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](#_ENREF_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 costs[2-8](#_ENREF_2) and better outcomes.[2](#_ENREF_2),[6](#_ENREF_6),[7](#_ENREF_7),[9-25](#_ENREF_9) 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](#_ENREF_1),[26](#_ENREF_26) a recent consensus report by Haggerty and colleagues[27](#_ENREF_27) and a literature review by Kringos, et al.[28](#_ENREF_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](#_ENREF_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](#_ENREF_1),[29](#_ENREF_29),[30](#_ENREF_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](#_ENREF_5),[9](#_ENREF_9),[12](#_ENREF_12),[20](#_ENREF_20),[21](#_ENREF_21),[23](#_ENREF_23),[31-34](#_ENREF_31) 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](#_ENREF_35) The association is strongest in non-urban counties,[18](#_ENREF_18),[36](#_ENREF_36),[37](#_ENREF_37) and may apply only to the availability of family physicians.[17](#_ENREF_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](#_ENREF_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](#_ENREF_24)

Improved Quality of Life (QoL)

Improved current QoL is another important goal.[38](#_ENREF_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](#_ENREF_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](#_ENREF_15),[22](#_ENREF_22),[24](#_ENREF_24),[35](#_ENREF_35),[40](#_ENREF_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](#_ENREF_41) Health problems have a significant impact on worker productivity.[42](#_ENREF_42)

Less often measured is “presenteeism,” the decrement in performance associated with remaining at work while impaired by health problems.[43](#_ENREF_43) Additionally, the productivity of family caregivers is a potentially important outcome.[41](#_ENREF_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](#_ENREF_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](#_ENREF_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](#_ENREF_11),[46](#_ENREF_46),[47](#_ENREF_47) Satisfaction is also associated with perceptions of affordability and effectiveness of care and strength of relationship with ones primary care physician.[48](#_ENREF_48) There is evidence of a recent deterioration of patient satisfaction in the U.S.[49](#_ENREF_49) Two recent studies suggest that higher levels of satisfaction are not necessarily associated with reduced mortality or increased QoL,[50](#_ENREF_50),[51](#_ENREF_51) and a third found that satisfaction was associated with more hospital days, higher costs, and increased mortality.[50](#_ENREF_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](#_ENREF_13),[15](#_ENREF_15),[17](#_ENREF_17),[19](#_ENREF_19),[21](#_ENREF_21),[24](#_ENREF_24),[31](#_ENREF_31),[52-54](#_ENREF_52)

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](#_ENREF_55),[56](#_ENREF_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](#_ENREF_3),[7](#_ENREF_7),[8](#_ENREF_8),[23](#_ENREF_23),[57-59](#_ENREF_57) 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](#_ENREF_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](#_ENREF_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](#_ENREF_24),[60](#_ENREF_60)

Enhanced Clinician Well-Being and Durability

A healthy health care system depends upon the health and well-being of clinicians. Physicians who are affected by the stresses of their work may go on to experience substance abuse, relationship troubles, depression, or even death. While clinician dissatisfaction alone does not appear to be associated with quality of care, defined as meeting quality metrics, or medical errors,[61-63](#_ENREF_61) research does suggest that physicians’ stress, fatigue, burnout, depression, or general psychological distress negatively affect health care systems and patient care.”[64-69](#_ENREF_64) Patient satisfaction appears to be more strongly associated with non-physician practice staff satisfaction.[70](#_ENREF_70)

Physician dissatisfaction and burnout are common and increasing.[71](#_ENREF_71),[72](#_ENREF_72) 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, particularly younger female family physicians.[71](#_ENREF_71),[73-75](#_ENREF_73) Clinician burnout is also more common among clinicians in larger group vs. smaller group and solo practices, health system affiliated vs. clinician-owned practices, federally-qualified health centers vs. clinician-owned practices, and clinicians in accountable care organizations.[76](#_ENREF_76),[77](#_ENREF_77) Primary care team structure, in particular the reliance on medical assistants rather than nurses and mid-level practitioners appears to increase physician stress and burnout, also quality of care and patient satisfaction.[78](#_ENREF_78) However, organizational characteristics appear to be less important than the practice environments they create.[79](#_ENREF_79)

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.”[80](#_ENREF_80) 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.

