

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

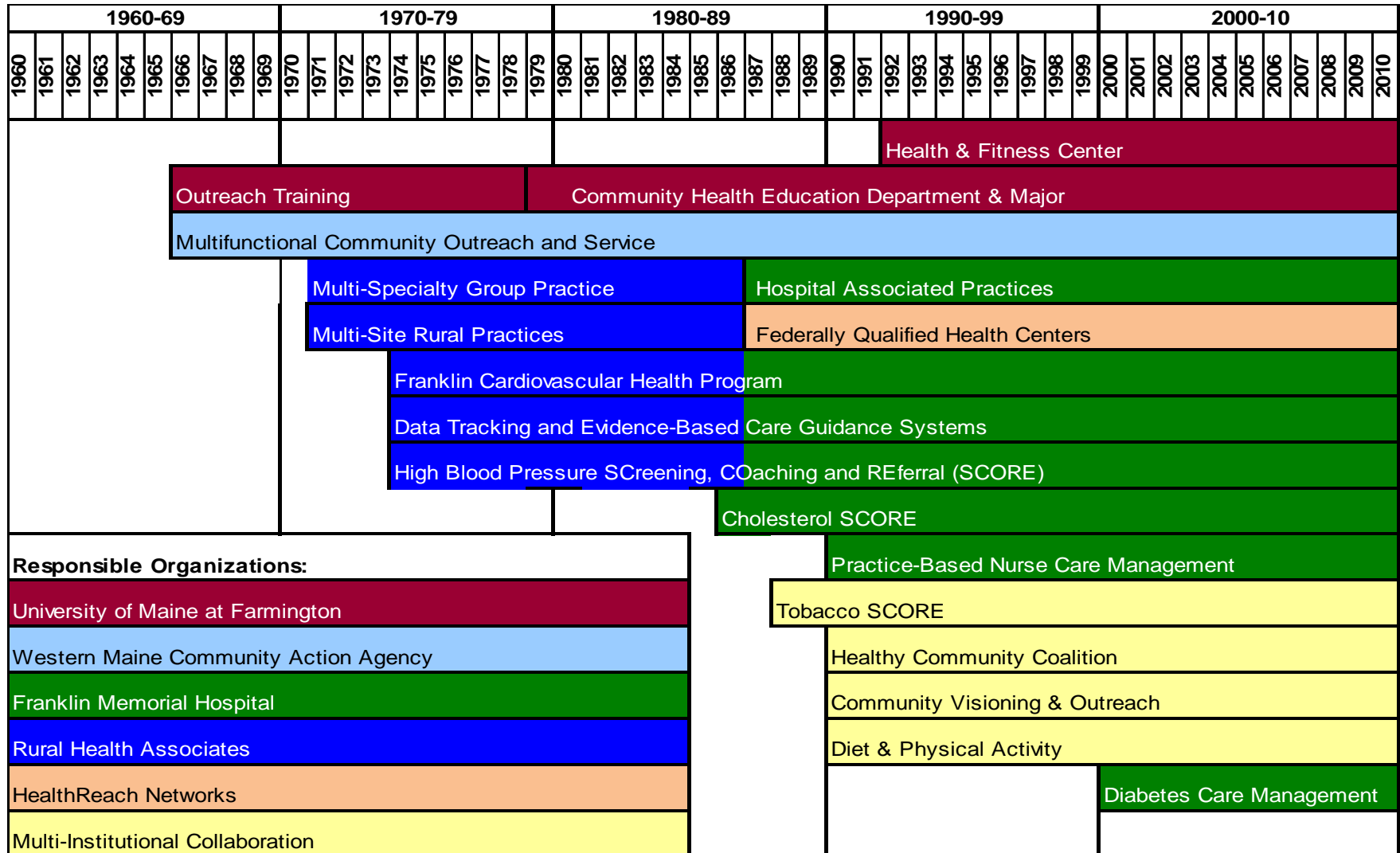
eTable. Hospitalization Cost Savings Estimates for Franklin County Residents In Any Maine Hospital, 1994-2006

