

How Primary Care Produces Better Outcomes: A Logic Model

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ABSTRACT

Context: Greater access to primary care is associated with lower health care costs and better health outcomes. The reasons for this are not entirely clear. In an attempt to clarify the links between primary care and outcomes, we constructed a “logic model” based upon a systematic review of the literature and our clinical experience.

Methods: We reviewed all publications from a search of the English language literature from 1966 to the present using the search term, “primary care,” plus potentially relevant references from their bibliographies. We then constructed lists of desired outcomes and intermediate outcomes and summarized the evidence supporting the links between them. The principal attributes of primary care were derived from the Institute of Medicine’s 1996 report.¹ To identify and categorize the mechanisms leading from attributes to intermediate outcomes, we relied upon our own clinical experience, the published literature, and from others in the field.

Findings: We identified 6 primary attributes (accessibility, coordination, sustained care, comprehensiveness, partnership, and person-centeredness) and two encompassing constructs (integration and accountability) that constitute primary care. Proposed causal links to the 8 desired outcomes pass through 14 mechanisms and 14 intermediate outcomes.

Conclusions: We hope this model will stimulate further discussion among policy-makers, researchers, educators, and clinicians working to strengthen primary care, the most logical foundation of the health care system.

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INTRODUCTION

More primary care clinicians per capita and a higher ratio of primary care clinicians to other specialists are associated with lower health care costs²⁻⁸ and better outcomes.^{2,6,7,9-25} The reasons for this are not entirely clear.

Because of renewed interest in strengthening primary care, we thought it important to articulate the pathways linking the attributes of primary care to improved outcomes (Figure 1). We hoped that such a “logic model” or thought picture might inform future innovations in health policy, clinical care, research, and education.

The first two authors are primary care physicians with a combined 82 years of experience. JWM is a family physician with 6 years of community practice experience followed by 27 years at an academic medical center. In 2008, he was elected to the Institute of Medicine (IOM) of the National Academies of Science. RIL was trained in pediatrics, which he practiced for 9 years. He subsequently expanded his practice to include all aspects of primary care. In 1968, he started one of the first four family medicine residency programs in the United States (U.S.) at the University of Oklahoma. Following his academic career, he returned to full-time community practice for 15 years until his retirement in 1991. The third author, BD spent the summer following graduation from Baylor University finding definitions, clarifying constructs, and collecting measurement tools related to the various parts of the logic model. This work, available at http://prezi.com/ecazolxt4_bk/primary-care-logic-model/, resulted in important modifications of the model sufficient to justify co-authorship.

METHODS

We began by collecting publications derived from a search of MEDLINE from 1966 to the present using the search term, “primary care.” We added potentially relevant articles

referenced in those manuscripts. Based upon a review of this literature, JWM and RIL agreed upon a set of desired outcomes (increased length of life, improved quality of life, increased productivity, improved end-of-life quality, increased satisfaction with care, reduced health disparities, reduced health care costs, and enhanced clinician well-being) and summarized the evidence of an association between primary care and those outcomes.

We then constructed a preliminary set of attributes characterizing primary care based upon the 1996 IOM report, Primary Care: America's Health in a New Era,^{1,26} a recent consensus report by Haggerty and colleagues²⁷ and a literature review by Kringos, et al.²⁸ We circulated these lists to selected primary care experts for comments and suggestions. Based upon this feedback, we agreed upon a set of six primary attributes (accessibility, coordination, sustained care, comprehensiveness, partnership with patients, and person-centeredness) and two overarching concepts (integration and accountability) that we believe fully characterize primary care.

We then constructed a list of 14 intermediate outcomes based upon the IOM report, the assembled references, and the summary of evidence compiled by Starfield in 2005.²¹ We summarized evidence supporting links between each intermediate outcome and the desired outcomes. To identify potential mechanisms linking attributes to intermediate outcomes, we created a tentative list from the literature and our clinical experiences, and, with input from colleagues, eventually reached agreement on a set of 14.

The model focuses on the clinical role of primary care clinicians. We have not included certain other roles, such as community health, health administration, or public policy-making. When we refer to clinicians, we are also referring to the teams and practices in which they work.

The model is intended to explain how primary care works with no need to postulate qualities often referred to as “the art of medicine.”^{1,29,30}

RESULTS

Desired Outcomes

Increased Length of Life

Prevention of premature death is arguably the most important goal of health care. The association between more and better primary care and reduced mortality rates is robust across multiple studies and methods.^{5,9,12,20,21,23,31-34} Macinko and colleagues estimated that an increase of one primary care physician per 10,000 population reduces the mortality rate by 5.3% or 49 per 100,000 per year.³⁵ The association is strongest in non-urban counties,^{18,36,37} and may apply only to the availability of family physicians.¹⁷ Perhaps the best evidence of an increase in life expectancy with increased access to primary care was provided by an analysis of data from the Medical Expenditures Panel Survey and the National Death Index. In this study, a primary care attributes score was inversely associated with mortality (adjusted hazards ratio 0.79; 95% confidence interval 0.64 – 0.98; $p = 0.03$).³⁴ Most recently, a stronger primary care system was found to be associated with fewer estimated potential years of life lost due to the most common causes of death.²⁴

Improved Quality of Life (QoL)

Improved current QoL is another important goal.³⁸ QoL is defined as the ability to comfortably participate in meaningful life activities. However, assessment of QoL has proved difficult. Negative scores on QoL instruments tend to return fairly quickly to baseline despite persistence of significant impairments and disabilities.³⁹ Perceived health is commonly used as a

proxy for QoL, and most studies have found that access to primary care is associated with improvements in perceived health.^{15,22,24,35,40}

Increased Productivity

The term, “productivity,” includes the ability of individuals to function productively in school, at home, and in the workplace. Productivity tends to be measured in the negative (e.g. days absent from school or work or days spent in bed or disabled). When applied to workplace, it typically includes inability to go to work due to illness and loss of work time due to medical visits and procedures.⁴¹ Health problems have a significant impact on worker productivity.⁴²

Less often measured is “presenteeism,” the decrement in performance associated with remaining at work while impaired by health problems.⁴³ Additionally, the productivity of family caregivers is a potentially important outcome.⁴¹ Better primary care ought to increase productivity. A randomized controlled trial of an intervention to improve depression management in primary care found that intervention patients had 6% greater productivity and a 23% reduction in absenteeism over a 2-year period.⁴⁴

Improved End of Life Quality

The IOM has defined a good death as one that is free from avoidable distress and suffering for patients, families, and caregivers; is in general accord with patients’ families’ wishes; and is reasonably consistent with clinical, cultural, and ethical standards.⁴⁵ We could find no published evidence that access to primary care makes a good death more likely.