Dean and colleagues have proposed reframing clinician distress as “moral injury, which they define as “the damage done to one’s conscience or moral compass when that person perpetrates, witnesses, or fails to prevent acts that transgress one’s moral beliefs, values, or ethical codes of conduct.”[81](#_ENREF_81) Houtrow states that “When health care providers cannot act in accordance with our moral obligations to patients (e.g., because of clinical productivity standards, excessive administrative tasks, and misalignment of the values and objectives of the health care system), profound psychological distress can result.”[82](#_ENREF_82) Physicians who view medicine as a calling rather than a job also tend to be more satisfied.[83](#_ENREF_83)

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.[84-89](#_ENREF_84)

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.[90-93](#_ENREF_90) Factors reducing satisfaction include the practice’s adaptive reserve, office chaos, time pressure, low work control, office details, an emphasis on electronic information, and paperwork.[62](#_ENREF_62),[94-96](#_ENREF_94) There is evidence that primary care, when well-organized, enhances clinician well-being and reduces clinician burn-out.[85](#_ENREF_85),[88](#_ENREF_88),[97-104](#_ENREF_97)

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.”[105](#_ENREF_105) 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.[106](#_ENREF_106)

**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.[107-109](#_ENREF_107) Immunizations have dramatically reduced morbidity and mortality from common infections.[110](#_ENREF_110) 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.[111](#_ENREF_111) 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.[112](#_ENREF_112) 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](#_ENREF_9),[13](#_ENREF_13)

Fewer Low Birth Weight (LBW) Infants

LBW infants have increased rates of morbidity and mortality.[113-115](#_ENREF_113) 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.[116](#_ENREF_116) Greater access to primary care is associated with reduced rates of LBW infants and neonatal mortality.[12](#_ENREF_12),[117](#_ENREF_117) 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.[118](#_ENREF_118)

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.[119](#_ENREF_119),[120](#_ENREF_120) 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](#_ENREF_6),[21](#_ENREF_21),[121](#_ENREF_121),[122](#_ENREF_122) A greater supply of family physicians is associated with earlier detection of breast cancer, colorectal cancer, and melanoma.[123-125](#_ENREF_123) 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](#_ENREF_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.[126](#_ENREF_126)

Better Adherence to Therapeutic Plans

The term, “adherence,” incorporates the notions of concordance, cooperation, and partnership between clinician and patient.[127](#_ENREF_127) 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.[128-130](#_ENREF_128) The cost of medication non-adherence is estimated to be $100 billion annually.[128](#_ENREF_128) Adherence has been associated with improved survival, better QoL, and reduced health care costs in most studies.[131-140](#_ENREF_131) In some settings, physician job satisfaction has been associated with higher rates of patient adherence to chronic medications.[141](#_ENREF_141)

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.[130](#_ENREF_130),[142-151](#_ENREF_142) 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.”[152](#_ENREF_152) Children who see their own physician are more likely to be given [by their parent] penicillin prescribed for streptococcal pharyngitis.[153](#_ENREF_153) 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.[154](#_ENREF_154)

Better Management of Chronic Diseases (Tertiary Prevention)

Most patients receive their chronic illness care from primary care physicians,[155](#_ENREF_155) 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](#_ENREF_9),[35](#_ENREF_35),[156-158](#_ENREF_156) This can not be explained by differences in severity of illness of patients seen by referral scpecialists versus primary care clinicians.[159](#_ENREF_159) 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, better continuity of care, and more comprehensive primary care services.[160](#_ENREF_160)

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](#_ENREF_8) In areas where access is not a problem, adherence to disease-specific CPGs is generally higher for referral specialists than for primary care clinicians,[161](#_ENREF_161) 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](#_ENREF_21),[162](#_ENREF_162),[163](#_ENREF_163) 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,[164](#_ENREF_164) providing little guidance about individualization or prioritization.[165](#_ENREF_165),[166](#_ENREF_166)

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](#_ENREF_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[167](#_ENREF_167),[168](#_ENREF_168) and with lower overall rates of utilization of medical services.[7](#_ENREF_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.[169](#_ENREF_169) Fragmentation of care is associated with more diagnostic testing.[170](#_ENREF_170)

