was chartered as a community-based not-for-profit corporation in 2005 after a comprehensive strategic planning process involving a broad base of stakeholders, including healthcare organizations and employers with ongoing programs of performance excellence which have gained recognition such as the Malcolm Baldrige Award and multi-level honors from the Tennessee Center for Performance Excellence. Influenced by the community-wide awareness of and expectations for excellence and quality, CareSpark was established from its inception as an organization committed to continuous quality improvement. CareSpark strives to integrate and demonstrate performance excellence through ongoing monitoring, reporting and evaluation of key internal and external measures. These measures help to assure attainment of CareSpark strategic outcomes: improved health status and increased value from healthcare resources invested.

CareSpark Mission: To improve the health of people in Northeast Tennessee and Southwest Virginia through the collaborative use of health information.

CareSpark Vision: To be a world-class, quality-driven, clinically integrated, efficient health and wellness system for the people of our region. CareSpark will serve as a neutral ground for clinical data exchange, implementing regional quality improvement initiatives and encouraging the adoption of health information technology.

CareSpark Values:

- Regional Cooperation
- Community Accountability
- Privacy
- Integrity
- Continuous Improvement
- Inclusiveness
- Stakeholder Parity

CareSpark Principles:

- Work for the good of the community
- Assure that the planning process be inclusive and involve all relevant stakeholders
- Engage all purchasers and providers (both large and small groups) willing to cooperate
- Enable clinicians to provide better outcomes at lower cost
- Facilitate necessary assistance for increased use and sharing of electronic health information
- Advocate for relationship of reward to investment that is fair for all parties
- Assure that benefits of the project accrue to investors in proportion to their investment
- Enable incentive payments for providers and improved value of care for selected diseases of regional importance
- Implement the full scope of project in a practical way
- Sequence implementation by introducing new programs over time with coordination to ensure functional and fiscal soundness
- Assure that scope and benefits will serve the entire region, including rural areas
- Align policies and strategies with current and emerging state and federal regulations

CareSpark's Organizational Structure:

CareSpark is governed by a board of directors, individuals elected at-large from the community to assure a balanced representation of demographics, stakeholder perspectives, subject matter expertise and leadership skills. Several working committees of volunteers, with support from CareSpark staff, consider and recommend strategies to the board in order to carry out the mission of the organization. Key among these committees is the Outcomes & Evaluation Committee, with liaisons to each of the other committees (Clinical, Technical, Communications & Marketing, Finance, and Personnel), which is charged with alignment of processes and resources to advance the overall goals of the organization. Two additional committees have been established with specific responsibilities for defining and monitoring key indicators of success in achieving CareSpark's strategic outcomes: Population Health improvement and Financial Value improvement (see *Attachment 1: CareSpark Organizational Structure*).

Each of CareSpark's committees consider and recommend metrics (including national benchmarks for comparison with best practices) that are monitored at regular intervals (some daily, some monthly, some quarterly and some annually) and reported to the board at appropriate intervals (see *Attachment 2: CareSpark Metrics Summary*). These data form the basis for an annual strategic planning process for the organization, and progress is reviewed at least quarterly for each key measure. Annual strategic plans are then translated into working project plans for each committee, with timelines and responsibilities outlined in order to guide the work of volunteers, teams and staff. At the end of each fiscal year, members of the board assess the attainment of annual objectives and set goals for the coming year, as part of the process for recognizing volunteer contributions and awarding staff incentives.

As part of its commitment to performance excellence, CareSpark participates in state and national initiatives that support networking with peer organizations, leadership and staff development and sharing of best practices, including the Tennessee Center for Performance Excellence, eHealth Initiative, and Health Information and Management Systems Society (HIMSS). CareSpark has twice been recognized by the Tennessee Center for Performance Excellence (with a "Commitment to Quality" Award in 2006 and 2007) and by Computerworld as a 2008 Laureate. Information and feedback from these sources is integrated with the metrics and work-plans of CareSpark committees, as relevant, to assure that CareSpark aligns efforts with emerging trends in the external market, as well as with the needs within our regional market, so that the resources and effort invested in CareSpark result in maximum positive impact on health outcomes and healthcare service value (see *Attachment 3: feedback from TN Center for Performance Excellence for 2007 Application*).

CareSpark has also chosen to participate in state and national initiatives for health information exchange, including the Tennessee eHealth Council, Virginia Health Information Technology Council and US Dept of Health and Human Services' Nationwide Health Information Network (NHIN) Prototype Demonstration and Trial Implementation. Each of these initiatives has different requirements for monitoring and reporting of outcomes, mostly process measures due to the early stages of these initiatives; CareSpark has worked to align our internal evaluation plans to integrate the requirements for each.

Evaluation Plan

A. Evaluation of Effective Governance

CareSpark's Governance model is based on a community-based, multi-stakeholder, mission-driven leadership. The Governing Board members are representatives of the regional stakeholders with established relationships. An annual strategic planning process provides effectiveness review and plan modification to verify that the governance model does not inhibit efficiencies; we strive to make it sufficiently comprehensive so that project decisions remain aligned with organizational goals.

Successful governance is determined by the ability of CareSpark's governance model to provide support to and help with technical/functional/operational efficiencies. Policy and procedure development for both technical and operational services have been completed and approved by the Governing Board. Success is measured by CareSpark's ability to exchange data throughout the CareSpark region and beyond, and to contribute to and align with state and national standards for health information exchange. Performance is assessed based on the following measures:

1. Participation of stakeholders (providers, purchasers, consumers) in health information exchange within the CareSpark region
2. Participation of stakeholders (providers, purchasers, consumers) in exchange of health information external to CareSpark region
3. Demographic usage (differences in large / small providers, local and non-local purchasers, racial / ethnic / gender / age of patient)
4. Participation in CareSpark organization (board, committee, focus group, other)
5. Participation in state or national governance entities (Tennessee eHealth Council, Va Health Information Technology Council, AHIC, NHIN, other)
6. Demonstrated compliance with national best practices for governance of health information exchange activities
7. Satisfaction survey (see *Attachment 4: CareSpark volunteer survey)*

The CareSpark Governing Board has elected to participate in the Tennessee Center for Performance Excellence Program (TNCPE), thereby adopting the Baldrige Criteria as measures for evaluation of Performance Excellence:

- Leadership
- Strategic Planning
- Customer and Market Focus
- Measurement, Analysis, and Knowledge Management
- Workforce Focus
- Process Management
- Results

Following an onsite assessment by a team of independent examiners, identifying strengths and opportunities for improvement based on these criteria, CareSpark integrates the recommendations into the organization's strategic plan and targeted outcomes to support the functional performance objectives for the organization.

B. Evaluation of Functional Effectiveness

Functional performance is defined as CareSpark's ability to securely provide accurate, up-to-date and relevant data to appropriate users in a timely and cost-effective manner. Assessment is performed using such information sources as CareSpark's audit log, metrics reporting tools and user satisfaction surveys. Organizational infrastructure that must be assessed includes:

Technical

a. Security of network and information
b. System Reliability (downtime)
c. Response time
d. Instances of duplicate, inaccurate or incomplete information (data integrity)
e. Number of users
f. Number of records
g. Volume of transactions
h. Operating efficiency (use of bandwidth, electricity, storage space, personnel to administer, cost to administer, etc.)

Finance

a. Revenue (projection compared to actual)
b. Expense (projection compared to actual)
c. Revenue vs. expenses (self-sustaining)
d. Cash reserves (minimum three months operating)
e. Accurate records and reporting (audit)
f. Increasing value for customers (ROI)

Personnel

a. Qualified personnel (volunteer, staff, consultants)
b. Customer Satisfaction survey results (volunteer, staff, vendor)
c. Participation (new participants, retention of current personnel)
d. Leadership development opportunities
e. Recognition / incentives / awards

Communications & Marketing

a. Community Awareness of CareSpark and benefits of health information exchange
b. Positive perception of CareSpark
c. Participation in CareSpark (clinicians and consumers)
d. Support for CareSpark (funders, policy-makers)

Health Outcomes

a. Adoption of clinical best practices for targeted health issues
b. Outcomes for selected indicators of population health
c. Ability to contribute to advancement of medical science

C. Evaluation of Feasibility in Emerging Market / Environment

Clinical Information Exchange:

In 2004-2005, in advance of any state or national initiatives to coordinate such efforts, CareSpark conducted a comprehensive regional analysis of the business and technical feasibility for an organizational infrastructure to support the adoption of interoperable health information technology and exchange of health information. This analysis resulted in a strategic business plan that outlined a three-year, $12 Million project to offer a hosted EMR for physician practices, to enable the exchange of medication and diagnostic data, with an estimated 3-to-1 return on investment for stakeholders. Analysis revealed that 95% of the anticipated savings would accrue to purchasers of health services (public and private health plans, self-insured employers, and self-pay patients). Providers would invest in acquisition of an electronic health record system, while purchasers would invest in incentives for providers and patients. The important role of public health plans (state Medicaid and federal Medicare) was evident, but little awareness or consensus existed at that time. Input from the public was also solicited and used to guide our direction on issues such as consumer-directed preferences for consent and authorization (see *Attachment 5: CareSpark Questionnaire*)

Since then, there have been significant public attention and resources directed to the potential benefits of health information technology and health information, requiring CareSpark to pay close attention to the changing environment within and outside the region. As part of the annual strategic planning process, CareSpark undergoes a thorough analysis of the organization's strengths, weaknesses, opportunities and threats, including review of the current market forces and drivers internal and external to our region and our organization (see *Attachment 6: SWOT analysis for 2008)*. An early analysis in 2005-06 revealed that there were already several options for acquisition of a hosted EMR by provider organizations, including one at no-cost. This resulted in a revision of CareSpark's initial business strategy, to avoid competition with partners already in this market and to seek other sources of ongoing revenue.

Participation in state and national initiatives has allowed CareSpark to stay abreast of the emerging standards, priorities and funding opportunities, while also paying careful attention to the innovations that could offer disruptive technologies to change the market dynamics. Each of these is tested within CareSpark teams and focus groups, to determine how best to utilize these innovations in order to serve the needs of people in our region.

There is clear recognition that the majority of health-related transactions occur within the regional market, but that there are instances where information from outside the region could be useful to those delivering patient care services. It should be noted that some states are establishing infrastructure for intra-state exchange, which is of limited value in the multi-state region served by CareSpark. In order to evaluate the value of health information exchange with sources outside the CareSpark geographic region, it is therefore necessary to differentiate between local (which is by necessity a multi-state region) and non-local data exchange—a differentiation which can also help to quantify the value of nationwide health information exchange.