1	Franklin Memorial Hospital gross patient care revenue, 2011	\$169,309,438
2	Inpatient care revenue	\$60,144,370
3	Total operating expenses	\$81,892,888
4	Inpatient share of operating expenses (line 2/line 1 x line 3)	\$29,091,090
5	Inpatient discharges	2,981
6	Franklin Memorial Hospital Expense per discharge (line 4 / line 5), 2011	\$9,759
7	Actual Franklin County resident discharge rate per 1,000, 1994-2006	94
8	Actual Franklin County discharges, 1994-2006	40,146
9	Expected Franklin County hospitalization rate based on median household income	111
10	Expected Discharges, 1994-2006 (Line 9 / Line 7 x Line 8)	47,406
11	Difference between expected and actual discharges, 1994-2006 (Line 10 – Line 8)	7,260
12	Total savings in 2011 costs from less-than-expected discharge rate, 1994-2006 (Line 11 x Line 6)	\$70,854,700
13	Estimated annual savings in 2011 costs (Line 12 /13)	\$5,450,362

*FMH: Franklin Memorial Hospital

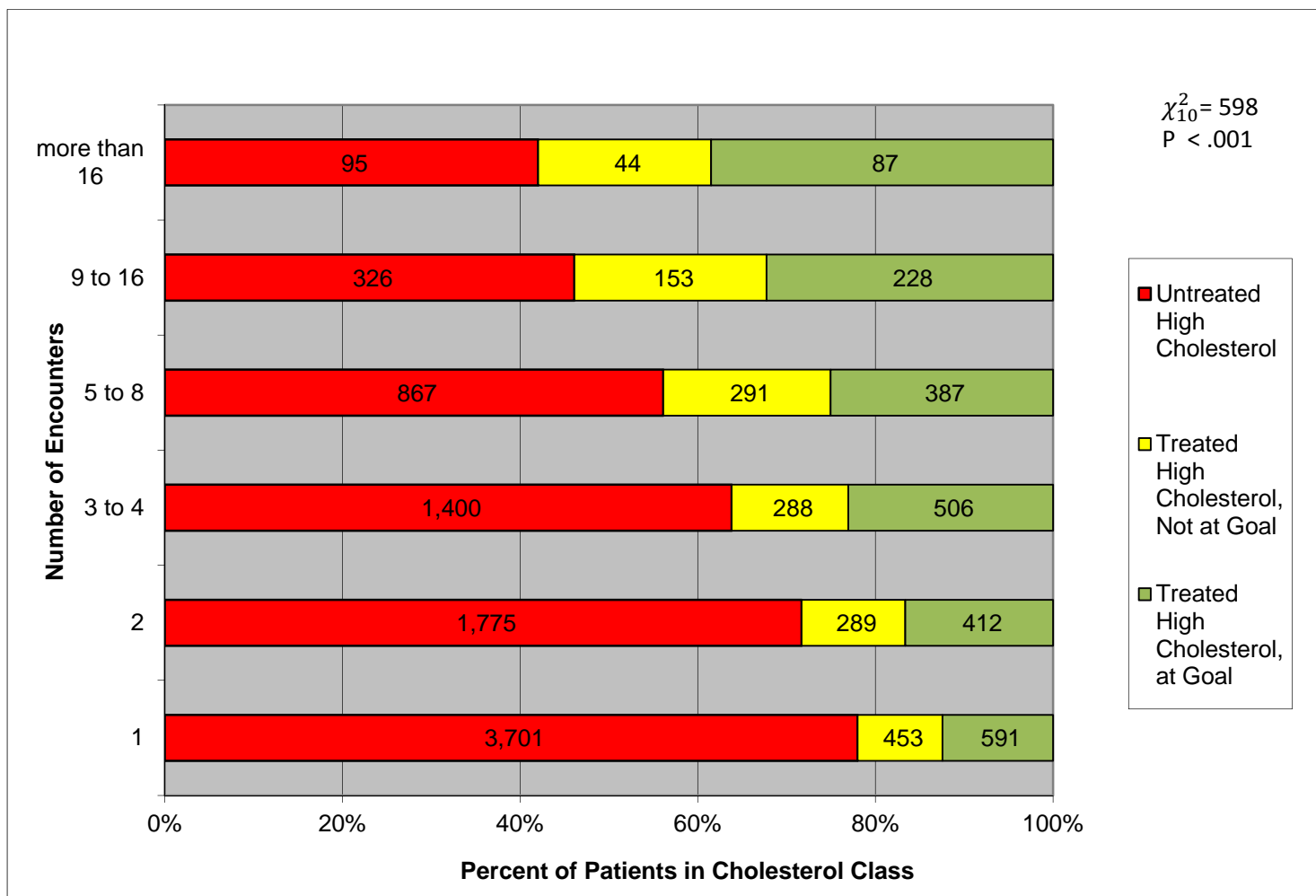
Legend: Franklin Memorial Hospital revenue and expenses from the 2011 Franklin Memorial Hospital Medicare Cost Report (https://mhdo.maine.gov/_pdf/Report3_2011.pdf). Franklin County resident discharges from any Maine hospital 1994-2006 and Franklin Memorial Hospital discharge counts for 2011 from the Maine Health Data Organization restricted inpatient discharge database (https://mhdo.maine.gov/data_hospital_discharge_restricted.htm). Estimates likely lower than actual, because FMH costs/hospitalization were below most other Maine hospitals during this period.