Increased Satisfaction with Care

Health care services should be convenient, timely, comfortable, safe, confidential, and responsive to individual patient needs. There is evidence of an association between access to primary care and greater patient satisfaction.^{11,46,47} Satisfaction is also associated with

perceptions of affordability and effectiveness of care and strength of relationship with ones primary care physician.⁴⁸ There is evidence of a recent deterioration of patient satisfaction in the U.S.⁴⁹ Two recent studies suggest that higher levels of satisfaction are not necessarily associated with reduced mortality or increased QoL,^{50,51} and a third found that satisfaction was associated with more hospital days, higher costs, and increased mortality.⁵⁰

Reduced Health Disparities

Health outcome disparities are still a major problem in the U.S. Increased access to primary care has been consistently shown to reduce disparities in access to care and health outcomes.^{13,15,17,19,21,24,31,52-54}

Reduced Health Care Costs

There is good evidence that primary care clinicians generate fewer health care expenses than referral specialists during the evaluation and management of similar conditions, usually with the same or better outcomes.^{55,56} Regions of the U.S. with more primary care clinicians and/or a higher ratio of primary care clinicians to other specialists have lower overall health care costs.^{3-5,7,8,23,57-59} Countries with higher ratios of primary care clinicians to referral specialists have generally had lower per capita health care costs and better health outcomes.¹⁶ However, a recent comparison of European health care systems found that while systems with stronger primary care had better population health, lower rates of preventable hospitalizations, and less inequality, costs were actually a bit higher.²⁴ However, while more primary care would almost certainly reduce cost, it may or may not reduce the rate of rise in cost over time.^{24,60}

Enhanced Clinician Well-Being and Durability

A healthy health care system depends upon the health and well-being of clinicians. Wallace and colleagues have summarized the importance of this outcome as follows: “Physicians who are

affected by the stresses of their work may go on to experience substance abuse, relationship troubles, depression, or even death. Results of emerging research show that physicians' stress, fatigue, burnout, depression, or general psychological distress negatively affect health care systems and patient care."^{61,62}

Physician dissatisfaction and burnout are common and increasing.^{63,64} Recent changes in the health care system, including an increase in management-driven practices, non-patient care-related work tasks, and the stress associated with incorporation of information technologies may be increasing stress and burnout, and primary care clinicians may be disproportionately impacted, and particularly younger female family physicians.^{63,65,66}

According to McWhinney, "Family physicians have in common the fact that they obtain fulfillment from personal relations more than from the technical aspects of medicine. Their commitment is to a group of patients rather than to a body of knowledge."⁶⁷ It should therefore not be surprising that factors positively impacting primary care clinician satisfaction include relationships with patients, respect and appreciation from patients and community, and service to humanity. Physicians who viewed medicine as a calling rather than a job also tended to be more satisfied.⁶⁸ Practice processes that increase clinician satisfaction include: 1. proactive planned care with pre-visit planning and pre-visit laboratory testing; 2. team-based care including standing orders and panel management; 3. reduced documentation burden including scribing and streamlined prescription management protocols; 4. verbal messaging and in-box management; and 5. continuing improvement of team functioning through team meetings and workflow mapping.⁶⁹⁻⁷³

The recent trend toward limitation of primary care to weekday daytime hours, outpatient care, and non-maternity care may also enhance clinician well-being and durability.⁷⁴⁻⁷⁷ Factors

reducing satisfaction include office chaos, time pressure, low work control, office details, an emphasis on electronic information, and paperwork.⁷⁸⁻⁸⁰ There is also evidence that primary care, when well-organized, enhances clinician well-being and reduces clinician burn-out.^{70,73,81-86}

Clinician resilience is also related to teachable skills. Zwack and Schweitzer found that physicians who more consistently were able to practice mindfulness, self-monitoring, limit setting, and constructive engagement with work challenges were less likely to experience “burn out.”⁸⁷ This was confirmed in a recent randomized trial, which found that a series of weekly discussion groups that included mindfulness, reflection, the chance to discuss shared experiences, and group learning resulted in significant and sustained increases in perceived meaningfulness of work and reductions in depersonalization, emotional exhaustion, and burnout.⁸⁸

Intermediate Outcomes

Fewer Preventable Diseases (Primary Prevention)

More than a third of premature deaths are caused, in part, by unhealthy diets, inactivity, use of tobacco, and abuse of alcohol.⁸⁹⁻⁹¹ Immunizations have dramatically reduced morbidity and mortality from common infections.⁹² For example, influenza vaccination has been shown to reduce physician visits and days lost from work at a net societal cost of \$11.17 per person when the vaccine and predominant flu strain are well-matched.⁹³ Childhood immunizations, smoking cessation, and use of low-dose aspirin by people at increased risk for cardiovascular events are all associated with reduced morbidity and/or health care costs.⁹⁴ States with more primary care clinicians per population have lower smoking rates, less obesity, higher rates of seatbelt use, and are more likely to receive an annual influenza vaccination than states with lower primary care clinician: population ratios.^{9,13}

Fewer Low Birth Weight (LBW) Infants

LBW infants have increased rates of morbidity and mortality.⁹⁵⁻⁹⁷ They are more likely to incur increased medical expenses during the neonatal period, to have lifelong medical problems that can adversely impact QoL for them and their families, and to have trouble becoming fully productive adults.⁹⁸ Greater access to primary care is associated with reduced rates of LBW infants and neonatal mortality.^{12,99} Greater access to prenatal care in rural and underserved areas is associated with reductions in rates of “non-normal” infants, reduced lengths of initial hospitalization, and reduced costs of care.¹⁰⁰

Earlier Detection and Treatment (Secondary Prevention)

Screening (secondary prevention) has been shown to reduce morbidity and mortality associated with cervical, colorectal, and breast cancer, some cardiovascular events, certain infections, some congenital metabolic disorders, depression in adults, and late life osteoporosis.^{101,102} Positive impacts of screening on productivity and disparities are likely but not well studied. In populations with greater access to primary care, screening rates are higher.^{6,21,103,104} A greater supply of family physicians is associated with earlier detection of breast cancer, colorectal cancer, and melanoma.¹⁰⁵⁻¹⁰⁷ Areas of Florida with more primary care clinicians had fewer cases of cervical cancer and lower cervical cancer mortality rates. A one-third increase in the supply of family physicians was associated with a 20% lower mortality rate from cervical cancer.³³ Low income breast cancer survivors with a primary care provider are more likely to receive mammography, pap smears, and colonoscopy than those followed by surgeons or oncologists.¹⁰⁸

Better Adherence to Therapeutic Plans

The term, “adherence,” incorporates the notions of concordance, cooperation, and partnership between clinician and patient.¹⁰⁹ Most research in this area has involved adherence to medications. More than 125,000 deaths per year in the U.S. and nearly half of medication-related hospital admissions are directly caused by non-adherence to medications.¹¹⁰⁻¹¹² The cost of medication non-adherence is estimated to be \$100 billion annually.¹¹⁰ Adherence has been associated with improved survival, better QoL, and reduced health care costs in most studies.¹¹³⁻¹²² In some settings, physician job satisfaction has been associated with higher rates of patient adherence to chronic medications.¹²³

Associations between primary care and adherence have not been reported. However, better adherence is associated with greater access to care, patient-centered care, better clinician-patient communication, more time spent on patient education, greater involvement of patients in decision making, and regular follow-up within the context of a therapeutic relationship, all consistent with attributes of primary care.^{112,124-133} Safran and colleagues found that physicians’ comprehensive (“whole person”) knowledge of patients and patients’ trust in their clinician were associated with self-reported “adherence to clinicians’ advice.”¹³⁴ Children who see their own physician are more likely to be given [by their parent] penicillin prescribed for streptococcal pharyngitis.¹³⁵ Better teamwork within primary care practices and better coordination of care between primary care and mental health clinicians is associated with improved adherence to depression treatment regimens.¹³⁶

Better Management of Chronic Diseases (Tertiary Prevention)