Evaluation of CareSpark's ability to exchange data with entities in other regions of our respective states (such as the Mid-South e-Health Initiative in Memphis, Tennessee, or MedVirginia in Richmond, Virginia) or in communities outside our respective states (such as New York, California or Arizona) is an important consideration for CareSpark's effectiveness, since local residents may travel outside our region for specialized services or unanticipated situations. Exchange with national providers (such as the Veteran's Administration) or agencies (such as the Social Security Administration) are even more important, since those agencies serve a significant percentage of the citizens who reside in our region and who receive health care services here.

It is for this reason that CareSpark must evaluate our ability to exchange information both within and outside our region. To this end, CareSpark's evaluation plan includes the following:

a. Ability to meet core services requirements (secure data exchange, consumer consent preferences, ability to query and retrieve data, ability to send / receive summary medical record, notification of new / updated patient data, service directory, etc.) as may be required for Nationwide Health Information Network participants.
b. Compliance with standards for health information exchange, as demonstrated by CCHIT certification for health information exchange organizations (HIE's)
c. Financial sustainability for CareSpark to support regional and national health information exchange
d. Compliance with legal requirements and contractual agreements, including HIPAA and other relevant policies.
e. Demonstrated value for participants in the CareSpark system

Consumer-Directed HealthCare

One of the most significant changes to occur since CareSpark conducted its first evaluation of business and technical feasibility is the emergence of consumer-directed solutions. The launch of Personal Health Records banks such as Microsoft HealthVault and Google Health, among others, could become a disruptive force in the market for electronic health records. For this reason, CareSpark elected to participate in the NHIN Consumer Empowerment Use Case, as a means of exploring and developing ways to connect PHR's with clinical information systems (EHR's).

Ongoing evaluation of the business case, functional capabilities and benefit to users will be included in CareSpark's analysis of ROI for stakeholders, and will include the following considerations:

a. Consumer Consent Preference: Consumer use of PHR's to authorize release of records will be compared to the consumer's indication of consent at the provider location through CareSpark's Master Patient Option Preference, to see which is preferred by the patient.
b. Provider willingness to allow Consumer Access to Clinical Information, including online viewing of records, results and messaging
c. Consumer ability to request and receive account of disclosure via an audit log.
d. Accurate identification and authorization of the consumer who is accessing information electronically
e. Surveys of consumer and clinician user satisfaction
f. Reports of inappropriate or unauthorized access / use of information
g. Health outcomes for patients using PHR's to monitor and manage information

Evaluation Results
November 2008

Perceived Value for Health Information Exchange

Perceived value has been demonstrated by CareSpark's ability to improve efficiency and health outcomes within the region and is reflected by:

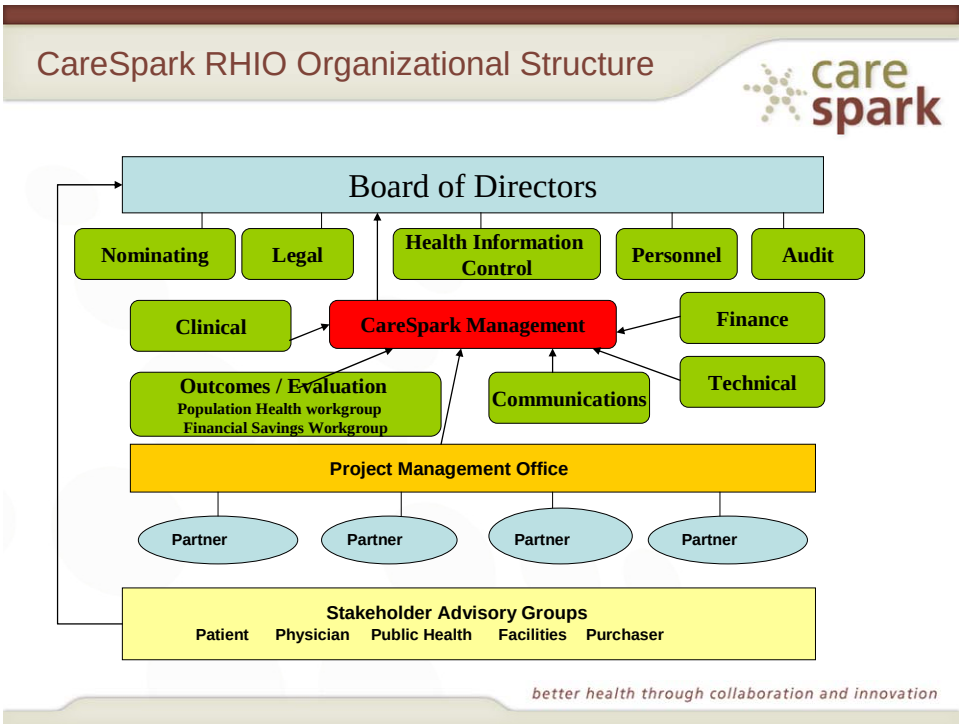
- Collection and Dissemination of baseline data for mortality and disease rates, as reported externally by Tennessee Dept of Health, Virginia Department of Health, and compiled by East Tennessee State University College of Public Health (see *Attachment 7: Premature mortality report 2008)*
- Medical error rates – no regional data yet available
- Compliance with standards: Integration of HITSP and CCHIT standards in CareSpark's project design and implementation enabled successful testing and demonstration of data exchange with participants of the National Health Information Network Trial Implementation, proving the capabilities for transactions across systems with varied technical architectures and functionalities. Within the CareSpark region, adoption and compliance with standards-based infrastructure has also taken hold with local providers. In Dec 2007, at the onset of the NHIN Trial Implementation project,, there were no standards-compliant systems in use by providers in the CareSpark region; by project end, two providers have installed or upgraded to systems that are standards-compliant, and eight providers have systems capable of achieving compliance with addition of an "appliance" to achieve compliance with standards.
- Adoption of standards for interoperability have enabled connectivity and exchange between four different provider systems, requiring only two days for interface and connection, rather than two or more weeks of work by technical personnel to configure technical interfaces.
- CareSpark has finalized data-sharing agreements with major healthcare provider organizations in the region, and has increased awareness of the requirements for exchange of information with providers outside the region (as will be required for the NHIN Data-Sharing and Reciprocal Services Agreement). CareSpark's policies have been aligned to support exchange of data inside and outside the region, reducing the time and cost required for provider systems to validate compliance with state and federal laws before releasing data to other providers.
- Participation in the NHIN TI Implementation project accelerated CareSpark's readiness to meet its objectives through communication and collaboration with other participants. The data exchange connectivity accomplished as part of this project is consistent with CareSpark's desire to share learnings and contribute to the identification of best practices for health information exchange organizations.

Perceived Barriers:

Although successful demonstration of health information exchange (regionally and extra-regionally) has been accomplished, barriers to full implementation remain. CareSpark must monitor and evaluate these barriers to determine whether strategies are effective or not in overcoming these challenges.

- Incentives to promote participation by clinicians and patients have been slow to arrive, delaying adoption of electronic health records and enrollment of consumers and leaving much uncertainty about the financial sustainability of health information technology investments
- Variations in state laws regulating electronic transmission of health information has resulted in significant cost and delay for execution of data-sharing agreements
- EHR vendors have not yet fully developed standards-compliant solutions, or have not yet brought those to market, hindering the ability of providers to easily exchange information
- Public concern about medical identity theft keeps some patients from participating, while agencies and organizations have been slow to put safeguards in place due to cost
- Certification process is slow, with some participants preferring to wait to assure that their investment in EHR's and HIE will not be lost
- Many providers, stretched to serve patients with limited resources, have little to allocate for technology upgrades or collaboration with other providers
- Governance for a Nationwide Health Information Network is still undefined, leaving many participants and many health information organizations uncertain about their obligations and commitments for future participation
- Risk of liability is high for early adopters, with no limits or protections in early stages of innovation
- Consumers in the CareSpark region are less engaged than in other regions, posing a greater challenge for consumer-directed healthcare decisions and potentially leading to greater disparities for low-income, less-educated individuals or those with poor health and lower ability to manage complex decisions for health care services.

Attachment 1
CareSpark Organizational Structure



Attachment 2
CareSpark metrics summary

Metric #	Metric	Owner	metrics detail completed	tech team reviewed / accepted	data collection enabled	Reporting enabled	Frequency to Gather	Frequency to Report	Calendar	Fiscal	Separate	Cumulative
CL 1.1	Diabetes: HgA1c <7	Clinical	Y	12/13/2007	Pending CDR		every 6 months	every 6 months	Y		Y	As of 1/1/2008
CL 1.2	Diabetic Prescriptions filled	Clinical	Y	12/13/2007	Pending CDR & Review by ActiveHealth		every 6 months	every 6 months	Y		Y	As of 1/1/2008
CL 1.3	Diabetes: LDL	Clinical	Y	12/13/2007	Pending CDR		every 6 months	every 6 months	Y		Y	As of 1/1/2008
CL 1.4	Adult Diabetic Risk Factors Controlled	Clinical	Y	12/13/2007	Pending CDR		every 6 months	every 6 months	Y		Y	As of 1/1/2008
CL 2.1	CV Disease Gender Disparity	Clinical	Y	12/13/2007	Pending CDR		every 6 months	every 6 months	Y		Y	As of 1/1/2008
CL 2.3	CVD - LDL < 100	Clinical	Y	12/13/2007	Pending CDR				Y		Y	As of 1/1/2008
CL 5.1.1	Colorectal Cancer and FOBT	Clinical	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
CL 5.1.3	Colorectal Cancer and Colonoscopy	Clinical	Y	12/13/2007	Pending CDR & Historical Lab Data (10 yrs)		Annually	Annually	Y		Y	As of 1/1/2008
CL 5.2	Mammogram	Clinical	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
CL 5.3.1.1	PAP age 21-30	Clinical	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
CL 5.3.3.1	PAP age 31-70 Abnormal	Clinical	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
CL 5.4	HPV Testing aged 11-12	Clinical	Y	12/13/2007	Pending Review by Active Health				Y		Y	As of 1/1/2008
CM 1.1	# clinicians actively using the system (X times per week / month)	Communications Committee	Y	NA			Daily	Quarterly	Y		Y	As of 1/1/2008