eFigure 1: Franklin County Health-Related Initiatives & Responsible Organizations: 1960-2010.



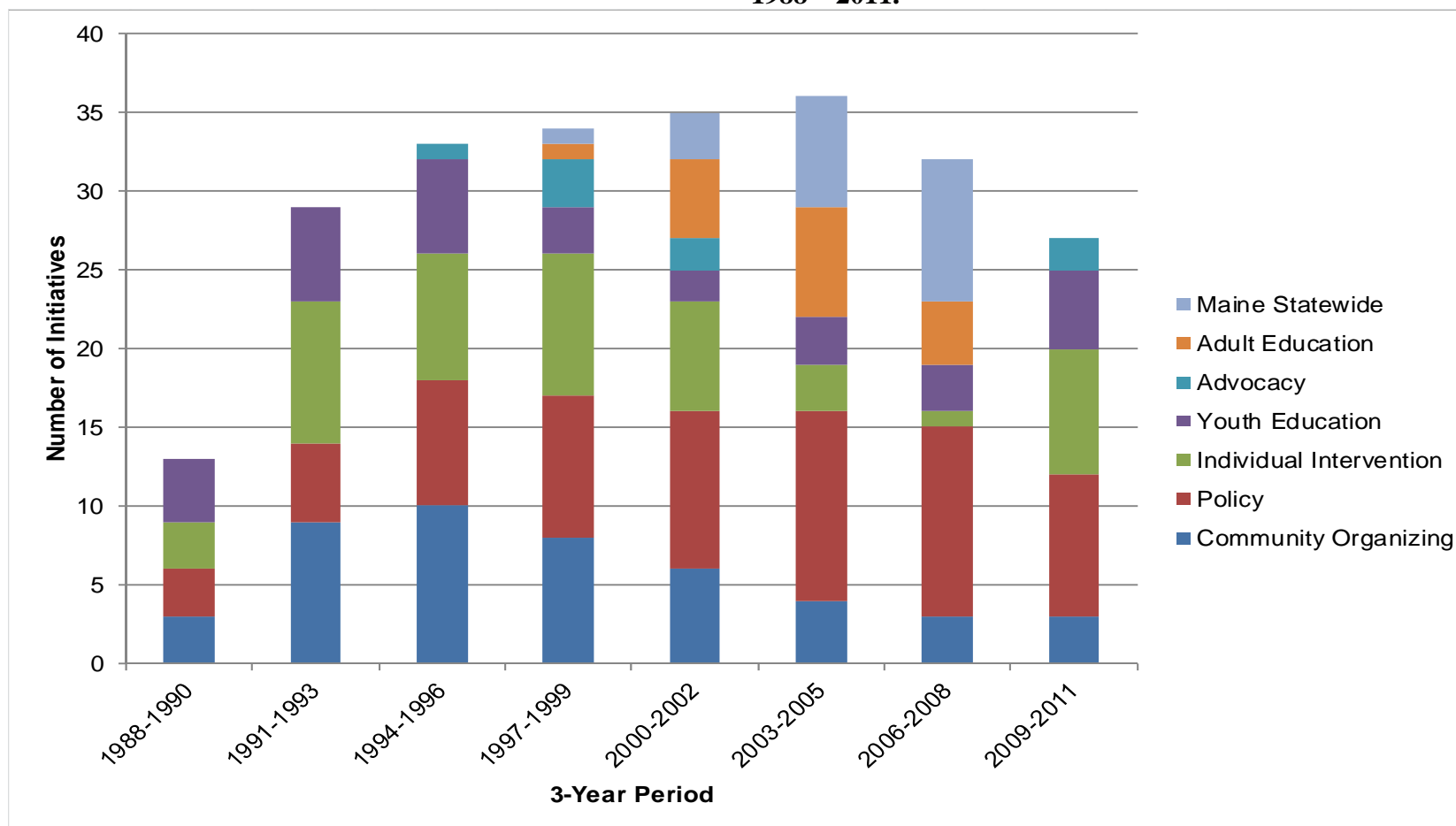
Listed and color-coded in the bottom-left quadrant of this chart are five organizations primarily responsible for origination and/or sustaining of the key health-related initiatives displayed across the timeline. Several initiatives resulted from and/or depended on multi-institutional collaboration (yellow).

eFigure 2. Cholesterol Control vs. Number of Encounters per Patient: 1986-2010.