Most patients receive their chronic illness care from primary care physicians,¹³⁷ and greater access to primary care is associated with reduced disease-specific mortality rates for heart disease and stroke, suggesting more effective tertiary prevention.^{9,35,138-140} This can not be

explained by differences in severity of illness of patients seen by referral specialists versus primary care clinicians.¹⁴¹ Individuals with multiple chronic conditions were more likely to rate their health as good or very good if they lived in a country with a strong primary care system and better continuity of care, and more comprehensive primary care services.¹⁴²

At a population level, a higher proportion of primary care clinicians is associated with higher quality of care for Medicare beneficiaries based upon adherence to clinical practice guidelines (CPGs).⁸ However, in areas where access is not a problem, adherence to disease-specific CPGs is generally higher for referral specialists than for primary care clinicians,¹⁴³ but outcomes tend to be the same or better for patients with the same illnesses cared for in primary care. This suggests that primary care clinicians and patients are better at choosing which recommendations are applicable to individual patients,^{21,144,145} that factors other than CPG adherence contribute to better outcomes, or both. It should be noted that physicians have expressed concerns that CPGs shift the focus from patients to diseases,¹⁴⁶ providing little guidance about individualization or prioritization.^{147,148}

Improved Functioning

Starfield defined functional status as “the representative of morbidity on the daily life of people... it considers how illness affects the way in which people perceive themselves and how it influences their professional and personal activities.” She defined QoL as, “a broader concept, taking into account how people feel about their lives and what they are able to do.”⁶ Thus, functional capacity is an intermediate outcome and QoL is the desired outcome. We were unable to find studies linking primary care to improved functional capacity.

Fewer Unplanned Visits

Unplanned visits to medical facilities usually result from unanticipated adverse health events, poor planning, or poor decision-making. They are likely to be associated with reduced survival, QoL, productivity, end of life quality, and increased costs. Greater access to and use of primary care services is associated with fewer emergency department visits^{149,150} and with lower overall rates of utilization of medical services.⁷

Fewer Diagnostic Tests

As the number of available diagnostic tests increases, strategic parsimony will be increasingly important. In addition to the direct cost of unnecessary testing, false positive results can lead to clinical cascades, the financial and human costs of which may be enormous.¹⁵¹ Fragmentation of care is associated with more diagnostic testing.¹⁵²

Primary care physicians order fewer diagnostic tests than referral specialists when evaluating patients with the same symptoms, usually with similar or better outcomes, and family physicians order fewer diagnostic tests than general internists.^{55,153,154} This may be because internists tend to be more disease-focused than family physicians.¹⁵⁵⁻¹⁵⁷

Greater Patient Safety

The IOM estimated that adverse events caused by medical errors occur in 2.9 to 3.7% of hospitalizations and that 44,000 to 98,000 preventable deaths occur each year in the U.S. as a result of medical errors in hospitals.¹⁵⁸ While these estimates have been questioned,^{159,160} there is no doubt that the problem is significant. The adverse consequences of medical errors are also common in outpatient settings.¹⁶¹⁻¹⁶³ Primary care processes ought to mitigate this problem. However, we could find no published evidence that more or better primary care results in greater patient safety.

Fewer Non-Urgent Emergency Department Visits

Use of hospital emergency departments for non-urgent care disrupts continuity and increases the cost of care. Recent increases in emergency department visits by patients with a usual source of care suggest that attributes other than sustained care may have deteriorated or that other societal forces are at work. In fact, it appears that adults who report receipt of more patient-centered care¹⁶⁴ and parents who are more satisfied with the health care received by their children^{165,166} are less likely to use the emergency department. Access is also a factor. Patients whose primary care clinicians have extended office hours and whose practices are convenient (less than an hour's drive from the patients' home or workplace) are less likely to use for non-urgent care as are patients whose primary care clinician speaks the same language as they do.¹⁶⁷

Fewer Hospitalizations and Hospital Days

Hospitalization is strongly associated with mortality, reduced QoL, reduced productivity, and increased cost of care. It has been estimated that 22% of health care costs are related to avoidable complications such as hospitalizations.¹⁶⁸ Greater access to primary care is associated with fewer hospitalizations,^{169,170} and, in particular, fewer hospitalizations for "primary care sensitive conditions."^{23,57,171-179} By contrast, greater access to primary care in a Veterans Administration Hospital study actually increased hospital admissions.¹⁸⁰ However, in this study, continuity of care in the primary care intervention arm was low compared with that seen in most primary care practices.

In-patient care is less expensive for patients cared for by primary care clinicians compared to the same care provided by referral specialists.⁵⁷ Children who sought care from a primary care clinician prior to hospitalization for appendicitis or tonsillectomy had fewer complications.¹⁸¹⁻¹⁸³ A 1990 study found that hospitalized patients managed by family physicians were, on average, older and sicker than those cared for by internists, but their outcomes were

similar.¹⁸⁴ However, in a more recent study, hospitalized patients managed by hospitalists (specialties not specified) had shorter lengths of stay than patients cared for by general internists or family physicians. In that study, cost of care was the same for hospitalists and family physicians but higher for general internists, and deaths and readmission rates were the same for all three groups.¹⁸⁵

More Appropriate and Effective Consultations and Referrals

Necessary, timely, and beneficial consultations and referrals should be associated with better outcomes, and more and better primary care should result in fewer and more appropriate referrals and consultations. In fact, patients who have a continuous relationship with a primary care clinician see referral specialists less frequently.¹⁸⁶ However, we could find no published studies directly examining associations between primary care and appropriateness of referrals and consultations.

More Affirming Interactions

Expressions of gratitude toward clinicians (e.g. “I always feel better after I see you.”) are likely to improve clinician job satisfaction, well-being, and durability. Patients commonly inquire about clinicians’ family members, personal health, and planned vacations. They show courtesy when deciding when to call with questions and problems. Other expressions of gratitude include gifts, cards, and referrals of family members and friends. Horowitz and colleagues identified several types of affirming interactions including patients showing kindness toward clinicians, clinicians witnessing the humanity of patients during profound emotional events, and clinicians feeling that the care they have provided is valued by their patients.¹¹⁶ Clinicians are also affirmed by the respect shown by their communities (e.g. awards and honors or respectful

comments made in public settings).¹⁸⁷ We found no evidence that affirming interactions occur more commonly in primary care, though, logically, they ought to.

Fewer Lawsuits

We could find no information on the impact of primary care on the likelihood of lawsuits. However, there is evidence that decisions to sue clinicians are often associated with perceived unavailability, poor delivery of information, discounting of patient and family concerns, and lack of understanding of the patient and/or family perspective.¹⁸⁸

The cost of “defensive medicine” has been difficult to estimate. However, in 1993 it was thought to be as much as \$76 billion per year.¹⁸⁹ Lawsuits also have a significantly negative impact on physician well-being.¹⁹⁰ While little information is available comparing the costs of defensive medicine across disciplines, the protective effect of sustained relationships with patients should help to mitigate this behavior.