CM 2.1	# patients enrolled (passive / active)	Communications Committee	Y	NA			Daily	Quarterly	Y		Y	As of 1/1/2008
CM 2.2	% patients disenrolled (either by opt-out or discontinuation of enrollment)	Communications Committee	Y	NA			Daily	Quarterly	Y		Y	As of 1/1/2008
CM 3.1	awareness--# Carespark "ambassadors with adequate level of comfort to advocate for CareSpark	Communications / Personnel Committee	Y	NA			Quarterly	Semi-Annually	Y		Y	As of 1/1/2008
CM 3.2	awareness--# media / publicity exposure events	Communications Committee	Y	NA			Monthly	Quarterly	Y		Y	As of 1/1/2008
CM 3.3	# website hits by new visitors	Communications Committee	Y	NA			Monthly after Media Exposure	Quarterly	Y		Y	As of 1/1/2008
FIN 1.1	Operating Budget - Revenue	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 1.2	Operating Budget - Expenses	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 1.3	Operating Revenue and Expenses	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 2.1	Capital Budget	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 2.2	Operating Budget - Expenses	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 2.3	Capital Revenue and Expenses	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008

FIN 3.1	Cash Flow Reserves	Finance	Y	NA			Monthly, Quarterly, Annually	Monthly, Quarterly, Annually		Y	Y	As of 1/1/2008
FIN 4.1	Unqualified Financial Audit	Finance	Y	NA			Annually	Annually		Y	Y	As of 1/1/2008
OE 1.1	TNCPE Award	O&E	Y	NA			Annually	Annually	Y		Y	As of 1/1/2008
OE 2.1	Action Plan Achievement	O&E	Y	NA			Quarterly	Quarterly		Y	Y	As of 1/1/2008
OE 3.1	Community Health Status	O&E	Y	NA			Annually	Annually	Y		Y	As of 1/1/2008
OE 4.1	Global Health Care Savings	O&E	Y	NA			Annually	Annually	Y		Y	As of 1/1/2008
P 1.1	Performance Evaluation	Personnel	Y	NA			Annually	Annually		Y	Y	As of 1/1/2008
P 2.1	Incentives Awards	Personnel	Y	NA			Annually	Annually		Y	Y	As of 1/1/2008
P 3.1	Vounteer Retention	Personnel	Y	NA			Annually	Annually		Y	Y	As of 1/1/2008
P 4.1	Volunteer Hours	Personnel	Y	NA			Monthly	Quarterly, Annually		Y	Y	As of 1/1/2008
PH 1.1	ER visits for CHF	PHWG	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
PH 2.1	Flu Vaccinations	PHWG	Y	12/13/2007	Pending CDR		Annually	Annually in May	Y		Y	As of 1/1/2008
PH 3.1	Stroke Rehabilitation	PHWG	Y	12/13/2007	Pending CDR		Semi-Annually	Semi-Annually	Y		Y	As of 1/1/2008
PH 4.1	Identified Diabetes Cases	PHWG	Y	4/10/2008	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
PH 6.1	Post Myocardial Infarction Follow up	PHWG	Y	12/13/2007	Pending CDR		Quarterly, starting 10/2007	Quarterly, starting 10/2007	Y		Y	As of 1/1/2008
PH 7.1	Premature Mortality	PHWG	Y	12/13/2007	Pending CDR		Annually	Annually	Y		Y	As of 1/1/2008
PH 8.1	Completed Lipid Testing	PHWG	Y	12/13/2007	Pending CDR		Semi-Annually	Semi-Annually	Y		Y	As of 1/1/2008
TC 1.1	# of Providers Interfaced to CareSpark	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 1.2	# of Unique Patient Identfiers in the MPI	Technology	Y	12/13/2007			Quarterly	Quarterly		Y	Y	As of 1/1/2008
TC 2.1	# of Registered Clinicians	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008

TC 2.2	# of Registered Patients	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 3.1	# of Users Trained to use a CareSpark Portal	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 4.1	Response Time on the Physician Portal	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 4.2	Response Time on Patient Portal	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 5.1	Percent of Up Time	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 6.1	Usability for clinicians	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008
TC 6.2	Usability for patients	Technology	Y	12/13/2007			Every 6 months	Every 6 months		Y	Y	As of 1/1/2008

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Attachment 3
Feedback from Tennessee Center for Performance Excellence

	Strategic Priority High-Med-Low			
Strengths:				
	S	Ensure Sustainability of Board and Organization		
		Systematic Approach to achiev Business Plan		
		Board Commitment to Values		
	S	Evaluate Performance Against Goals		
	C	Maintains Active Volunteer Pool for Service		
	S	Fiscal Accountability		
		Purpose Driven Focus on Improvement of Health Status and Delivery		

Opportunities for Improvement:				
	C - High	Identify relative expectations of key customer groups		
	C - High	Gather relevant feedback from customers		
	S - High	Finalize development of measu with consistent tracking and analysis		
	S - Low	Identify benchmarks for comparative analysis		
	S - High			
		Initiate reporting of measures		
	S - C - L	Focus on future		

Category		Opportunity for Improvement	Committee / Resource
1 Leadership			
	C - High	Systematic process to communicate mission, visio values to workforce, suppliers, partners and stakeh	Board
		Systematic process to create an environment for organization PI to achieve mission and vision	
	S - High	Long-term performance measures to achieve long- Business Plan	
		Establish consistent process for evaluating perform of Board members	
	L - High	Approach for monitoring ethical behavior and publi responsibility	
	C - High	Identify key community to support within the servic area, areas of emphasis and types of support	
	S - High	Identification of strategic challenges	
2 Strategic Planning			
	S - High	Consistent process for determining strategic adva for sustainability	
	S	Develop goals and timetables for accomplishing K Strategic Objectives	
	S - High	Systematic process to ensure SPP addresses SW	
	S - Medium	Identify competitor information and benchmarks to address strategic challenges and advantages to respond to changes in competitive environment	
	S - High	Process to roll action plans into overall strategic p and deploy throughout the organization	
	S - Medium	Define long-term and short-term plans including ti horizons (beyond 2008)	
3. Customer / Market Focus			
	C - Medium	Consistent approach to keep customer and marke listening and learning methods current with busine needs and direction which is key to reacting to cha in expectations	
	C - Medium	Consistent approach to evaluating and using cust information to identify opportunities for innovation, customer satisfaction, etc.	
	C - High	Five key customer groups - identify distinct needs these groups to tailor services and programs	
	C - Medium	Systematic customer feedback process	

4 Measurement, Analysis, Review of Organizational Performance		
	S - High	Global scorecard with measures to track daily operations or overall organizational performanc
	S - Low	Process for selecting, using and ensuring effectiveness of comparative information
	S - Low	Translate organizational performance review fin into priorities for continuous improvement
	S - Medium	Process to incorporate results of organizataiona performance reviews into systematic evaluation improvement of key processes
	S - High	Emergency plan to ensure continuity of services
	S - High	Systematic process for ensuring timeliness, acc and security/confidentiality of CareSpark's data
Measurement, Analysis Review of Organizatior Performan (cont'd)	**S - Low**	Approach for collecting and transferring knowle and for rapid identification, sharing and implementation of best practices
5 Work systems		
	S - Low	Employee satisfaction measurement is linked to business results
	S - Low	Workforce career progression plan
	S - Low	Process needs to identify how CareSpark ensur workgroce represents the diverse ideas, culture thinking of the hiring community
	S - Medium	Consistent process for managing and organizing workforce to reinforce customer focus, address strategic challenges and achieve agility to addre business needs
	S - High	Obtaining and retaining a qualified staff
6 Process Management		
	S - Low	Systematic process to identify key core compete for providing customer value in marketplace
	S - High	Contingency plan for work system and work pla preparedness for disasters or emergencies
	S - High	Establish key performance measures for consis management of work processes (costs, tests, re and service errors)
	S - Medium	Deploy improvement processes (FOCUS PDCA SIPOC)
	S - Medium	Provide results on service performance by servi type, customer groups or market segments.

7 Product / Services Outcomes

S - Low	Present comparative results on product and servic performance using industry benchmarks
C - Low	Identify benchmark data for customer focused out using peer organizations and industry benchmark
C - High	Identify segmented data addressing performance related to satisfaction and dissatisfaction for each five customer/stakeholder groups.
S - High	Financial results are not meeting targets and no comparisons are provided.
S - High	No results are presented for measures of marlketp performance such as market share growth or new markets entered
S - Medium	Results of workforce-focused outcomes for creatir maintaining a productive environment have not be presented (i.e., employee satisfaction)
L - High	No measures identifying performance regarding workplace health, safety, security or benefits
S	No results for Process Effectiveness Outcomes
S - Medium	Provide measurements relevant to strategic objec and goals identified in category 2.1b(1) and 2.2b
C - Medium	Provide results for social responsibiity or organiza citizenship
L - Low	Provide comparative data for results of strategic p accomplishments (legal, ethical, etc.)

Attachment 4
Survey of CareSpark Volunteer Satisfaction

CareSpark Volunteer Response

1. Volunteer Feedback

Please help us assure that the volunteer experience at CareSpark is satisfying and effective for you and others in the organization by responding to the questions below (which should require 5-10 minutes to complete).

1. Please select one or more reasons that you initially agreed to serve as a volunteer in the CareSpark effort:

request from a respected individual
desire to help our regional community
professional interest in the issue
opportunity to learn about emerging trends in this field
opportunity to network with professional colleagues
opportunity to build my resume and advance my professional status
Other (please specify)

2. Please select all of the volunteer positions in which you currently serve:

Board of Directors
Clinical
Communications & Marketing
Executive
Finance
Financial Outcomes
Nominating
Outcomes & Evaluations
Personnel
Population Health
Technology
Other (please specify)

3. In general, how you would rate the group you spend the most time with based on the qualities listed below?

Committee leadership
Collaboration among team members
Timeliness
Clarity of objectives with overall mission of the organization
Quality of work products
Attainment of objectives
Support from CareSpark staff
Alignment with other CareSpark committees
Recognizing/ acknowledging contributions of team members

4. Please rank CareSpark's effectiveness in maximizing the utilization of your:

Knowledge & Expertise
Skills
Contacts
Other Resources
Time

5. Please share any observations or suggestions that might help us improve the experiences for our volunteers.

6. Would you recommend volunteering to colleagues?

Yes
No

7. Is this survey a convenient and effective way for you to give feedback to CareSpark?

Yes
No

Survey Powered by: SurveyMonkey.com

care spark

Attachment 5
Questionnaire of Public Attitudes
About Sharing Personal Health Information Electronically

Please complete this Survey for a chance to win a door prize!