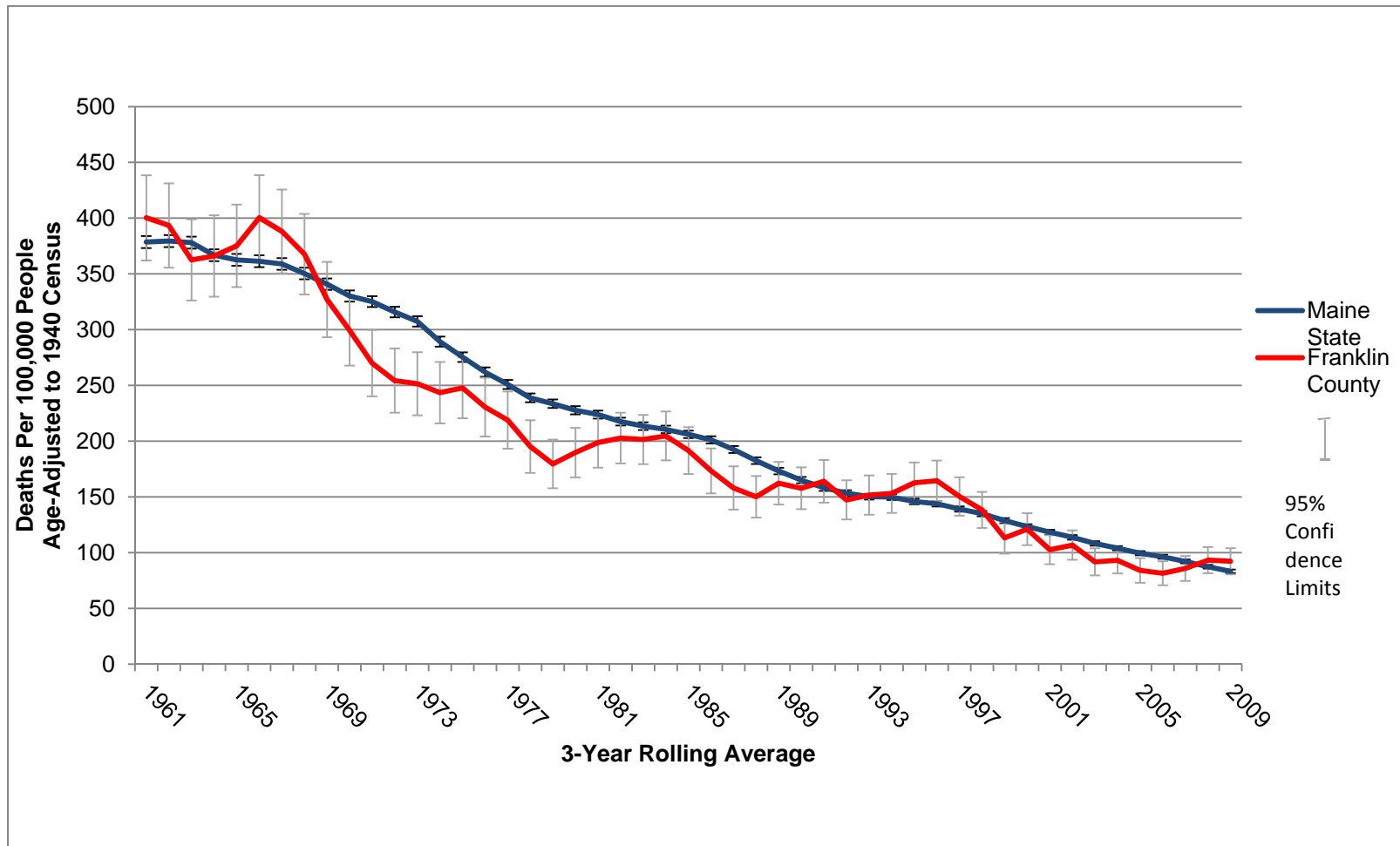
Legend: Total individual patients (n = 11,893), with cholesterol recorded in FCHP database during at least one "cholesterol encounter" between 1986-2009, stratified by number of cholesterol encounters per patient during the period. Each patient's cholesterol class is that recorded as of his/her last Program encounter, based on "At Goal" criteria of contemporaneous Adult Treatment Panel (ATP): ATP I (1988-1992); ATP II (1993-2001); ATP III (2002.-updated 2004-2013). Numbers in each bar are the number of patients in the encounter number/cholesterol status cell.