Fewer Unnecessary and/or Futile Interventions

It has been estimated that 30% of health care spending is for services that are unlikely to benefit patients.¹⁹¹ One quarter of Medicare dollars are expended on services for individuals during their last year of life, and 40% of these dollars are expended during the final week of life.¹⁹² Terminally ill patients referred for hospice care live, on average, a month longer than those who are not, suggesting that some interventions provided near the end of life are not only unnecessary, they may actually shorten life.¹⁹³ Two-thirds of deaths now occur in the hospital where patients’ preferences and advance directives are often not respected or followed, resulting in less than optimal experiences of dying.^{194,195} There is evidence that patients who have discussed end of life options with their personal physician are less likely to undergo unnecessary and futile interventions.¹⁹⁶

In Figure 2, we have drawn proposed links between intermediate and desired outcomes. Increasing confidence in the associations between these two sets of outcomes will be critical for future research, since intermediate outcomes are easier to measure over shorter time intervals.

Primary Care Attributes

The IOM, in 1996, defined primary care as “the provision of integrated, accessible health care services by clinicians that are accountable for addressing a large majority of personal health-care needs, developing a sustained partnership with patients, and practicing within the context of family and community.”²⁶ Thus, primary care is defined by its attributes rather than by medical content, clinician discipline, or the age or gender of patients. This makes it qualitatively different from all other medical disciplines. A critical literature review of the evidence linking primary care to better outcomes supports this process-oriented definition of primary care.¹⁹⁷

The practice of primary care requires a depth of understanding and practice of all of the attributes in the same way that neurology requires a depth of understanding of the diagnosis and management of diseases of the nervous system.^{26,198} In this way, it is primarily a specialty of depth, not breadth. Referral specialists who practice some attributes with some patients are therefore not actually practicing primary care. Likewise, clinicians trained in family medicine, general internal medicine, or general pediatrics who do not practice all of the attributes at a specialty level are not practicing primary care.

There are 8 essential attributes of primary care, which are overlapping, interrelated, and inseparable. The organizational attributes (accessibility, coordination, and sustained care), provide the structure and administrative processes that make it possible to provide primary care. The clinical attributes (comprehensiveness, partnership with patients, and person-centeredness), define the nature of that care.^{199,200} In addition, there are two overarching concepts (integration

and accountability), which bind the attributes together. These attributes act through a set of mechanisms to produce better outcomes.

Accessibility

If care is inaccessible, the other attributes can have no impact. Optimal accessibility requires a sufficient supply and appropriate distribution of primary care clinicians and timely 24/7 availability.²⁰¹ It also includes accommodations for vulnerable populations, whose demographic, cultural, geographic, educational, socioeconomic, or physical circumstances are impediments^{11,36,202-206} and for other hard-to-reach groups like adolescents²⁰⁷ and immigrants.^{204,208} These two concepts correspond to “first contact accessibility” and “accessibility accommodation” defined by a panel of Canadian experts.²⁷ Other authors have explored concepts like “timeliness” and “patient-centered access.”^{209,210} Because accessibility is a prerequisite for the other attributes of care, the associations between primary care and intermediate outcomes will not be reiterated here.

Coordination

“Coordination ensures the provision of a combination of health services and information that meets a patient’s needs. It also refers to the connection between, or the rational ordering of, those services, including the resources of the community.”^{26,45} It has been estimated that more than one-third of a primary care clinician’s work day involves coordination of care.^{82,211} Even more coordination is handled by practice staff.²¹² Recent Patient-Centered Medical Home initiatives have clarified the need for new payment models that acknowledge the importance of care coordination.²¹³

Internal coordination includes effective and efficient exchange of healthcare-relevant information within the practice. Failure of internal coordination has been found to be a root cause

of a high proportion of clinical errors.^{214,215} In a study of practices exhibiting exemplary teamwork, one research team identified two primary themes, coordination and mutual respect, and four organizational features, independent professional responsibilities, opportunities to learn about each others' roles, frequent interdisciplinary communication about patients, and strong leadership in inter-professional practice values.²¹⁶

External coordination involves exchange of information between the practice and referral specialists, care managers, allied health professionals, pharmacists, home health agencies, hospitals, long term care facilities, hospice providers, durable medical equipment companies, departments of motor vehicles, employers and teachers, insurance companies, departments of public health, and others.²¹⁷ One study found that, in a typical primary care practice, external coordination for Medicare patients involves communication with 229 different referral physicians working in 117 different practices.²¹⁸

Sustained Care

Sustained care encompasses longitudinality, the more critical characteristic of primary care, as well as management and informational continuity.²¹⁹ Longitudinal care increases knowledge and understanding, enhances trust, and promotes shared decision-making.²²⁰ It provides the primary care clinician with the opportunity to use judicious “watchful waiting” to guide assessment and treatment decisions, thus avoiding expensive and overly aggressive evaluation and management. While longitudinal relationships also occur in referral practice, they are a central feature of primary care where they encompass a breadth and depth not often achieved in other settings.⁶

Management continuity is defined as “the extent to which services are received as part of a coordinated and uninterrupted succession of events consistent with the medical needs of

patients.²²¹ In both cross-sectional and cohort studies, management continuity has been found to be associated with better preventive care, adherence, and satisfaction with care for both patients and clinicians, and reduced emergency room visits, hospitalizations, utilization of health services, and health care costs.^{149,222-250} Management continuity appears to be most helpful to and valued most highly by individuals who are ill, disabled, or disadvantaged in some way.^{251,252} Since the advent of hospitalists, continuity of care with the primary care clinician during hospitalizations has dropped significantly.²⁵³

Informational continuity requires that all information pertinent to a particular episode of care, no matter where it was collected, is available to all involved parties when needed. Informational continuity is particularly important during transitions in care, such as admission to and discharge from a hospital.²⁵⁴ For example, having a usual source of care is associated with better outcomes in patients admitted to the hospital with myocardial infarction.²⁵⁵ Post-discharge continuity, with the clinicians who have cared for patients prior to admission, significantly reduces urgent readmissions.²⁵⁶ However, an enhanced primary care intervention in the Veterans Administration system actually increased readmissions.¹⁸⁰

Forced discontinuity of primary care resulting from changes in insurance coverage have been found to be associated with poorer self-rated quality of care and feelings of increased stress and vulnerability.^{257,258} It is not surprising then that older patients tend to stay with their primary care physician until they are forced to change, and the longer they stay with the same primary care physician, the better they rate the quality of care received.²⁵⁹

Comprehensiveness

Primary care clinicians provide a range of services that include primary, secondary, and tertiary prevention, diagnosis and treatment of acute and chronic conditions, outpatient surgical

and diagnostic procedures, rehabilitative care, and management of normal life stages including end-of-life care. Care is provided in the office, home, emergency room, hospital in-patient, and nursing home. The range of services provided by a primary care practice should match the needs of the community served.⁶ Approximately 90 to 95% of health-related issues can be addressed by a well-trained primary care physician.^{260,261}

As a result, primary care physicians are able to address multiple health topics within the same encounter, saving patients time and money and reducing the number of duplicative services (repeated histories, physical exams, and testing).²⁶² Based upon an analysis of Medicare claims data, patients of family physicians who provided more comprehensive care cost the Medicare program less money and had fewer hospitalizations.²⁶³

Given the large and expanding volume of medical knowledge, it might appear that this would be virtually impossible. However, the task is not as formidable as it appears to be,²⁶⁴ and advances in information technologies and interdisciplinary teamwork is expected to make comprehensive care even safer and more effective.²⁶⁵