Primary care physicians provide fewer low-value services and order fewer diagnostic tests than referral specialists when evaluating patients with the same symptoms, usually with similar or better outcomes.[171](#_ENREF_171) Family physicians order fewer diagnostic tests than general internists.[55](#_ENREF_55),[172](#_ENREF_172),[173](#_ENREF_173) This may be because internists tend to be more disease-focused than family physicians.[174-176](#_ENREF_174)

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.[177](#_ENREF_177) While these estimates have been questioned,[178](#_ENREF_178),[179](#_ENREF_179) there is no doubt that the problem is significant. The adverse consequences of medical errors are also common in outpatient settings.[180-182](#_ENREF_180) 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 care[183](#_ENREF_183) and parents who are more satisfied with the health care received by their children[184](#_ENREF_184),[185](#_ENREF_185) 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.[186](#_ENREF_186)

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.[187](#_ENREF_187) Greater access to primary care and less ambulatory care fragmentation are associated with fewer hospitalizations,[188-190](#_ENREF_188) and, in particular, fewer hospitalizations for “primary care sensitive conditions.[23](#_ENREF_23),[57](#_ENREF_57),[191-200](#_ENREF_191) By contrast, greater access to primary care in a Veterans Administration Hospital study actually increased hospital admissions.[201](#_ENREF_201) However, in this study, continuity of care was low compared with that seen in most primary care practices.

Hospital care is less expensive for patients cared for by primary care clinicians compared to the same care provided by referral specialists.[57](#_ENREF_57) Children who sought care from a primary care clinician prior to hospitalization for appendicitis or tonsillectomy had fewer complications.[202-204](#_ENREF_202) A 1990 study found that hospitalized patients managed by family physicians were, on average, older and sicker than those cared for by internists, but there outcomes were similar.[205](#_ENREF_205) 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.[206](#_ENREF_206)

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.[207](#_ENREF_207) 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.[134](#_ENREF_134) Clinicians are also affirmed by the respect shown by their communities (e.g. awards and honors or respectful comments made in public settings).[208](#_ENREF_208) 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.[209](#_ENREF_209)

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.[210](#_ENREF_210) Lawsuits also have a significantly negative impact on physician well-being.[211](#_ENREF_211) 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.[212](#_ENREF_212) 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.[213](#_ENREF_213) 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.[214](#_ENREF_214) 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.[215](#_ENREF_215),[216](#_ENREF_216) There is some evidence that patients who have discussed end of life options with their personal physician are more likely to receive hospice services and less likely to undergo unnecessary and futile interventions.[217](#_ENREF_217),[218](#_ENREF_218) Whether they are more or less likely to be hospitalized is unresolved.199,200,[219](#_ENREF_219)

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](#_ENREF_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.[220](#_ENREF_220)

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](#_ENREF_26),[221](#_ENREF_221) 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.[222](#_ENREF_222),[223](#_ENREF_223) 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. Reduced access is, for example, associated with reduced continuity of care.[224](#_ENREF_224) Optimal accessibility requires a sufficient supply and appropriate distribution of primary care clinicians and timely 24/7 availability.[225](#_ENREF_225) It also includes accommodations for vulnerable populations, whose demographic, cultural, geographic, educational, socioeconomic, or physical circumstances are impediments[11](#_ENREF_11),[36](#_ENREF_36),[226-230](#_ENREF_226) and for other hard-to-reach groups like adolescents[231](#_ENREF_231) and immigrants.[228](#_ENREF_228),[232](#_ENREF_232) These two concepts correspond to “first contact accessibility” and “accessibility accommodation” defined by a panel of Canadian experts.[27](#_ENREF_27) Other authors have explored concepts like “timeliness” and “patient-centered access.”[233](#_ENREF_233),[234](#_ENREF_234) 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](#_ENREF_26),[45](#_ENREF_45) It has been estimated that more than one-third of a primary care clinician’s work day involves coordination of care.[98](#_ENREF_98),[235](#_ENREF_235) Even more coordination is handled by practice staff.[236](#_ENREF_236) Recent Patient-Centered Medical Home initiatives have clarified the need for new payment models that acknowledge the importance of care coordination.[237](#_ENREF_237)