1. **What kinds of information would you be comfortable sharing among health professionals, for the purpose of coordinating and improving the delivery of health care services to you?**
   - ____ name, address, phone, date of birth
   - ____ social security number
   - ____ payment information (health plan, health savings account, credit card, or other)
   - ____ employer
   - ____ past history for health issues (childhood, previous illness or injury)
   - ____ list of current medications, including vitamins, over the counter medications and herbal supplements
   - ____ allergies
   - ____ names of physicians or other health professionals from whom you receive care
   - ____ preferred choices for pharmacy, lab, diagnostic services, inpatient services
   - ____ mental health diagnosis / treatment history
   - ____ sexually-related diagnosis / treatment history
   - ____ infectious disease history (HIV, tuberculosis, hepatitis)
   - ____ chronic disease conditions (diabetes, lung disease, cancers)
   - ____ family history of disease
   - ____ other (please explain)

2. **What methods would you use to give permission?**
   - ____ sign paper form at doctor's office, hospital, pharmacy, lab, clinic, etc.
   - ____ sign paper form at other location (mall kiosk, etc.)
   - ____ sign-up online

3. **To whom would you give permission to view your information?**
   - ____ to doctors who are responsible for my personal health care services
   - ____ to nurses or other office staff who assist my doctors
   - ____ to my pharmacist
   - ____ to technicians in laboratories, imaging centers, clinics
   - ____ to emergency responders (EMS, ambulance, etc.)
   - ____ to home health agencies, caregivers
   - ____ to public health officials responsible for tracking bio-terrorism, disease outbreaks, public health trends
   - ____ to organizations conducting research for clinical purposes (medical treatment procedures, pharmaceutical, medical devices, etc.)
   - ____ to persons tracking and reporting quality improvement measures
   - ____ to persons tracking and reporting cost-efficiency measures
   - ____ to those responsible for payment for my health care (employer, health plan)
   - ____ to family members who would make decisions if I am incapacitated

4. **What kinds of information in your records would you expect to have access to view?**
   - ____ list of all who have viewed my records (stamped with time and date of access, list of information viewed)

____ all information in my records
____ some information in my records (explain what this might include):

5. **Who is responsible for protecting the security of my information?**
____ I am
____ my health care provider
____ CareSpark staff who are employed to maintain system security
____ CareSpark board of directors
____ state / federal government

6. **What should be the penalties for release of information without permission?**
____ reprimand, retraining of employee
____ firing of employee
____ loss of certification, license or credentials for health professional
____ loss of business license for organization
____ civil charges, fines
____ criminal charges, time in jail
____ other (please specify)

7. **How would we best communicate with you about the system?**
____ verbal explanation at health professional's facility
____ written explanation at health professional's facility
____ online website for information
____ general media information
____ direct mail from your health provider
____ other (please specify)

8. **What benefits do you perceive from the electronic exchange of health information?**

9. **What risks do you perceive from the electronic exchange of health information?**

CareSpark is a not-for-profit organization in Northeast Tennessee and Southwest Virginia working to improve health through the collaborative use of health information that allows physician offices, hospitals, public health departments, pharmacies, laboratories and imaging centers to communicate electronically in order to improve patient care and safety while reducing costs. The CareSpark region includes 705,000 residents, 1,200 physicians, and 18 hospitals within the 17 counties that CareSpark encompasses. The efforts of CareSpark will enhance provider capabilities and support, allowing physicians to treat patients with an immense amount of up-to-date information, available at a moment's notice, in order to provide accurate and timely treatment while overcoming barriers that currently prevent this level of coordination.

Thank you for taking time to share your opinions and ideas with us!

CareSpark
info@carespark.com
phone: 423-963-4208
P. O. Box 657
Kingsport TN 37662
fax: 423-378-9646

Attachment 6
SWOT Analysis (Feb 2008)

Weaknesses

- Slow to Deploy
- Financial Constraints
- Fragile Balance of Perspectives
- Difficulty in Quantifying Return on Investment
- Health Status and Measurable Outcomes slow to change
- Standards not Defined
- Risk of Liability
- Dependence on Volunteers and Contributions
- Delay in Obtaining Non-Profit status
- Difficulty of establishing stable, long-term funding mechanism

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Opportunities

- **National Visibility and Leadership**
- **Varied Revenue Streams**
- **Additional Capabilities of Infrastructure**
  - Lab orders / reports
  - Imaging orders / reports
  - Electronic submission of records for Chart Audits
  - Document management (storage for fax / scan / electronic records)
  - Disability claims report submission
  - Back-up and Recovery
  - Personal health record
  - Patient access to clinical records
  - Population outcomes monitoring and reporting
  - Biosurveillance
  - Clinical research trial recruitment
- **Franchise (assist others to replicate)**
- **Re-sell Technical Expertise and Capabilities (MPI cleanup, policy development,**
- **Data Mining**
- **Intellectual Property Development (**
- **Patient Information and Education**
- **Grants and Projects (EHR adoption, rural broadband access, quality initiatives, P4P pilot)**
- **Telemedicine**
- **Tennessee Grants to Physicians (promotion of broadband access and HIT adoption)**
- **Conference and Training events**
- **CareSpark certification of product interoperability with network**
- **Sponsorship**
- **Membership**
- **Subscription-based participation**
- **Gain-Sharing**
- **Publication**

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Threats

- Well-funded Competitors
- Complex and Fast-Changing Environment
- Political Agendas
- Resistance to Change – all players
- Fear of Accountability – all players
- Lack of Understanding – Difficulty to communicate complex matters in a simple way
- Economic Pressures on Partners
- Public Unwillingness to Participate
- Technical Failure
- Innovator/Early Adopter Hurdles
- Cost
- Alternative Models might be Mandated
- Short-Term Timeframes to Show Results

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Key Assumptions

- No government-mandated system (federal or state)
- Non-Profit status approved
- Ongoing volunteer base
- Staff retention / succession
- Liability coverage
- Compliance with Contracts and Legal Requirements
- Meet deadlines for NHIN deliverables (Sept / Nov 2008)
- NHIN contract extended for 2009
- Revenue over expenses (budget management)
- Meet revenue / enrollment targets
- Provider willingness to enroll patients
- Patients Consent to Participate
- Providers acquire EHR Capability
- Provider adoption of best practices
- Financial ROI for each Data Participant
- Retention of Enrollment by Employers, Providers, Patients
- Business Continuity

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Key Indicators

- **Provider Adoption of**
  - EHR
  - Best Practices
- **Patient Enrollment**
- **Stakeholder participation**
- **User Retention**
- **Revenue over Expenses**
- **System capabilities (response time, downtime, security)**
- **Compliance**
- **Manpower**
- **Reduction in Chronic Disease Rates**
- **Cost of services**

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Attachment 7
Regional Health Status Report – Premature Mortality

Assessment of Public Health Indicators

of the

CareSpark Region

[Upper East Tennessee and Far Southwest Virginia]

A white paper prepared by the
Department of Public Health
East Tennessee State University

Tim E. Aldrich, Ph.D., MPH

Jonathon Savoy, MPH

January 14, 2008

The Public Health Work Group of Care Spark has guided this report's development. The Outcomes and Evaluation Committee is the target audience for this work;

yet portions of the findings may be developed for distribution to other audiences.

Abstract

A series of community health status indicators are assessed for the Care Spark region, a region defined by adjoining portions of upper east Tennessee and extreme southwest Virginia. Data sources were the national Center for Health Statistics [mortality data, 1999-2004] and the Centers for Disease Prevention and Control, Behavioral Risk Factor Surveillance Survey (1998-2006). The selected indicators are: premature mortality (age 45-64); knowledge of a diagnosis of diabetes; influenza immunization among the elderly; follow-up care for myocardial infarction; emergency room visits following congestive heart failure discharge; prevalence of cholesterol testing; and frequency of rehabilitation referrals after hospitalization for a stroke.

These indicators were assessed individually to represent disparities for population health in the Care Spark region. A simulation is offered of an aggregate measure from these indicators to inform policy makers. The weighting of the separate indicators was proposed to be accomplished with a modification of the Mantel-Haenszel proportional weighting solution, and by applying a weight assigned for sensitivity to clinical interventions.

A discussion is given for some limitations with the data analysis products and precautions for interpretations based on these findings. A set of recommendations are made based upon this data analysis experience. From the inaugural version of this report [2005], several of the recommendations proposed have been implemented.

Acknowledgement: The authors wish to express their appreciation to: David Ridings the TN BRFSS Coordinator; Susan K. Spain the VA BRFSS Coordinator. Appreciation is expressed to Mark McCalman (Chairman) and the members of the Population Health work Group for their welcome guidance and assistance with this report preparation. We also acknowledge the support of Dr. Randall Wykoff and Ms. Cynthia Taylor of the ETSU College of Public Health's Dean's office for their support of this effort.

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SYNOPSIS FROM FIRST CARE SPARK, COMMUNITY HEALTH STATIS REPORT

In September of 2005, the first version of this report was filed.(1) That report examined a variety of health indicators, principally cancer and cardiovascular disease risk factors, per the directions of the funder: the ETSU Office of Rural and Community Health and Community Partnerships. Those analyses emphasized capabilities for rural disease control in extreme southwest Virginia and upper east Tennessee. Further this report demonstrated the capacity for strategic, county-level data compilation for studies of local impact in the Care Spark region.

From that reports' recommendations: several accomplishments have followed that will expand and enhance Care Spark's assessment capabilities. The recommendations from that report were:

[1] A geographically localized BRFSS-compatible survey be completed for the CareSpark region:

The ETSU Department of Public Health funded this initiative in calendar year 2007. One thousand additional calls will be directed into the Appalachia region, expressly to African-Americans. The survey questions will be the same as the 'regular' Tennessee survey, with added question related to stroke risk and care seeking patterns [a particular interest of the authors].

[2] Future BRFSS surveys contain sampling from Appalachia, Care-Spark, and representing African-Americans;

The representation of African-Americans and the Care Spark region are addressed in the previous description. However, beginning in 2005, Tennessee began to sample its BRFSS calls based upon public health districts, this assured that approximately 700 call [of the 4000 statewide sample] would be from the Care-Spark region; Virginia had begun that sampling scheme in 2003.