Partnership with Patients

Partnership refers to “the relationship established between the patient and clinician with the mutual expectation of continuation over time. It is predicated on the development of mutual trust, respect, and responsibility. A bond to someone you trust may be healing in and of itself.”²⁶⁶ Tresolini states, “The foundation of care given by practitioners is the relationship between the practitioner and the patient, a relationship vitally important to both. This relationship is a medium for the exchange of all forms of information, feelings, and concerns, a factor in the success of therapeutic regimens, and an essential ingredient in the satisfaction of both patient and

clinician. For patients, the relationship with their provider frequently is the most therapeutic aspect of the health care encounter.”²⁶⁶

A good clinician-patient relationship increases receipt of preventive services and enhances the effectiveness of medical treatment, improving desired patient outcomes.²⁶⁷⁻²⁷⁰ It increases patient satisfaction and adherence and reduces the likelihood of malpractice suits.^{132,188,271,272} In addition, healthy clinician-patient relationships increase clinician job satisfaction.²⁷³

Effective clinical partnerships depend upon helping skills such as respect, genuineness, congruence, and empathy,²⁷⁴ shared decision-making,²⁷⁵⁻²⁷⁷ and advocacy.²⁷⁸

Person-Centeredness

The 1996 IOM report states, “Beyond the knowledge of disease is knowledge of the patient as a human being. Humanism is therefore a core area of primary care practice.”²⁶ Starfield stated, “Effective medical care is not limited to the treatment of disease itself; it must consider the context in which the illness occurs and in which the patient lives.”⁶ An individual’s life story provides the context within which health information must be understood and discussed, and each story is built upon a framework of beliefs, ranging from mundane to deeply spiritual.²⁷⁹ Person-centered care is care that is specific to an individual based on his or her goals, abilities, resources, values, and preferences.²⁸⁰⁻²⁸² As stated by Dr. Bill Phillips, “The most important question [pertaining to quality of care] is not just how well Dr. Jones cares for diabetes, or for Mrs. Smith’s diabetes, or even Mrs. Smith’s diabetes, depression, and dermatitis, but how well Dr. Jones cares for Mrs. Smith.”²⁸³

Providing such care requires that the clinician be aware of social challenges in the patient’s life, such as economic pressures, marital difficulties, and care-giving responsibilities,²⁸⁴

and the patient's spiritual beliefs.²⁸⁵ In contrast to manufacturing, where the objective is for each item to be identical, primary care strives to understand and treat each patient as a unique individual. This difference has major implications for quality measurement and improvement.^{147,286,287}

Higher degrees of person-centeredness are associated with lower annual health care costs.^{157,164} This could be the result of individual prioritization and/or greater awareness of and concerns about the cost of care for individual patients. Patients' perceptions of person-centeredness are also associated with better intermediate outcomes, such as fewer diagnostic tests and referrals, better recovery from discomfort, and better emotional health than objectively measured patient-centeredness.^{282,288,289}

The primary care clinician must also be cognizant of the patient's family and social network and the effect it has on clinical decision-making.²⁹⁰ The primary source of personal identity, social support, and connection to others for most people is their family. Family relationships are key determinants of health and interactions with health care services.^{6,291} Family members are often the first to provide advice about new symptoms or changes in health status. Family joys and stressors can temper, cause, or exacerbate health problems. Providing care to more than one family member creates more opportunities to form a therapeutic relationship with each individual and to gain a better sense of the strategies most likely to be helpful.²⁹² Most families have a "family health expert." Forming a therapeutic alliance with that person can be crucial to the success of interventions with all other family members.²⁹³

The community in which an individual lives can also be a source of identity and social and psychological support. Involvement in community activities provides the primary care clinician with additional opportunities to understand and form relationships with patients and

families. Active engagement in community health promotion efforts can positively impact the health of individuals.^{294,295}

Finally, primary care clinicians must be sensitive to the culture of patients and take cultural considerations into account when communicating and making decisions.²⁷ As stated by N. W. Lienke, a nurse-anthropologist who worked with several American Indian tribes, “Disease, whether or not, how much, and what type is present, is a biological manifestation (or symbolization) arising from an impingement of social or cultural factors as well as other stimuli or etiologic agents on a susceptible organism. This disturbed biologic process or dysfunctional state of *dis-ease* is elaborated by the individual into an abstract concept or health idea by means of cultural attitudes concerning this disease or disease in general. These attitudes include such things as the acceptability and significance of the disease, a perception of its severity, the range of its secondary gains or values for the patient and family, and ideas about its cause, treatment, and prognosis.”²⁹⁶

Integration

All of the attributes are essential and interdependent. Comprehensiveness increases access opportunities, making sustained care more likely. Continuity improves coordination.²⁹⁷ A focus on the whole person within their family and community contexts results in more comprehensive and better-coordinated care. It is disturbing that fewer than two-thirds of visits for primary care services in the U.S. take place in primary care practices, the others taking place in the offices of referral specialists and emergency departments where only some of the attributes are practiced.²⁹⁸

The skills required for integration are both quantitative (e.g., probabilistic) and qualitative (e.g., phenomenological). It is the ability to perceive and integrate the many variables

contributing to a patient's health and well-being.^{29,299} This has often been incorrectly called the “art of medicine” or clinical wisdom and is construed as indescribable, non-replicable, and not teachable. We contend that the knowledge and skills required for integration can be modeled, described, and taught, and should be core elements of primary care curricula. In fact, integration is arguably the most important skill of a primary care clinician, and the hardest to acquire. Epstein has coined the term, “whole mind” to this critically important but poorly understood process.³⁰⁰ Safran found that patients' perception of their primary care physician's ability to integrate information about them and their health was associated with greater adherence, satisfaction with care, and positive health trend over four years.¹³⁴

Accountability

Accountability also applies to all of the attributes. Primary care clinicians are accountable to patients, families, professional colleagues, and to their communities.³⁰¹ Because of their critical role in the health care system, they are accountable collectively to the health of the system as a whole.^{6,302} Accountability therefore implies both incorporation of continuous quality improvement processes and the routine reporting of quality data from the practice. As important members of “communities of solution,” they are also responsible for contributing to, mentoring, and attempting to improve population health.^{294,303}

Proposed Mechanisms

We propose 14 mechanisms through which the attributes improve intermediate outcomes.

Greater Efficiency and Capacity

Health care is more efficient when clinicians and staff know their patients well, when relevant information is available in one place, when members of the team understand their roles, and when clinicians have closer relationships with referral specialists. Greater efficiency results

in increased capacity, which improves accessibility and the outcomes associated with it. This mechanism partially explains why coordination, sustained care, and comprehensiveness result in fewer preventable diseases, earlier detection and treatment, and better management of chronic diseases. Primary care physicians attribute their ability to deliver more cost effective care to their attitude and skills and a thorough knowledge of their patients.³⁰⁴

Fewer Medical Errors

We have distinguished medical errors (a mechanism) from patient safety (the consequence of reducing them). Determining the rates of medical errors is difficult. Errors of omission appear to be a bigger problem in primary care, while errors of commission (doing too much) are probably more often committed by referral specialists.^{144,305-308} Lack of medical knowledge does not appear to be a major factor in primary care errors. For example, breakdowns during physician – patient encounters appear to account for a majority of diagnostic errors in primary care, with coordination problems a close second.³⁰⁹ The combination of the primary care attributes should reduce errors, resulting in better intermediate outcomes, but we could find no specific evidence to support this.