Internal coordination includes effective and efficient exchange of healthcare-relevant information within the practice. Failure of internal coordination has been found to be the cause of a high proportion of clinical errors.[238](#_ENREF_238),[239](#_ENREF_239) 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 other’s roles, frequent interdisciplinary communication about patients, and strong leadership in inter-professional practice values.[240](#_ENREF_240)

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.[241](#_ENREF_241) 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.[242](#_ENREF_242) Patient ratings of greater coordination of care are associated with better performance on clinical care measures.[243](#_ENREF_243)

Sustained Care

Sustained care encompasses longitudinality, the more critical characteristic of primary care, as well as both management and informational continuity.[244](#_ENREF_244) Longitudinal care increases knowledge and understanding, enhances trust, and promotes shared decision-making.[245](#_ENREF_245),[246](#_ENREF_246) 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](#_ENREF_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.”[247](#_ENREF_247) In both cross-sectional and cohort studies, management continuity has been found to be associated with better preventive care, better adherence to treatment plans, greater satisfaction with care for both patients and clinicians, and reduced emergency room visits, hospitalizations, utilization of health services, and health care costs.[167](#_ENREF_167),[248-279](#_ENREF_248) Based upon a systematic review and critical analysis of 22 studies meeting selection criteria, Gray and colleagues concluded that there is also sufficient evidence to conclude that continuity of care is associated with reduction in all-cause mortality.[280](#_ENREF_280) Management continuity appears to be most helpful to and valued most highly by individuals who are ill, disabled, or disadvantaged in some way.[281](#_ENREF_281),[282](#_ENREF_282) Since the advent of hospitalists, continuity of care with the primary care clinician during hospitalizations has dropped significantly.[283](#_ENREF_283)

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.[284](#_ENREF_284) For example, having a usual source of care is associated with better outcomes in patients admitted to the hospital with myocardial infarction.[285](#_ENREF_285) Post-discharge continuity, with the clinicians who have cared for patients prior to admission, significantly reduces urgent readmissions.[286](#_ENREF_286) However, an enhanced primary care intervention in the Veterans Administration system actually increased readmissions.[201](#_ENREF_201)

Forced discontinuity of primary care resulting from changes in insurance coverage or the death, retirement, or relocation of one’s primary care clinician have been found to be associated with poorer self-rated quality of care, feelings of increased stress and vulnerability, more frequent urgent care and emergency care visits, more visits to referral specialists, and higher medical costs.[287-289](#_ENREF_287) 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.[290](#_ENREF_290)

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 often provided in the office, home, emergency room, hospital, and nursing home. The range of services provided by a primary care practice should match the needs of the community served.[6](#_ENREF_6) Approximately 90 to 95% of health-related issues can be addressed by a well-trained primary care physician.[291](#_ENREF_291),[292](#_ENREF_292)

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).[293](#_ENREF_293) 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 emergency room visits and hospitalizations.[294](#_ENREF_294),[295](#_ENREF_295)

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,[296](#_ENREF_296) and advances in information technologies and interdisciplinary teamwork is expected to make comprehensive care even safer and more effective.[297](#_ENREF_297)

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.”[26](#_ENREF_26) 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.”[298](#_ENREF_298)

A good clinician-patient relationship increases receipt of preventive services and enhances the effectiveness of medical treatment, improving desired patient outcomes.[299-303](#_ENREF_299) It increases patient satisfaction and adherence and reduces the likelihood of malpractice suits.[150](#_ENREF_150),[209](#_ENREF_209),[304](#_ENREF_304),[305](#_ENREF_305) In addition, healthy clinician-patient relationships increase clinician job satisfaction.[306](#_ENREF_306)

Effective clinical partnerships depend upon helping skills such as respect, genuineness, congruence, and empathy,[307](#_ENREF_307) shared decision-making,[308-310](#_ENREF_308) and advocacy.[311](#_ENREF_311)

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](#_ENREF_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](#_ENREF_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.[312](#_ENREF_312) Person-centered care is care that is specific to an individual based on his or her goals, abilities, resources, values, and preferences.[313-315](#_ENREF_313) 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 for Mrs. Smith’s diabetes, depression, and dermatitis, but how well Dr. Jones cares for Mrs. Smith.”[316](#_ENREF_316)