[3] Disease registries be considered for establishment; and finally

Tennessee has embraced the stroke registry concept, submitting an application for national funding as part of the Coverdell solicitation from CDC in the Spring of 2007.(2) That application was approved but not funded. The Tennessee Stroke Systems of Care taskforce has determined to go forward with a voluntary stroke registry. The inaugural call for data will be November of 2007.

[4] Further analyses be completed using these data assets.

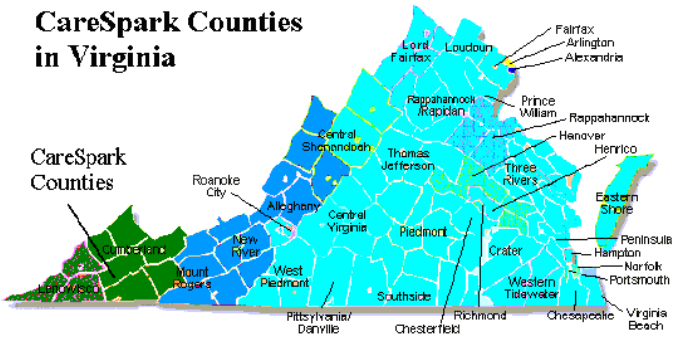
Diverse manuscripts for publication have been completed are in preparation from these data resources. (3-4) In addition, seven grant applications were prepared in the 2007, drawing on descriptions and graphics based on these data resources. In fact, the potential posed by these data assets has prompted the ETSU College of Public Health to develop a regional data center: SAPPHIRE.

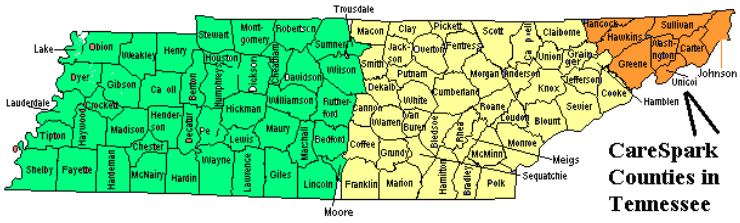
There has been substantive growth of Care Spark initiatives, including development toward its data system, its continuing quality assurance initiatives, but also collaborative grant applications

in 2007 for participation in the National Health Information Network, as well as a CDC-funded public health simulation of situational awareness.

INTRODUCTION

Care Spark is a Regional Health Information Organization established in 2001 as an out-growth of local quality improvement efforts of the City of Kingsport, TN. Over several years, Care Spark has evolved to represent health care facilities in a seventeen county area of upper east Tennessee and extreme southwest Virginia (see Figure 1). Care Spark has five administrative staff and is guided by a Board of Directors [Dr. John Dreyzehner, Chairman] and a series of steering committees. The Care Spark organization is progressing toward a 2008 initiation of its clinical data exchange from member facilities. This data stream will represent a model of the national health information exchange protocol to improve patient care via shared data access between providers. During its tenure,





Care Spark has continued two of its earliest commitments, first to improve the health of the residents of the community it serves, and to strive for quality improvement. Care Spark has received a Commitment Level 2 award from the Tennessee Center for Performance Excellence.

Figure 1: The CareSpark Counties and Appalachian Regions: Tennessee and Virginia

Care Spark Committee Process and Development of Quality Indicators:

In the intervening two years, since that earlier report (1), Care Spark volunteer committees have directed much attention to its aim of productive impact for local populations. First, the Care Spark Outcomes and Evaluation Committee [O&E] has directed a process of assessment metrics expressly intended for monitoring these impacts. Seven O&E sub-committees worked with development of such indicators, but particularly, the Public Health Work Group [PHWG] has developed a series of indicators for tracking as measures of community health status. In this endeavor, the PHWG was guided by several national panels of similar indicators. (5,6) Eventually seven variables were selected for monitoring of community-based impact from Care Spark initiatives. These seven variables are discussed later [Methods section.]

The metric development process includes establishing an operation definition for the metric. This includes specification of ICD codes, age or time ranges for inclusion, exclusions, and formulae for calculation (when applicable, e.g., rates or proportions). For each metric, a detailed work sheet is developed that specifies the data source, and normalization steps [e.g., age-adjustment]. This process specifies the baseline referent, and projects targets values for 2008-2010. The source of benchmarking data, e.g., state, national are identified. The process concludes with the designation of the frequency for reporting to the Outcomes and Evaluation Committee and to the Care Spark Board of Directors. This report then is again a base-line report for Care Spark [similar to the former report]; however this report is expressly directed to the PHWG selected criteria for tracking impacts. The membership of the Population Health Work Group follows, in Table 1.

Table 1 Membership of the Population Health Work Group

Mark McCalman, Chairman	Regional Epidemiologist, Sullivan Co. Regional Health Dept TN
Donna Robbins	Regional Epidemiologist, Northeast Regional Health Dept TN
Marlene Peters	Mt. Rogers Health District Epidemiologist
Delilah Long	Lenowisco Health District Epidemiologist
Dr. Gary Michael	Primary Care Physician; Chair O&E Committee
Bruce Behringer	Director, Office of Rural and Community Health and Community Partnerships, ETSU
Dr. Tim Aldrich	Associate Professor (Epidemiology), ETSU
Paige Lucas	Cumberland Plateau Health District Epidemiologist
Liesa Jenkins	Executive Director, Care Spark, Inc.

METHODS

This report is based on secondary data analyses. The principal data sources were the National Center for Health Statistics [mortality data, 1999-2004] (7) and the Centers for Disease Prevention and Control, Behavioral Risk Factor Surveillance Survey (1998-2006). (8)

Diabetes: This metric represents the persons who have learned their diabetes diagnosis, e.g., within the preceding calendar year. The baseline measure will be all (living) persons with an ICD-9 code of 250.xx. The source of data is the Care Spark data stream, and an accruing registry of persons 'diagnosed' with diabetes. It is presented as a percentage. The contrast will be national and state prevalence rates for diabetes. The American Diabetes Association estimates that only two-thirds of persons with diabetes are aware of their diagnosis. As such, the Care Spark goal is to measure a 50% increase over a ten-year period, that represents a five-percent annual proportion of persons (newly-designated) diagnosed with diabetes. Health People 2010 projects a goal that 80% of persons with diabetes will know of their diagnosis.

Influenza Immunization: This is another widely credited national public health status indicator (5,6) expressly tracking the vaccination for this annual disease outbreak among person over age

65 years. Older adults represent 90% of the deaths attributed annually to influenza and pneumonia. It is presented as a percentage of persons in this age group. The primary source of data will be the CareSpark Clinical Data Repository. Regional immunization rates for this group may also be collected in collaboration with local pharmacies, drug manufacturers, and payors. BRFSS will provide a ready reference for the nation and state. The baseline for this metric will be the 2008/2009 influenza season. For this metric, the projected performance improvement target is a two percent annual increase from the baseline prevalence. Currently Sullivan County reports from the 2005 BRFSS a prevalence of 66.1%; and all of Tennessee is at 59.8%. The US reports 60.6% vaccination rates in 2006.

Prevalence of Lipid Testing: This metric monitors the proportion of the adult population [over age 18 years] with a documented lipid testing within the preceding five years. It is presented as a proportion of the population in this age group seen within the Care Spark data stream during the preceding five years. The source of data is the EMR. The Healthy People 2010 goal for this metric is 80% of persons having routine lipid testing. Care Spark will project a 67% prevalence at its inaugural measurement [2008] based on the National Health Interview Survey prevalence. This will be followed by 7%, 6% increases to the 2010 goal.

Follow-up for Myocardial Infarction: After the occurrence of a 'heart attack' [ICD-9 codes 410-414 or ICD10 codes I21-I22], a follow-up visit within two weeks is recommended. This simple proportion then, is a measure of the proportion of persons, age 18 years and older, who are discharged following an acute myocardial infarction [AMI], and show a clinical follow-up visit within 14 days. The primary data sources will be the CareSpark Clinical Data Repository, supplemented with billing data. This data will be reported quarterly beginning in 2008. A registry of AMI will need to be maintained so that only the first episode of AMI will be eligible for this tracking for a two-week return visit. Excluded from the analysis will be persons who remain hospitalized, or who are transferred directly to a non-acute care facility. No national referent was readily available; the proposed performance improvement target will be for a 10% increase over the inaugural baseline data gathered from year one of CareSpark data exchange.

ER Visits for Congestive Heart Failure: Following hospital discharge for congestive heart failure, a high number of individuals [especially frequent among older adults] require urgent care need within a short time. This indicator is presented as the percentage of CHF patients discharged who return to the ER within thirty days time, it is a measure of quality of out-patient care for this especially vulnerable population. CHF is defined as ICD-9 codes 402.01, 402.11, and 402.91; 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.20-23, 428.30-33, 424.40-42, and 428.9. The source of these data will be the EMR with the designation of readmission; also medical claims data. All persons over age 18 years will be eligible for inclusion. Exclusions will be persons transferred to another hospital [that transfer will be disregarded as a re-admission], those who leave against medical advise and return; and finally those who are discharged to a hospice. The National Quality Measures Clearinghouse reports this re-admission fraction for CHF to be at 18%. The target performance measure will be to decrement the 2008 frequency by 2% annually in the first three years of Care Spark operations.

Rehabilitation Referrals for Stroke: Quality of life indicators (tertiary prevention) after a stroke are not commonly tracked. In the Care Spark community we aspire to do better for our stroke

survivors. Stroke is defined as an ICD-9 diagnosis of 431.xx, 433.01, 433.11, 433.21, 433.81, 434.01, 431.11, 434.91, or 436.xx. This metric is presented as a percentage of all eligible discharges with a documented order or review for post-discharge rehabilitation services. The source of the data will be the Tennessee Stroke Registry, with data provided under the national Get With The Guidelines data set. Currently, the expected range for this value is about 40% based on the Joint Commission for Accreditation of Hospitals projections. The benchmark for Care Spark will be set as the 2007 value, with annual increases of 2.5% over the first three years of Care Spark operations.

Premature Mortality: This annual death rate is referenced to deaths occurring from all causes between ages 35 and 64 years. It is intended to represent the avoidable fraction of deaths from the leading causes of death for this age group, e.g., chronic disease. It is widely regarded as an indicator of health disparities.(5,6) This metric is expressed as an age-adjusted mortality rate [2000 U.S. population standard] in three year aggregates from 1998 to 2006. The data for analysis will be obtained annually from the National Center for Health Statistics. Referents will be the US, and the balance of the states of Tennessee and Virginia. The Care Spark goal is to play a part in reducing the region's premature mortality rate by two percent from the initial baseline each year for the first three years of the organization's initiation of data collection (2008). Comparisons of progress will also be made by race and gender groups, as well as between the patient populations directly served by Care Spark compared to the balance of the regional population.