eFigure 3. Categories and Number of Franklin County Community Anti-Smoking Initiatives: 1988 – 2011.



Legend: Number and variety of anti-smoking initiatives in 3-year periods, categorized by initiative type. Not included are one-on-one encounters of individuals with their physicians or nurse coaches.

eFigure 4. Age-Adjusted Cardiovascular Mortality Rates for Franklin County and Maine: 1960-2010



Death rates for heart and cerebrovascular diseases for rolling 3-year periods for Franklin County and all of Maine, age-adjusted to the 1940 US Standard Population for comparability (see Data Analysis explanation) across the entire time period. The year shown is the mid-point of the 3-year rolling average. Error bars are 95% confidence limits.

eMethods

Western Maine Community Action Agency (WMCAA)

In 1965, funding from the Federal Office of Economic Opportunity (OEO) enabled creation of the WMCAA in Franklin County, Maine. WMCAA began several projects to improve social and public health services, especially for the most impoverished residents and communities in the area. By 1970, in response to local community groups, which identified health as a major concern, WMCAA had developed: the first Maine family planning clinics at several county sites; minibuses for low-income transportation for health services; a staff of indigenous outreach workers, trained at the local University of Maine campus, supervised by a trained social worker, and uniquely responsible for specific geographic communities rather than specific programs, with daily presence in primary care medical offices; Women, Infant, and Children nutrition programs in area towns; and home improvement programs to insulate homes, provide heating assistance, and bring clean water and indoor plumbing to low-income families.

University of Maine at Farmington (UMF)

Established as a teachers college in 1864, UMF now offers programs in teacher education, human services and arts and sciences. In the late 1960s, health professions staff at UMF helped train WMCAA outreach workers to add health-related services to their social service repertoires. Experiences with both WMCAA and Rural Health Associates gave impetus to the development of a new academic major, Community Health Education. Those students and Franklin Cardiovascular Health Program staff collaborated in UMF-based and community programs to help reduce smoking, and improve fitness and nutrition education throughout the region. Community Health graduates have gone on to lead and staff many community health programs in Maine and beyond. In 1992 a UMF Health and Fitness Center, built in part through community donations, opened to the public with programs for all age groups, including Phase 3 cardiac rehabilitation. Its Worksite Wellness Committee focused on health promotion and education.

Rural Health Associates (RHA) Group Practice

In 1971, several local physician leaders collaborated with WMCAA to form Rural Health Associates, a community board-directed, non-profit healthcare organization. RHA formed an innovative group medical practice with primary care physicians and supportive specialists, dentists, physician assistants, and nurse practitioners, all collaborating with WMCAA's community outreach workers. Problem-oriented medical records, multiple systems of clinical audits, and medical student, resident, and continuing medical education programs promoted quality care. Broadband microwave interactive television, broadcasting from transmitters atop a local mountain, enabled audiovisual contact with patients and clinicians at three satellite clinics up to 50 miles from the RHA central clinical practice. Fee-for-service and capitation revenue helped pay for medical services. The multi-specialty group practice disbanded in 1986 over salary disagreements. Most clinicians remained in the area, converting to private and/or hospital employed practices. Even today, RHA clinical and organizational leaders have continued to play roles within the Franklin Community Health Network (FCHN), Franklin Memorial Hospital medical staff, and the other health-related organizations.