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,[317](#_ENREF_317) and the patient’s spiritual beliefs.[318](#_ENREF_318) 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.[165](#_ENREF_165),[319](#_ENREF_319),[320](#_ENREF_320)

Higher degrees of person-centeredness are associated with increased patient satisfaction with care[321](#_ENREF_321) and with lower annual health care costs.[176](#_ENREF_176),[183](#_ENREF_183) 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.[315](#_ENREF_315),[322](#_ENREF_322),[323](#_ENREF_323)

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.[324](#_ENREF_324) 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](#_ENREF_6),[325](#_ENREF_325) 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.[326](#_ENREF_326) 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.[327](#_ENREF_327)

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.[328](#_ENREF_328),[329](#_ENREF_329)

Finally, primary care clinicians must be sensitive to the culture of patients and take cultural considerations into account when communicating and making decisions.[27](#_ENREF_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.”[330](#_ENREF_330)

Integration

All of the attributes are essential and interdependent. Comprehensiveness increases access opportunities, making sustained care more likely. Continuity improves coordination.[331](#_ENREF_331) 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.[332](#_ENREF_332)

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](#_ENREF_29),[333](#_ENREF_333) 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.[334](#_ENREF_334) 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.[152](#_ENREF_152)

Accountability

Accountability also applies to all of the attributes. Primary care clinicians are accountable to patients, families, professional colleagues, and to their communities.[335](#_ENREF_335) Because of their critical role in the health care system, they are accountable collectively to the health of the system as a whole.[6](#_ENREF_6),[336](#_ENREF_336) 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.[328](#_ENREF_328),[337](#_ENREF_337)

**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 primary care 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.[338](#_ENREF_338)

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.[162](#_ENREF_162),[339-342](#_ENREF_339) 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.[343](#_ENREF_343) 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](#_ENREF_9),[13](#_ENREF_13),[21](#_ENREF_21),[122](#_ENREF_122),[196](#_ENREF_196),[344-350](#_ENREF_344) 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.[351](#_ENREF_351)

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.[352-354](#_ENREF_352)

Bertakis and colleagues found that a practice style emphasizing patient activation resulted in increased patient satisfaction.[355](#_ENREF_355) Associations between patient activation and self-management behaviors, medication adherence, and better control of chronic illnesses have also been demonstrated.[356-358](#_ENREF_356) 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.[359](#_ENREF_359)

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.[152](#_ENREF_152) 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.[360](#_ENREF_360) 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.[361](#_ENREF_361),[362](#_ENREF_362) Greater trust is also associated with more complete disclosure of clinically important information and increased adherence.[363](#_ENREF_363) 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.[364](#_ENREF_364),[365](#_ENREF_365)

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.[313](#_ENREF_313),[314](#_ENREF_314) 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.[366](#_ENREF_366)

The mission then becomes helping the patient rather than restoring normalcy, a mission that only sometimes involves making a correct diagnosis and prescribing treatment.[367](#_ENREF_367),[368](#_ENREF_368) Person-centered care provides a broader and 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 work with a large number of referral specialists. 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.[169](#_ENREF_169)

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.”[324](#_ENREF_324),[369](#_ENREF_369) 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.[315](#_ENREF_315),[370-372](#_ENREF_370) However, the results of controlled trials have been mixed, with clearer benefits associated with longer term decisions.[310](#_ENREF_310)

Positive Psycho-physiological Effects

The work of Schoenheimer and others as early as 1935 demonstrated the interconnectedness of cells and organ systems.[373](#_ENREF_373),[374](#_ENREF_374) 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.[247](#_ENREF_247),[375-378](#_ENREF_375) 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.”[379](#_ENREF_379) Sustained, person-centered care within a therapeutic partnership may support healthy physiological functioning via neuroendocrinological and neuro-immunological pathways.[380](#_ENREF_380) 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](#_ENREF_21) Direct comparisons between family physicians and general internists consistently find family physicians to be, on average, more person-centered and less disease-oriented.[174-176](#_ENREF_174)