Analysis Scheme

The general strategy for the tracking of indicators is a temporal frequency polygon, with contrasts to the immediately contiguous Appalachian regions in Virginia and Tennessee. To provide base-line momentum, we aim to begin reporting with three data points for several of the variables. Contrasts with the Tennessee, Virginia, and U.S. will depict Care Spark progress in measuring and impacting community health.

Aggregation Technique

One objective of the PHWG is to provide Care Spark decision-makers with a composite measure of population health, aggregating the seven separate indicators. In early deliberations, one strategy for combining indicators is that of Mantel and Haenszel (9) that weights the contributions of each component for its sample size. See Table 2. In addition, there is a consideration of simple proportion weights for the indicators based on public health priority for the specific impact or ease of intervention. Following [Table 2] is a model weighting scheme using both the MH weighting for precision [third column – MH weights], and an arbitrary weight for illustration [fifth column "PH weights].

As illustrated, the simulated hypothetical 504 events that comprise the composite observations translate into an 'abstract' 0.62 for precision weights. No adjustment is posed for measures where lowering the count are the appropriate action, versus where raising the count is the aim [e.g., follow-up for MI and Stroke rehabilitation]. Then, when public health weights are applied

the composite, absolute score becomes 0.44, this then would be monitored as a 'relative' measure of impact, over time for Care Spark actions to improve public health in the community served.

Table 2: Sample application of Mantel-Haenszel proportional weights, also with Public Health weights to arrive at a summary measure.

Indicator	# of events	MH wt	applied	Pub Hlth Weights	Applied
Diabetes	22	0.043651	0.02881	0.33	0.009507
Flu Imm	90	0.178571	0.149554	0.66	0.098705
f/u MI	32	0.063492	0.042328	0.5	0.021164
ER - CHF	12	0.02381	0.009158	0.5	0.004579
LDL < 100	196	0.388889	0.241975	1	0.241975
Rehab	34	0.06746	0.047972	0.66	0.031661
Premature	5	0.009921	0.001984	1	0.001984
Sum	504	1	0.626409		0.444104

RESULTS

To this point, our analyses have examined four of the seven indicators selected by the PHWG. The three indicators aimed at returns-to-care following periods of clinical have been especially difficult to obtain. At this point, negotiations for each for these measures are in progress and may attain shortly, but for this version of the assessment report, we will present descriptions from four of the indicators.

Diabetes

The diabetes metric is a measure of the persons with diabetes who are aware of their diagnosis, presumably persons who then will be motivated to pursue control measures. The American Diabetic Association suggests that one-third of persons with clinical diabetes are aware of their diagnosis. The Care Spark aim then is to increase people with diabetes in the region becoming aware of their condition. The U.S. and TN show a slowly rising fraction, but Virginia and Care Spark show declines (see Figure 2). The projected benchmark for Care Spark then is increased diagnostic awareness [the rising brown line, toward the Health People 2010 range of tripling the national proportion [8%] to 24%.

With diabetes, there is the tandem need to bring people into medical surveillance, and to inform and educate them about their medical condition and the patient role in diabetes management, whether managed via diet and exercise or medication, so that on-going monitoring is practiced. The primary aim for this medical surveillance is to reduce complications from diabetes, e.g., vision deficits, peripheral circulatory problems. Of course, diabetes poses a substantive risk for many other chronic conditions, e.g., heart disease, stroke, cancer. Recognition of this co-

morbidity relationship is essential to preventing serious medical problems by management of blood insulin levels, taking advantage of preventive services (e.g. yearly influenza vaccination) and acting on symptoms that might indicate serious health conditions. Over time, a distinct pattern of benefit should be evident for persons with diabetes who are under the coordinated medical tracking associated with Care Spark clinical indicators [e.g., hemoglobin A1c (hgA1c)]. This metric in isolation may pose one of the most valuable of the Care Spark impacts for the region, based on the demonstrated higher prevalence of diabetes and obesity.(10)

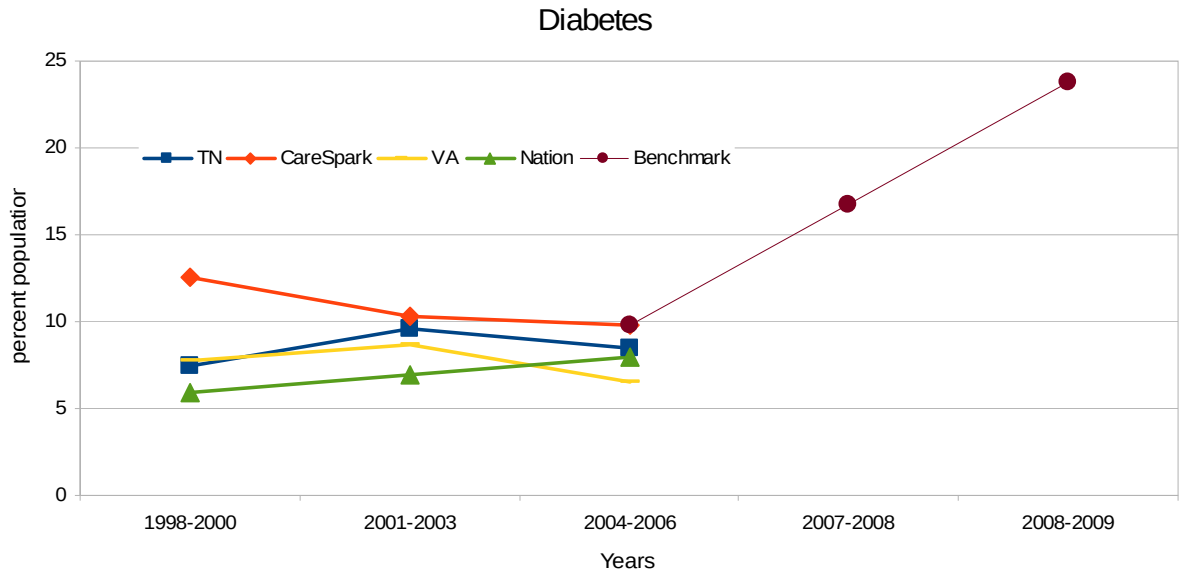


Figure 2: Persons told by a medical provider that they have diabetes.

Influenza Immunization

A well recognized measure of primary prevention is the vaccination of persons at high risk for seasonal influenza complications, particularly pneumonia. Prominent among these at-risk populations are persons over age 55. The regional health departments for both the Virginia and Tennessee have exemplary records for vaccination programs among older adults, keeping close pace with national rates (see Figure 3). However, the pursuit of the Healthy People 2010 aim of 80% is still a target benchmark. Apprehensions of avian flu strains, and of pandemic conditions fuel the sense of urgency for this metric. As an essential public health action, flu vaccinations pose a metric with good momentum going into the Care Spark era for our region; distinction for 'covered' persons should emerge quickly from this effort.

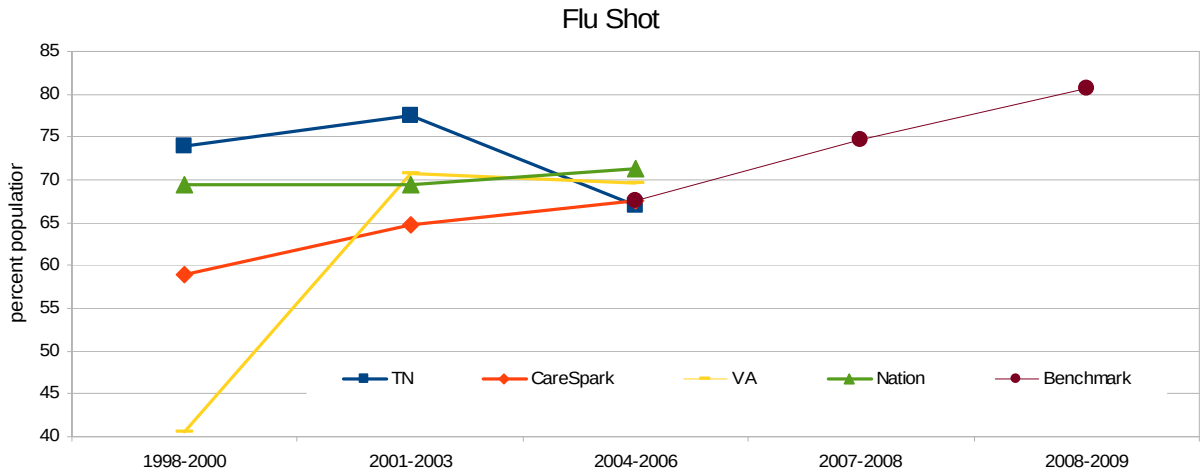


Figure 3: Persons age 55 years and older who report having a flu shot in the last year.

Follow-up for Myocardial Infarction

No data is available at this time for documenting this indicator. An interim report may be provided in 2008 with these data, if baseline estimates can be obtained from state and regional resources. The implication for this metric is that persons experiencing 'heart attacks' should be under close medical monitoring following their discharge, e.g., a return to their physician visit within two weeks of discharge. Such follow-up appointments improve appropriate medication management and the patient's ability to manage the instructions given them at discharge. .

ER Visits for Congestive Heart Failure

No data is available at this time for documenting this metric. As with the heart attack follow-up, this metric will involve medical systems initially beyond Care Spark monitoring, e.g., emergency rooms. As state-level data is released solely anonymously, data for this metric is difficult to obtain. An interim report may be provided in a few months with these data if they can be obtained from regional partners, e.g., as Care Spark systems come on line. By contrast to the myocardial metric preceding, this one has the logical aim of **lowering** the frequency of emergency visits that follow a hospital discharge for congestive heart failure.

Myocardial infarction is generally a disease of men, and during their 40-60 age range. By contrast, congestive heart failure affects more women and during their 70's and 80's. Certainly both conditions occur to both genders in all ages, but this general population separation provides a public health priority for both segments of the population Care Spark aims to serve.

Both this indicator and the indicator of follow-up for myocardial infarction mesh well with clinical metrics that Care Spark will be pursuing simultaneously.