Franklin Area Health Plan (FAHP)

In 1971, RHA also created the capitated Franklin Area Health Plan, which provided comprehensive health, dental, prescription drug, and mental health care insurance for 3000 low-income residents. It was funded initially by the Federal Office of Economic Opportunity (OEO) and later the US Department of Health and Human Services (DHHS). In 1980, FAHP obtained a State insurance license to become Maine's first commercial health maintenance organization (HMO), eventually serving an additional several thousand-area residents through capitated, employer-based insurance. In 1985 the US DHHS Bureau of Community Health Services terminated financial support of all capitated care systems and encouraged FAHP to convert its systems to community health centers. As a result, the local health plan closed. The commercial HMO merged with Maine Blue Cross and Blue Shield. Health Reach Network, a Maine rural health center consortium, took over the four outlying RHA satellite clinics.

Franklin Cardiovascular Health Program (FCHP)

In 1974, RHA established FCHP to focus public, individual and health professional attention on long-term risk-factor reduction through education, detection, management and control. Endorsed from the start by the hospital medical staff, FCHP initially based protocols on published, peer-reviewed evidence, and later, as they became available, on evolving national guidelines¹ for control of risk factors. A nurse manager, medical director and diverse advisory groups provided FCHP leadership. The FCHP health-coaching roster included nurses (RNs and LPNs), health educators, and other health professionals and trained lay volunteers. Health coaches provided services,

including integrated risk factor screening² in multiple settings: churches, workplaces, grocery stores, restaurants, pharmacies, and dental and medical offices. They educated individuals, groups, health care professionals and the public at large. FCHP promoted collaborative patient/health coach/physician teamwork, patient engagement (in person and telephonic) and reciprocal referrals with primary care practices and other health programs^{3, 4}, community organizations activation, media advocacy and promotion of effective health policy and environmental change.

FCHP's first risk factor intervention target was hypertension (HTN), "*in anticipation of improved high blood pressure control, with consequent reduction in cardiovascular morbidity and mortality*⁵". FCHP initially focused on education and detection but soon added a major emphasis on HTN treatment and control. Without national guidelines, "control" was defined as BP less than FCHP program-specified criteria: ages 21-40, 140/90; 41-60, 150/90; 61-80, 160/95; over 80, 170/100. When national guidelines became available, those were adopted. Unlike many national programs at the time, in addition to public education, FCHP used public screening and subsequent individual tracking and follow-up. Both detection and control were facilitated by regular clinics at least monthly in every Franklin County town, conducted by more than 200 volunteer nurses, each working in her own home town, and by physicians, many of whom referred patients for interval monitoring close to home between doctor visits. HTN treatment and control improved as measured over the first 4 years⁶ (Figure 2A) and compared favorably with national program reports⁷.

Modeled on this approach to hypertension control, later programs to address cholesterol, smoking, physical activity, diet, diabetes, and others were added. In 1986, FCHP nurses began risk factor coaching within selected physician practices. Nurse management experience during a practice-based lovastatin trial led to formation of a lipid co-management clinic in 1990. In 2000, FCHP adopted an explicit strategy to move experienced nurses into medical practices in order to help complex and/or challenging patients and their physicians. Most physician-referred patients had diabetes as either the primary reason for referral or as a major comorbidity. The perceived and monitored improvements in diabetic, hypertension and lipid control were favorable; as a result, nurse care management was incorporated into all FMH-affiliated primary care practices.

FCHP responded to changing demographics and financial support by "going to where the people are". It reached children in school, young and middle-aged at work, and older adults where they socialized or received healthcare services. Senior citizens initially flocked to community blood pressure (BP) clinics, often arriving en masse in free, grant-supported buses. When such transportation became less available, FCHP took BP screening and education services to seniors' group meetings, including the Grange. When attendance at these traditional gatherings diminished, the program used a donor-sponsored mobile van that took appropriate services, including cardiovascular risk factor screening, referral, and coaching, to a wide variety of locations from shopping center parking lots to the furthest county reaches at the Canadian border. FCHP produced and provided health education materials written at a sixth grade level.

The Cooperative Extension Service provided a conduit to the county's agrarian population, and brought nutritional education services by experts to all school systems. FCHP developed relationships with radio stations and newspapers. Early in the program, a local station broadcast weekly live reports, competitively tallying blood pressure checks done in towns and worksites. For decades the radio station hosted live interviews with FCHP and FMH staff on health topics, many of which appeared in receptive local newspapers. The editor of a major regional paper coined the phrase: "Franklin Health Model".