Delivery and Receipt of More Preventive Services

More and better primary care is associated with patient receipt of more primary and secondary preventive services.^{9,13,21,104,176,310-316} In a direct observational study conducted in community-based primary care practices, higher patient ratings of interpersonal communication and continuity of care were associated with being more up-to-date on screening services and health habit counseling, and higher scores on accumulated knowledge and preference for regular physician were associated with being more up-to-date on immunizations.³¹⁷

Better Informed and Activated Patients

Because of the frequency of encounters with patients and their family members, primary care clinicians have many more opportunities to provide education and encouragement. Several meta-analyses have found that patient education can have a positive effect on adherence and chronic disease management.³¹⁸⁻³²⁰

Bertakis and colleagues found that a practice style emphasizing patient activation resulted in increased patient satisfaction.³²¹ Associations between patient activation and self-management behaviors, medication adherence, and better control of chronic illnesses have also been demonstrated.³²²⁻³²⁴ A 2004 review of randomized controlled trials of interventions designed to increase patient knowledge and activation found that such interventions were effective, resulting in better control of chronic diseases and improved functional status.³²⁵

Higher Level of Trust

Trust increases over multiple encounters with the same clinician over time, nurtured by patient-clinician partnership and a person-centered approach.¹³⁴ Trust makes it easier to agree on conservative approaches such as “wait and see” and on reasonable advance directives. Becker and Roblin found that, within primary care, “practice climate” was associated with increased patient trust, which was associated with activation.³²⁶ Higher levels of trust in one’s clinician has been found to be associated with higher ratings of clinician communication, interpersonal treatment, knowledge of the patient, and perceived ability to manage diabetes.^{327,328} Greater trust is also associated with more complete disclosure of clinically important information and increased adherence.³²⁹ Less well-studied, is the trust clinicians have in patients, which might reduce unnecessary tests, referrals, and treatment.

Investment

Sustained partnerships, built upon a series of impactful experiences, lead to clinician and patient investment. An investment is more than an interest or even a commitment. It implies that both parties have a stake in and recognize that they will be affected by future shared events. We could find very little published on this subject as it applies to primary care, but we believe that investment improves both clinician and patient performance across the board, resulting in improvement in all of the intermediate outcomes.

More Family Support for Improved Health

Comprehensive, person-centered care over time, in which the patient's family context is considered to be vitally important, particularly when family members are also patients, results in relationships with families that support the therapeutic partnership. Strong relationships with families are likely to improve outcomes.³³⁰

More Community Support for Improved Health

Primary care can also strengthen relationships between community-based organizations and between patients and community resources. We assert that this mechanism can support healthier lifestyles, reduce births of LBW infants, and enhance early detection and improve management of chronic conditions.

Greater Focus on Outcomes

Longitudinal clinician-patient partnerships change the nature of the interactions between clinicians and patients. For clinicians this often manifests itself as a shift from a problem-oriented, abnormality-identification-and-correction focus to a goal-directed or outcomes-based approach.^{280,281} This change in orientation and approach provides greater support for patients' basic psychological needs for autonomy, competence, and relatedness, which contributes to improved health outcomes.³³¹

The mission then becomes helping the patient rather than restoring normalcy, a mission that only sometimes involves making a correct diagnosis and prescribing treatment.^{332,333} Person-centered care provides a broader understanding of patients' challenges, needs, values, preferences, and resources. Within this context, the diagnosis of "depression" does not adequately describe the patient's situation, and it is not automatically linked to "antidepressant medication." The range of available strategies is broadened, and the likelihood of settling upon the right options is increased.

Enhanced Clinician Learning

Sustained, comprehensive care of patients of all ages and both genders provides primary care clinicians with countless opportunities to increase their knowledge and skills. They almost always see the outcomes of diagnostic and therapeutic decisions. This constant feedback provides primary care clinicians with a sense of probabilities leading to better decisions about when to act and when to wait a bit longer. Interactions with clinical consultants provide additional learning.

Closer Relationships with Consultants

Though the rate of referrals and consultations is only 5 to 10% of patient encounters, the total number of consultations and referrals made by a primary care clinician over time is large. This creates the opportunity for primary care clinicians to get to know a large number of referral specialists fairly well. Provision of care in a variety of settings (office, home, hospital, nursing home, etc.) and involvement in community activities further strengthens these relationships. Relationships established between primary care clinicians and referral specialists probably result in better coordination of care, fewer errors, and better management of chronic conditions.

Less Clinician and Patient Anxiety

Access to a primary care clinician who knows and is interested in you as a person can create a sense of security. Clinician anxiety is also reduced by greater knowledge of and trust in patients. Confidence that care is always available when needed makes it easier to temporize when appropriate. Reduced clinician anxiety reduces the likelihood of unnecessary testing and treatments and hospitalizations that can lead to undesirable clinical cascades.¹⁵¹

Greater Understanding Results in Higher Quality Decisions

All of the primary care attributes contribute to a more accurate understanding of the patient's evolving narrative and to a richer clinician-patient-family relationship. Decisions made in this context involve both analytic and non-analytic cognitive processes, referred to by Epstein and Street as "shared mind."^{290,334} In situations like the patient-clinician interactions, in which each partner has important information to contribute, common understanding leads to better decisions. Patients may report concerns earlier, provide complete information, adhere to plans, achieve better control of their chronic illnesses, function better at home and work, make fewer unplanned visits, require fewer hospital days, and express gratitude toward their clinicians.^{282,335-337} However, the results of controlled trials have been mixed, with clearer benefits associated with longer term decisions.²⁷⁷

Positive Psycho-physiological Effects

The work of Schoenheimer and others as early as 1935 demonstrated the interconnectedness of cells and organ systems.^{338,339} Further studies have identified vital connections between the brain and the endocrine and immune systems that help to explain observed associations between sensory inputs and physiological responses.^{221,340-342} The implications of these discoveries for clinical care are profound. The body reacts at a biochemical and cellular level to people, situations, events, and ideas; how feelings, emotions, stress, and

many contextual factors influence a person's physical and mental health status. As general internist Stewart Wolf, MD, said, "... the stimulus is a symbol which has no intrinsic force of its own but which undergoes interpretation by the brain and thereby gains its power."³⁴³ Sustained, person-centered care within a therapeutic partnership may support healthy physiological functioning via neuroendocrinological and neuroimmunological pathways.³⁴⁴ The powerful message is that the bidirectional flow of mental stimuli between patient and clinician may itself translate into better control of chronic diseases, fewer adverse health events, fewer LBW infants, and better outcomes.

The Complete Model

Figure 3a shows the complete model. In order to illustrate its complexity, we have also drawn connections from a single attribute, partnership with patients, through proposed mechanisms and intermediate outcomes to desired outcomes (Figure 3b).

DISCUSSION

We believe we have created a simplified but generally complete "logic model" that outlines how primary care produces better health outcomes. If the arrows could be accurately drawn, some would probably go up or down rather than from left to right (e.g. all other aspects depend upon accessibility), and the model might be recursive (e.g. interventions that negatively impact clinician well-being negatively impact on accessibility). We were surprised to find so many gaps in our knowledge about how primary care works and, in fact, whether it impacts some of the desired outcomes. We hope that others will improve the model based upon evidence that we may have missed and the results of future research. Meanwhile, we hope it can be used to

direct improvements underway in primary health care delivery and give policy makers a better understanding of the importance, complexity and fragility of primary care in the U.S.