Elevated LDL Prevalence

A broad public health impact is posed for uncontrolled blood lipid levels and composition [much like the earlier metric for diabetes]. Here the essential public health strategy is to motivate persons to have their 'cholesterol' tested. See Figure 4. The clinical picture of individual lipid monitoring and 'high density'/'low density' management is a complex proposition, with diverse management solutions. However, the basic awareness of one's elevated 'cholesterol' status is the starting point for more healthful living. The nation, Virginia, and Care Spark community have higher proportions of their populations with this elevated cholesterol awareness than the balance of Tennessee. However, the Healthy People 2010 goal of 40% awareness is still a benchmark to be sought.

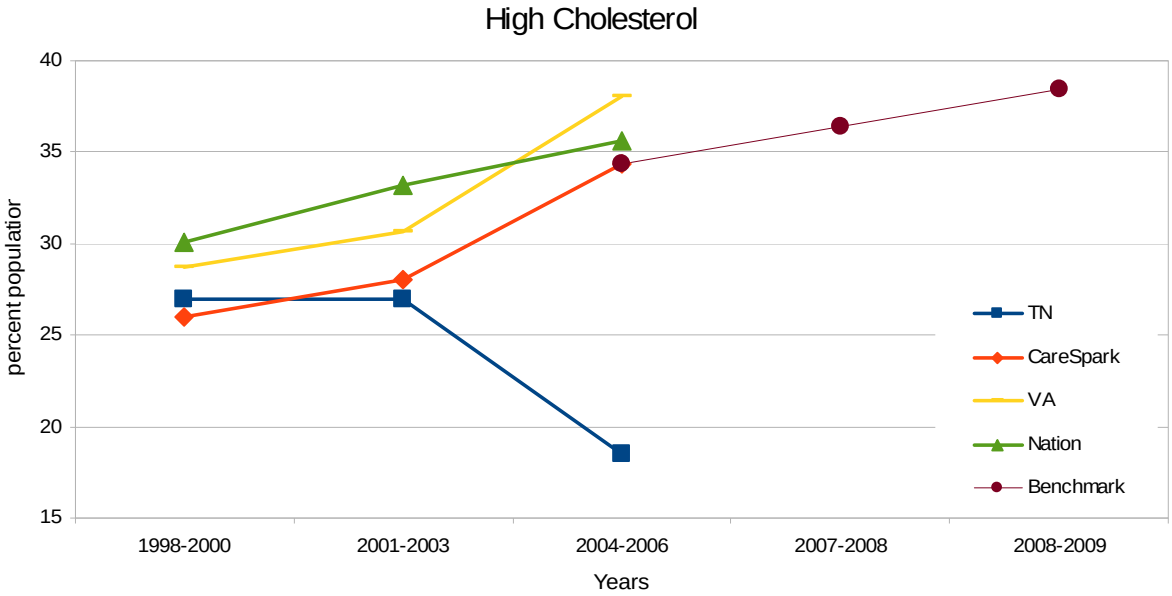


Figure 4: Persons who reported having their cholesterol tested in the last five years, who were told by a health care provider that their cholesterol level was high.

Rehabilitation Referrals for Stroke

These base-line data will be available shortly as part of the 2007 call for data from the Tennessee Stroke Registry. That 'call-for-data' was made in November, 2007 with the data compilation to take place in early 2008. An interim report may be provided in 2008 with these data if they can be obtained. A baseline study from the region suggested that the Care Spark region may be close to 60% for this generally accepted national care practice. This frequency is superior to the nation, where the proportions of stroke referred for rehabilitation has been estimated at 40%. The presence of two accredited stroke centers in our region may account for this difference. However, the consistency of the clinical recommendation for smaller hospitals and among specific populations poses an opportunity for improvement though the Care Spark initiatives. This PHWG metric connects well with statewide and Appalachia regional endeavors related to stroke prevention and control.

Premature Mortality

Perhaps the most widely used public health indicator, premature mortality represent a general perspective of avoidable deaths, or preventable deaths among the working ages. Mainly the causes of death are chronic disease, heart attacks, cancer, and diabetes. Due to the years of life lost, the impact for general productivity, premature mortality is often regarded as metric for health disparity. Hypertension and diabetes are examples of chronic conditions that people can 'live with' through their middle years if well managed. Initially, the PHWG aimed to see if the region has distinctive patterns. It does. See Figure 5.

Clearly, Virginia and the nation have lower premature mortality rates than does Tennessee. The population that resides in the CareSpark counties has a rate that is quite similar to that for Tennessee. In Figure 5, the Virginia counties of Care Spark have been separated from those in Tennessee to emphasize that both 'sides' of the region reflect a Tennessee-like pattern for Premature mortality. From further inspection of these patterns, African-Americans [both genders] and males [both races] are at greatest risk for premature mortality. Further study is recommended with these patters, and examining specific causes of death. Care Spark-specific data will provide clear distinctions between the leading causes of death for those persons under medical care, from the underserved persons in this geographic region.

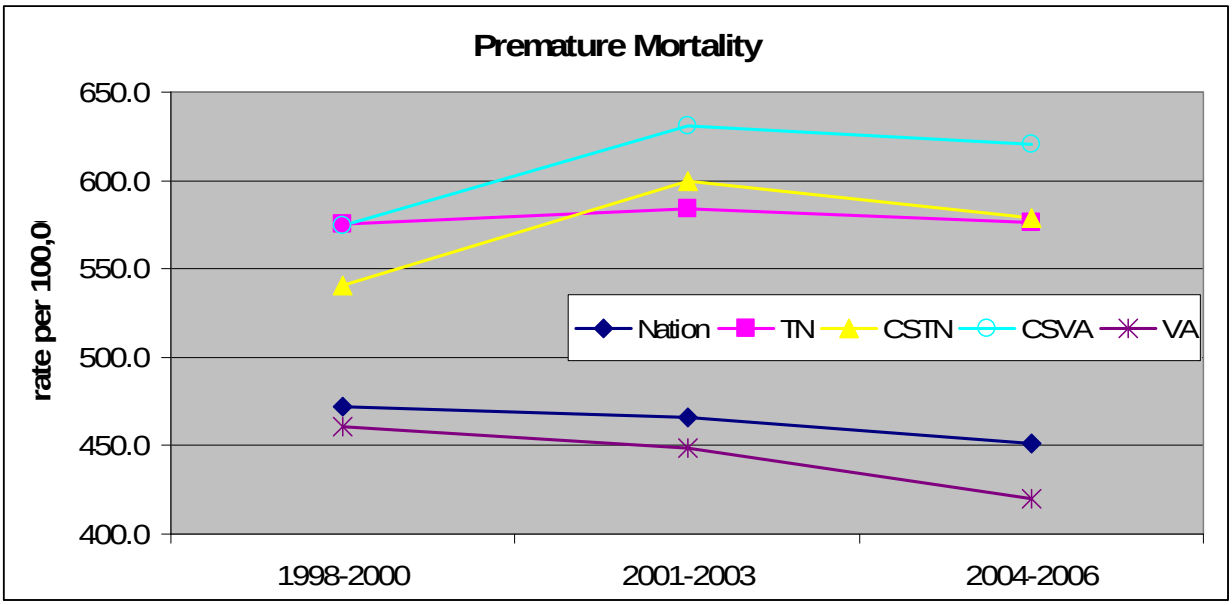


Figure 5: Premature Mortality [ages 35-64 years] for 1998-2006, US, TN, VA, and both Care Spark regions.

Premature mortality in the Care Spark region is largely due to the health disparities in the region: communities with many medically uninsured or underinsured citizens; communities that are

medically underserved; and socioeconomic level of individuals in the region. A future task for Care Spark will be to assess the causes of premature mortality in our region and explore creative ways to help eliminate health disparities.

No specific projected target is set for this metric, especially because actions to shift a mortality rate have such a delayed temporal perspective. That is, modifying risk factors or clinical factors may take a decade or more to evidence a **lowering** of this mortality-based metric.

DISCUSSION

This report to the Care Spark Outcomes and Evaluation Committee remains a work-in-progress. The authors, and the PHWG have striven to provide a variety of baseline measures for their selected indicators, with contrasts for the recent secular trends in the nation and respective states of our Care Spark region Likewise, we have endeavored to sketch the projected benchmarks for Care Spark performance over the next three years.

For some indicators, the Care Spark region's health indicators are relatively good. The prevalence of people 'being told you have diabetes;' is higher than either state or the nation. This could indicate that the area health care providers are doing a good job at screening at-risk clients and notifying them. However, this may simply reflect higher diabetes rates more than a higher proportion of individuals that know their diabetes diagnosis..

For the flu vaccination metric, the Care Spark area has a lower percent of adults over 65 years of age that received a flu vaccine in the past 12 months, but this indicator is improving. The Care Spark region's prevalence of 'being told you have high cholesterol' is lower than the nation and Virginia, but higher than Tennessee

Another notable difference is that for premature mortality, the Virginia portion of Care Spark is more similar to Tennessee than Virginia as a state.

Describing the baseline health indicators for the Care Spark community raise many intricate and interrelated considerations: the impact of culture, socioeconomics, medically underserved communities, all impact the health of our region's population. Further characterization of the Care Spark region by age, sex, and race will go far in delineating the mixed results of the baseline studies. One specific consideration posed by the earlier Care Spark report is that of age-specific artifacts in the Care Spark population that may amplify some disease specific measures, e.g., congestive heart failure emergency room visits.

Aggregate Measures

With the application of public health indicators, there is a challenge to apportion disease impact and to segregate health risk.(11) One conventional solution is the measure, population attributable risk proportion [PARP].(12) The PARP is disease specific, and apportions the observed burden of disease based upon the prevalence of identified risk factors for that disease. This report offers an examination of that approach. The United Health Foundation has reported a

national metric that the College of Public Health at East Tennessee State University has embraced as a rallying call.(13). This composite metric ranks the state of Tennessee 46th in the nation for 'over all' public health. Virginia is ranked 22th (13)

Many southern states are 'ranked' poorly by the CHF, and an ETSU study is seeking to compare the Appalachian portions of several states to the balance of the states to describe the Appalachia impact for states that have regions posing dramatic health-related risk distinctions. Nonetheless, a single amalgamated metric poses public education benefit, and offers a clearer perspective of the progressive impact from several 'small' gains over diverse health outcomes or states. Based upon its target aim, informing the Care Spark Board of Directors, this aggregate measure is still preferred for simplicity and direct efficacy of representation. See Figure 6. This simulated report is based on a quarterly data collection and annual reporting. Implicated is a dynamic metric [one that can represent quarterly changes], despite some indicators routinely or necessarily being annual measures. Figure 6 shows the Care Spark region making progress in contrast to the non-Care Spark region, this is a distinction that may not be readily achievable. Also shown are specific temporal patterns that may be distinctive to those of the respective states as a whole.