FCHP and the entire region experienced the ups and downs of local and national economies. Historically, the Franklin County economy depended on manufacturing, from paper mills and other wood products companies (e.g. toothpicks), to large leather product companies (e.g. shoes). As long as regional businesses thrived, indigenous mill owners invited FCHP into their shops and paid for screening, follow-up and coaching services delivered to their employees and for helping institute effective non-smoking policies. At its peak, FCHP served employees of nearly all (>50) worksites in the county, where a majority of all Program encounters occurred. Later, sales of local mills to distant owners led to less cooperation with FCHP and eventually most mills departed from Maine completely. Program nadirs coincided with national and regional economic recessions in the early 1980s, the early 2000s and 2008-2011 (see Figure 1). Despite adversity, Franklin County has demonstrated persistent "economic-health resilience", with health outcomes better than expected for its socioeconomic status.

Shifting national standards and Program focus may have impacted cholesterol control data reported here. For instance, the rapidly improved cholesterol control noted in 2004-2006 (Figure 2B) may have reflected an increased focus and control of "very high risk" patients via practice-based nurse care management, superimposed on steadier and more gradual improvements.

The Franklin Cardiovascular Health Program no longer exists, but it served as a model for many other programs in Maine, New England and beyond. Although individuals who provided medical, nursing and administrative

leadership and continuity from its beginning have retired, many of its programs have been continued by the Healthy Community Coalition and the hospital's network of primary and specialty medical practices (see below).

Franklin Memorial Hospital (FMH) and Franklin Community Health Network (FCHN)

In the early 1970s, hospital administration and board opposed RHA's health improvement efforts, fearing they might reduce hospital admissions and thus threaten the hospital's financial health. In more recent decades, despite a negative impact on hospitalization rates, the hospital has assumed increasing regional responsibility to provide accessible care, health promotion and disease prevention. After RHA dissolved in 1986, FMH adopted FCHP and took an increasingly active lead role in community health, both within Franklin County and the State of Maine.

In 1991 the hospital formed an umbrella entity, FCHN, which included: FMH, several medical practices, the Healthy Community Coalition (HCC), a mental healthcare organization, and a regional ambulance service. The FCHN mission has been "to work cooperatively with other concerned individuals and organizations to achieve the highest level of health and wellness possible for the people of west central Maine." The hospital has also cooperated extensively with other local and regional public and private organizations. FCHN has established specialty medical services and expanded dental services for low-income people. It has sponsored community health needs assessments periodically for 20 years and has responded to these "visioning sessions" with many new programs. FCHN's present role and plans for community health were described in its June 2013 Community Needs Assessment⁸.

Over the decades, worsening unemployment has been associated with less employer-sponsored health insurance and greater poverty with its attendant social ills. FCHN (especially the hospital and HCC) initiated programs to help the unemployed and impoverished by soliciting and then distributing free care from providers (physicians, pharmacies, others) to those in need, and Contract For Care, which, by means of barter, enabled the hospital to accept services-in-kind, like carpentry, by skilled individuals, in place of monetary payment for hospital services.

Healthy Community Coalition (HCC)

In 1989 many individual health promotion programs coalesced into the more formal, broadly representative, hospital-supported Healthy Community Coalition, which has subsequently served as the policy, coordinating and goal-setting body for the area's health education, promotion and prevention activities. Volunteer citizens and professionals formed regional task forces. Their efforts included: community-wide heart healthy menu campaigns involving restaurants, schools and grocery stores; guided healthy grocery shopping tours; a brochure on year-round fitness opportunities; opening of area schools for in-door winter walking; maps of safe walking routes in most towns; health screenings, and cancer and substance abuse prevention programs. HCC has continued to promote healthy behaviors and community building with worksite initiatives, mobile health unit outreach, youth programs, resources for health education and community gardens. It continues to obtain external grant funding for innovative health-related initiatives.

Tobacco Control Initiatives

Concurrent with the formation of FCHP, anti-smoking efforts in Franklin County began in the early 1970s when the medical staff of FMH banned smoking from its meetings. From the mid-1980s on, FCHP and then HCC promoted, initiated, adopted and/or adapted statewide initiatives including adult, youth, and clinician education, community organization, advocacy, public policy changes, and individual intervention. The timeline, characteristics, and intensity of those efforts are shown in eFigure 1 and eFigure 3. FMH became Maine's first hospital to ban smoking, initially indoors and later throughout its campus. In 1989, school teacher and health worker alarm about addictive youth smoking led to a county-wide, multidisciplinary health education initiative, and eventually to multiple projects, including: coordinated smoking prevention efforts by 50 volunteer health professionals (physicians, nurses, dentists) and school teachers, who worked together in classroom programs with students in many grades, primarily 5, 7 and 10; a classroom tobacco-use prevention curriculum; smoking cessation resources for students, led by a clinician-teacher team; smoke-free areas at local businesses, restaurants, organizations, schools, town recreation facilities and fields; recruitment of youths, with parental, legal and law enforcement backing, to participate in merchant under-age tobacco sales compliance checks; publication and distribution of a "100% Smoke-Free Restaurant Guide" and "Self-Help Smoking Cessation Guide"; and recording of smoking cessation as a healthcare vital sign. Because of this local success, FCHP and HCC leaders and staff worked with many other Maine regions to develop similar programs after the State dedicated tobacco settlement monies to that effort.