Who Should Provide Primary Care

While the IOM defined primary care as a set of attributes that could, in theory, be performed by any of a variety of clinicians or clinician teams, nearly all of the evidence linking the primary care attributes to better outcomes holds true only for family physicians (and general practitioners in other countries).²¹ Direct comparisons between family physicians and general internists consistently find family physicians to be, on average, more person-centered and less disease-oriented.¹⁵⁵⁻¹⁵⁷

The nature of the primary care attributes suggests characteristics of individuals who would be more likely to enjoy and best suited to perform the primary care function. The organizational attributes (accessibility, coordination, sustained care, and accountability) require an interest in designing and continually improving organizational integrity and efficiency. Individuals who are driven to make things work better and who don't mind dealing with financial and personnel issues would be well suited to these tasks. Of course, all of the attributes require teamwork, and these tasks need not be the primary responsibility of clinicians.

To provide comprehensive care clinicians must be able to tolerate uncertainty and have a firm grasp of probabilities,^{304,345} while integration requires the ability to see the "brightness" within large amounts of information.

Probably most importantly, person-centered care based upon sustained partnerships with patients is best performed by individuals who enjoy becoming involved in other peoples' lives. Supporting this point, when asked what they would have done had they not been accepted to

medical school, family physicians listed counselor, social worker, and teacher more often than scientist.

Primary Care “Transformation” and Health Policy

The birth of Family Medicine as a specialty in 1969 promised to marry the best features of general practice with specialty-level training in the science of medicine. Integrating the new specialty into academic medical centers increased exposure of medical students to the field, increasing the number of residency-trained primary care physicians. However, the qualitative differences between primary care and the referral specialties were never fully understood or incorporated into undergraduate medical curricula. As a result, disease-oriented thinking is still overemphasized and the primary care attributes neglected.

Meanwhile, in the mid-1990s, the *Chronic Care Model (CCM)* was proposed to address the changing pattern of illness in the population.³⁴⁶ It pointed out the need for better systems to support patient activation and engagement, teamwork, for decision-making, and population management. The laudable objective of the CCM was to facilitate “productive interactions between informed, activated patients and prepared proactive practice teams.” However, an unintended consequence appears to have been an even greater focus on diseases.³⁴⁷ Disease-specific CPGs have proliferated, from which quality indicators have been derived. Teamwork must also be handled carefully lest it result in improved access but reduced coordination, continuity, and integration.³⁴⁸

The combination of the CCM and CPGs may, therefore, have actually contributed to further erosion of person-centered, relationship-based care. A 1995 review of the literature on quality improvement in primary care found 21 studies that addressed access, continuity, and coordination but no studies addressing how to improve “humanistic processes.”³⁴⁹ Montgomery,

Safran, and colleagues showed that, between 1998 and 2000, the quality of interactions between older patients and their primary care physicians had deteriorated.⁴⁹ Systems engineers have pointed out that sometimes “efforts that improve efficiency in one process or department actually worsen performance of the overall system.”³⁵⁰

Perhaps, in part, as a response to these disturbing trends, the concept of the *Patient-Centered Medical Home* (PCMH), a model developed in pediatrics in 1967 to address the needs of disabled and chronically ill children, has been adopted by the primary care community. The PCMH framework purports to both embrace the CCM and reemphasize the centrality of patients.³⁵¹ It also promotes interdisciplinary teamwork and the use of advanced electronic technologies. Studies of PCMHs in evolution suggest improvements in the quality of some care processes, some intermediate outcomes, and some costs, with both positive and negative effects on patient satisfaction.^{352,353} It isn’t yet clear how transformation to PCMH will affect clinician well-being and durability.³⁵⁴

To date, most primary care transformation efforts have focused primarily on CCM components, health information technologies, and the organizational attributes of primary care. “Patient-centeredness” has often meant making care more convenient rather than more person-centered. This has led some to express concern that we are creating “medical houses” rather than medical homes.^{163,186,199,355} On the other hand, widespread enthusiasm for the PCMH as an idea may result in better reimbursement for primary care, which is long overdue and increasingly important since much more is being expected.¹⁹⁹

The logic model makes it clear that more effort should be directed at improving the clinical attributes of primary care. “Patient-centeredness” should not just mean greater access or greater satisfaction. It must include a shift from disease-oriented to person-centered thinking and

from an expert-customer model to one based upon sustained therapeutic partnerships. Clinicians' skill sets must include more than diagnostic and prescriptive abilities, and the focus must shift to the outcomes desired by each individual (e.g. ability to participate in meaningful life activities for as long as possible) rather than the intermediate outcomes most often used now as indicators of quality (e.g. blood pressure or blood sugar control).

Because of the importance of primary care to the health of the health care system and to the health of individuals, and because of its fragility, policy decisions should enhance and not reduce its effectiveness. We hope that our model will help to inform policy-makers on the critical drivers of outcomes. The model may also help those wishing to redesign primary care to understand the complex web of connections upon which its effectiveness depends. Tinkering with individual attributes may improve some outcomes while worsening others.

Clinical Care, Education, and Research

We hope that experienced clinicians will applaud our attempt to conceptualize what they have learned to do through practice. Having said that, we believe that clarification of the primary care attributes and their mechanisms of action could help them to be even more effective. A reminder that the clinician-patient partnership itself improves outcomes through psychophysiological pathways may help to shift the focus away from advice giving and prescriptions towards a greater emphasis on relationships and person-centeredness.

We also hope that the logic model can reduce the time required to reach this understanding. Too often primary care has been taught as an amalgam of the referral specialties. Medical students often choose primary care because they enjoyed all of their other clinical rotations. We hope that the logic model will give students a more accurate understanding of primary care as a career and that it will be used to improve curricula for medical students and

residents. We also hope that clearer articulation of the qualitative difference between primary care and the referral specialties will enhance efforts to recruit, admit, and encourage a larger proportion of attitudinally and intellectually qualified individuals to pursue careers in primary care. For despite increased medical student interest recently, we are still losing ground in our efforts to increase the proportion of primary care clinicians in the workforce.³⁵⁶

We hope the model will also be used to develop ways to more accurately assess the impact of innovations and changes in policy on primary care processes and outcomes. By embedding measurement of the various model components in routine practice, it might be possible to both assess the impacts of both intentional and unintentional changes resulting from innovations, policies, and secular trends.

Even this relatively simplified model suggests that attempts to improve some aspects of care may have both positive and negative effects on others. For example, use of hospitalists has been shown to increase the number of primary care office visits (improved access),³⁵⁷ but it certainly has the potential at least to reduce both management and informational continuity.

Conclusions

Strengthening primary care is one of the only strategies known to both improve the quality and reduce the cost of health care. It is a foundational component of a healthy health care system. Despite changes in the epidemiology of health problems and advances in science and technology, there is no evidence that the need for primary care or any of its attributes have diminished. Pathways leading from the attributes of primary care to desired outcomes are interdependent and complex. All of the attributes are essential. Proposed changes in the health care system should be undertaken with careful consideration of their impact on the attributes of primary care and desired outcomes.