Lost with application of an aggregate metric are the individual indicator gains, as well distinct improvements in high risk populations, e.g., race, gender groups, specific geographic areas. Likewise, the making of a composite measure may obfuscate the heterogeneity of the region. However, the development effort alone for these indicators or the composite is a demonstration of progress, progress that will benefit the citizens of the Care Spark region during the near future as the data systems and case management protocols are implemented.

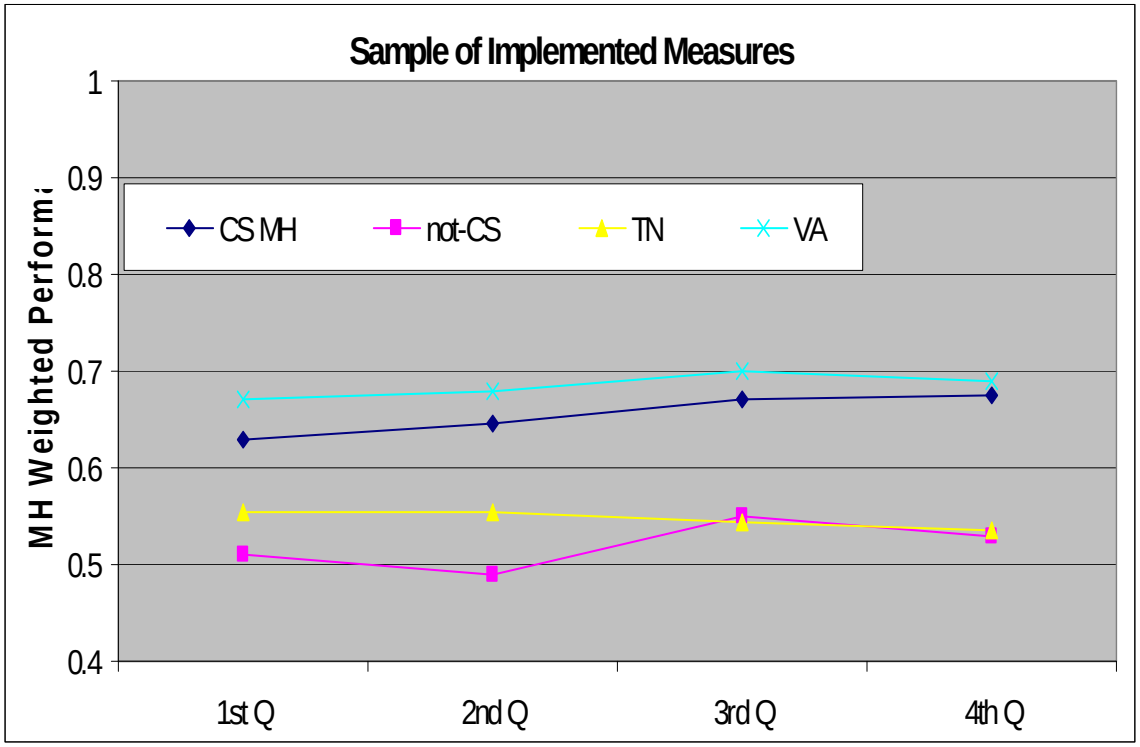


Figure 6: Sample of fully implemented composite measure, [CS MH for Care Spark, with the Mantel-Haenszel weighting], showing the region divided into persons within the Care Spark coverage, and for the region as a whole, with the respective state values. A quarterly monitoring of the composite metric is indicated. The public health weights are not shown.

INTERPRETATION / RECCOMMENDATIONS

One need identified during this second effort toward baseline population health indicators is the necessity for targeted data collection, e.g., surveys. This survey capacity is essential to monitor the knowledge and practices in the community residents. Contrasting data for the states may be routinely gained from the Behavioral Risk Factor Surveillance System, but within the Care Spark region, to sufficiently represent sub populations (by age, sex, race, socioeconomic status, etc.) necessitates tailored data collection that may only be achieved by local strategic efforts.

Next, is recognition that even relatively small geographic regions possess intricate population dynamics of demographic variables, environment, and health behavior. Active health surveillance is necessary to discern impacts from clinical services, and for specific conditions. This sort of surveillance calls for the exact sort of monitoring that the PHWG has posed, and proposes. Since Care Spark will have the capacity for real time surveillance, it will be able to provide a critical public health function in performing sentinel event monitoring.(14). Such sentinel event strategies benefit small cohort surveillance [e.g., clinical trails] and that scrutiny is a manifest need for the Care Spark health data systems.

Following are a set of strategic recommendations for the Care Spark organization to consider.

- Translate the lessons learned from the Care Spark surveillance ‘case studies’ with the National Health Information Network simulations into routine practice with Care Spark surveillance.

- Develop automated algorithms based upon *a priori* probabilities to provide signals to designated persons of potential sentinel events transpiring or emerging.

- Identify information sources for the three indicators [Myocardial Infarction, Congestive Heart Failure, and Stroke Rehabilitation] that are in need of referent data.

- Develop partnerships with organizations that have survey capacity and expertise for localized sampling to meet the needs for strategic data gathering for population sub-groups, e.g., age, race, community sub-groups.

- Develop incentives for clinical or administrative response to emerging disease or care patterns to preempt reciprocity for neglect or oversight.

- Provide training to the community of Care Spark clients for reporting concerns and suspicions about quality of outcomes and consistency of clinical directions.

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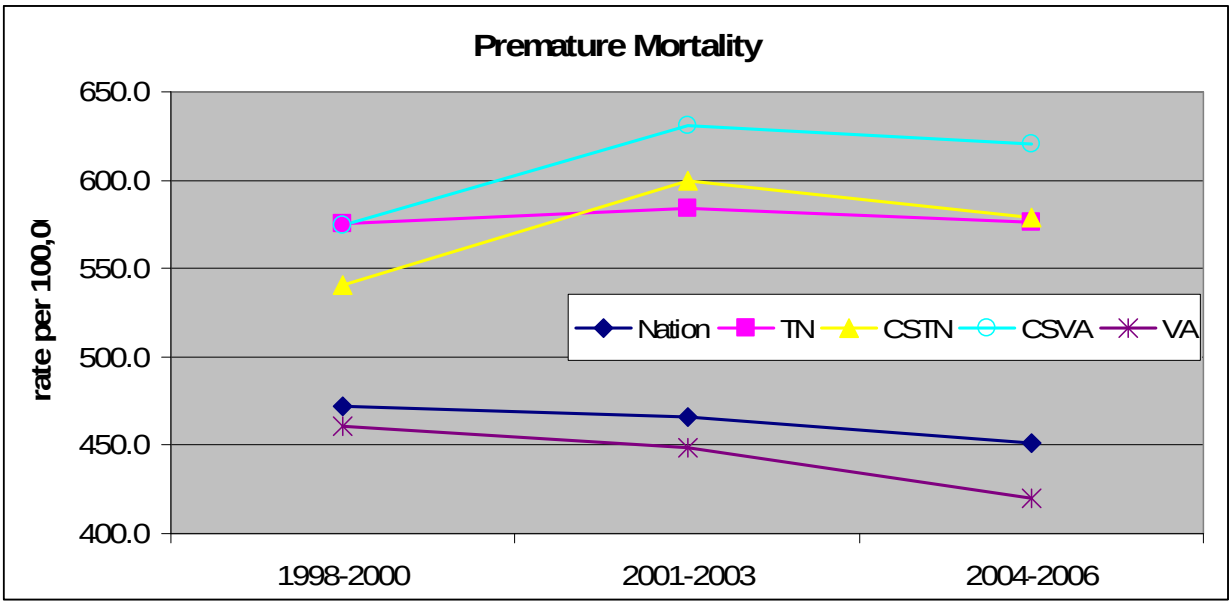
Call to Action

Premature Mortality in Our Region is Too High

Report to the Public April 24, 2008 Volume 1; Number. 1

As part of CareSpark's effort to improve health for people in southwest Virginia and northeast Tennessee, health officials have compiled information from the National Center for Health Statistics on death and disease in the region from 1998 through 2006, comparing the region's rates to national averages, as well as to averages in the states of Tennessee and Virginia. Comparisons show that significantly higher percentages of people in the region die between the ages of 35 and 64 than in other parts of our states or nation, a public health indicator often referred to as "premature mortality" that translates to a lower life expectancy for people in our region. Mortality rates for those aged 65 years or older are close to the national average.



Premature Mortality [ages 35-64 years] for 1998-2006, United States, Tennessee, Virginia, counties in the Tennessee portion of the CareSpark region, and counties in the Virginia portion of the CareSpark region.

Causes of Premature Mortality

Chronic diseases--diabetes, heart disease and stroke--are leading causes of death for people between the ages of 35 and 64 in the region, and are related to high rates of tobacco use, obesity and high blood pressure among these age groups. Accidents and violence are the leading causes of death for those between the ages of 35 and 44, particularly for white females. Cardiovascular disease and cancers are the leading causes of death for males and females between the ages of 45 and 64.

How can we reduce premature mortality?

CareSpark can enable secure communication among healthcare professionals and patients, so that services for prevention and treatment can be coordinated effectively in order to reduce these preventable causes of death and disease.
Health professionals can make sure to have and use the most up-to-date, complete and accurate information when considering and recommending options for prevention and treatment of these diseases.
Public health officials can use sophisticated technology and methods to understand and report the patterns and causes of death and illness for specific groups and geographic areas.
Government and business leaders can support the demand for better quality and value through the wise investment of healthcare dollars and by encouraging responsible choices that promote individual and community health improvement.
Patients and consumers can make good choices about diet, exercise and tobacco use, reducing the risk of diabetes, heart disease and stroke and enjoying longer, healthier lives.
You can take responsibility for your own health—and help to improve our community's health as a result!

The CareSpark Effort

Counties in the Tennessee portion of the CareSpark region include Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi and Washington.

The Virginia portion of the CareSpark region includes the counties of Buchanan, Dickenson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise and the cities of Bristol and Norton.

CareSpark is a regional non-profit organization, formed in 2005 as a grassroots coalition of healthcare professionals, business and community leaders working together to improve health through the collaborative use of health information. We welcome your participation and support!

For More Information:

This information was prepared by students and faculty from East Tennessee State University's College of Public Health

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