Data Tracking, Health Records and Care Guidance Systems

FCHP created several generations of paper-based and later computerized personal health records, which: helped track individual patient progress and follow-up; provided a basis for communication with clinicians, coaches and patients; and facilitated program management, analysis, and reporting. Patients and health care workers received personal scorecards to encourage attainment of personalized goals, find “lost” at-risk patients, and provide performance feedback to patients, coaches, clinicians, worksites, practices and other organizations. The computer systems developed by FCHP to support its personal services led to the formation of the commercially available ScoreHealth System⁹. The term “ScoreHealth” derived from an acronym (SCreen, COach and REfer [SCORE]) first coined and used by FCHP with permission from the Pawtucket Heart Health Program in Pawtucket, RI.

FCHP began prior to the widespread use of computers in healthcare. In fact, the FCHP RadioShack desktop, programmed in BASIC, may have been the first computer used for any healthcare purpose in Franklin County. Nor were there then any standardized criteria for the diagnosis of hypertension, institution of medical therapy, or goals of treatment. Medical staff endorsement facilitated consensus regarding these criteria. To enable up to 200 volunteer nurses and other trained individuals to provide professional-level performance and consistency of message, FCHP leaders devised a simple, functional classification system, with brief, relevant scripts for each of 6 management categories, based on 3 dichotomous variables: history of hypertension and/or prior known elevations (Y/N), current anti-hypertensive medication (Y/N), and current status of current blood pressure (at goal? Y/N).

As county residents and their physicians came to use the program for interval follow-up between doctor visits, the need for longitudinal, individual tracking became apparent. For this purpose FCHP used the McBee Keysort System to create individual client records with continuous variables (such as systolic and diastolic blood pressure values) written on the center of the card, and categorical variables (the category codes 0-6 of the individual’s first and latest blood pressure values) punched out around the perimeter. With placement of long “knitting needles” through appropriate holes in cards’ perimeters, then lifting the needle, it was possible to sort individuals based on initial and latest classification codes and thus track the progress (or lack thereof) of individuals and groups of individuals.

Each nurse took with her the box(es) of cards associated with her clinic(s) for the day. Pulling the card for each client seen, the nurse questioned and checked blood pressure, provided the person with his/her value and circled the appropriate script on the client report, added the day’s data to the card and updated the punched holes on the periphery. The cards of clients seen that day were returned to the central office, where administrative staff entered the day’s person-specific data into the current tracking system (initially RadioShack, later KnowledgeMan), from which a variety of client, nurse and physician-specific reports were printed and acted upon. A multi-risk-stratified list of practice patients not-at-goal for one or more risk factors was sent monthly to each physician, with highest-risk patients prioritized toward the top. Practices were invited to recall patients when indicated and to return lists to the Program with updated blood pressure, cholesterol and other values.

Not until the advent of the ScoreHealth System⁶ in 2000 did the nurse at the clinic site have real-time, direct laptop access to and assistance from the same information tracking system used for centralized, administrative functions. The new guideline-based system enabled risk assessment, coaching, longitudinal tracking and outreach for multiple risk factors, including blood pressure, lipids, BMI, blood glucose and A1C, and status of eating, activity, emotions, and tobacco and alcohol use. A Web-enabled application allowed patients/employees to read and respond to key questions, produce their own reports and thus participate directly in their own care. The ScoreHealth System has been used by more than 20 US healthcare organizations in a wide variety of settings: community, worksite and clinical inpatient and outpatient.

No matter what health record and tracking system was used, FCHP nurse/physician leaders came to believe that the most powerful factor in helping patients achieve optimal risk factor and health behavior status was establishment of mutually supportive triangular relationships among the patient, nurse-coach and physician.

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