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Figure 1. Structure of the logic model

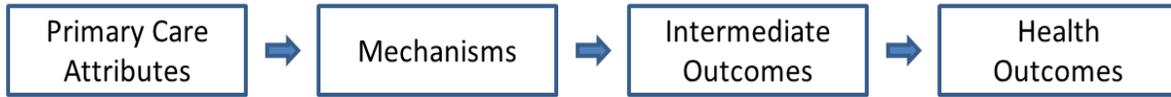


Figure 2. Proposed links between intermediate and desired outcomes

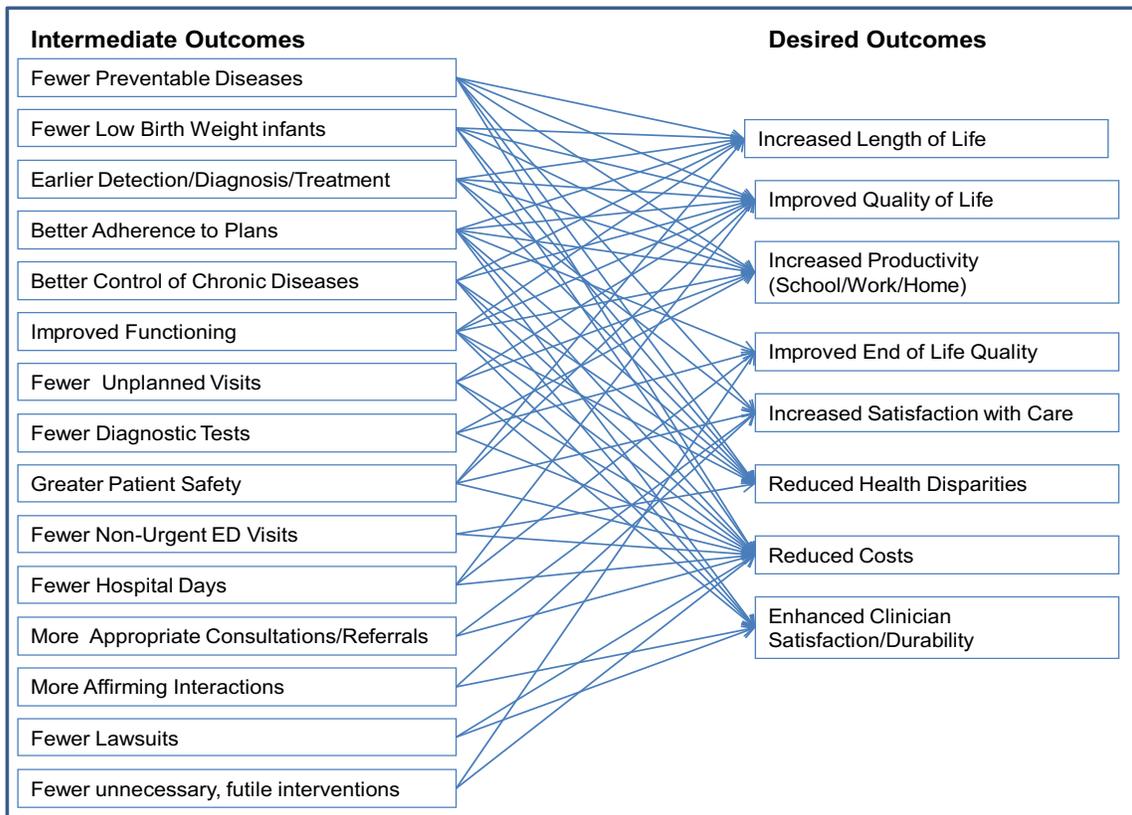


Figure 3a. Complete model.

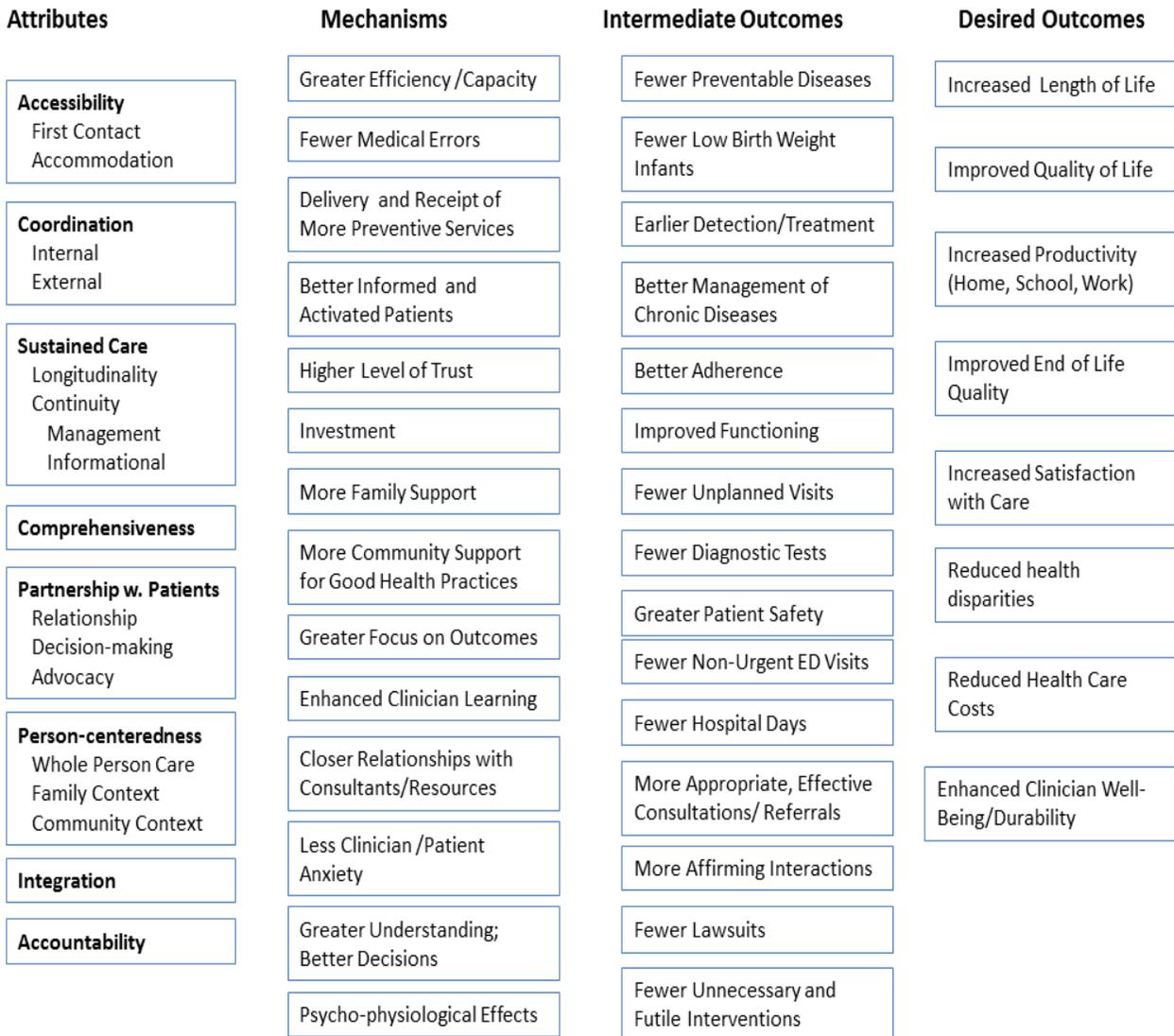


Figure 3b. Complete model with proposed links between one attribute (partnership with patients) and downstream affects.