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,[338](#_ENREF_338),[381](#_ENREF_381) 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.[382](#_ENREF_382) 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.[383](#_ENREF_383) 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.[384](#_ENREF_384)

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.”[385](#_ENREF_385) 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](#_ENREF_49) Systems engineers have pointed out that sometimes “efforts that improve efficiency in one process or department actually worsen performance of the overall system.”[386](#_ENREF_386)

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.[387](#_ENREF_387) 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.[388](#_ENREF_388),[389](#_ENREF_389) It isn’t yet clear how transformation to PCMH will affect clinician well-being and durability.[390](#_ENREF_390)

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.[182](#_ENREF_182),[207](#_ENREF_207),[222](#_ENREF_222),[391](#_ENREF_391) 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.[222](#_ENREF_222)

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 psycho-physiological 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.[392](#_ENREF_392)

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),[393](#_ENREF_393) but it 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.

**REFERENCES:**

1. Foss L. The challenge to biomedicine: a foundations perspective. *J Med Philos.* 1989;14(2):165-191.

2. Starfield B, Simpson L. Primary care as part of US health services reform. *Jama.* 1993;269(24):3136-3139.

3. Becker LA. The effect of first-contact care on ambulatory health care expenditures. *J Fam Pract.* 1996;43(5):435-436.

4. Mark DH, Gottlieb MS, Zellner BB, Chetty VK, Midtling JE. Medicare costs in urban areas and the supply of primary care physicians. *J Fam Pract.* 1996;43(1):33-39.

5. Franks P, Fiscella K. Primary care physicians and specialists as personal physicians. Health care expenditures and mortality experience. *J Fam Pract.* 1998;47(2):105-109.

6. Starfield B. *Primary Care: Balancing Health Needs, Services, and Technology.* New York: Oxford University Press; 1998.

7. Engstrom S, Foldevi M, Borgquist L. Is general practice effective? A systematic literature review. *Scand J Prim Health Care.* 2001;19(2):131-144.

8. Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood).* 2004;Suppl Web Exclusives:W4-184-197.

9. Shi L. Primary care, specialty care, and life chances. *Int J Health Serv.* 1994;24(3):431-458.

10. Starfield B. Is primary care essential? *Lancet.* 1994;344(8930):1129-1133.

11. Blumenthal D, Mort E, Edwards J. The efficacy of primary care for vulnerable population groups. *Health Serv Res.* 1995;30(1 Pt 2):253-273.

12. Vogel RL, Ackermann RJ. Is primary care physician supply correlated with health outcomes? *Int J Health Serv.* 1998;28(1):183-196.

13. Shi L, Starfield B. Primary care, income inequality, and self-rated health in the United States: a mixed-level analysis. *Int J Health Serv.* 2000;30(3):541-555.

14. Shi L, Starfield B. The effect of primary care physician supply and income inequality on mortality among blacks and whites in US metropolitan areas. *Am J Public Health.* 2001;91(8):1246-1250.

15. Shi L, Starfield B, Politzer R, Regan J. Primary care, self-rated health, and reductions in social disparities in health. *Health Serv Res.* 2002;37(3):529-550.

16. Starfield B, Forrest CB, Nutting PA, von Schrader S. Variability in physician referral decisions. *J Am Board Fam Pract.* 2002;15(6):473-480.

17. Shi L, Macinko J, Starfield B, Xu J, Politzer R. Primary care, income inequality, and stroke mortality in the United States: a longitudinal analysis, 1985-1995. *Stroke.* 2003;34(8):1958-1964.

18. Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J. Primary care, social inequalities, and all-cause, heart disease, and cancer mortality in US counties, 1990. *Am J Public Health.* 2005;95(4):674-680.

19. Shi L, Macinko J, Starfield B, Politzer R, Xu J. Primary care, race, and mortality in US states. *Soc Sci Med.* 2005;61(1):65-75.

20. Starfield B, Lemke KW, Herbert R, Pavlovich WD, Anderson G. Comorbidity and the use of primary care and specialist care in the elderly. *Ann Fam Med.* 2005;3(3):215-222.

21. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q.* 2005;83(3):457-502.

22. Gravelle H, Morris S, Sutton M. Are family physicians good for you? Endogenous doctor supply and individual health. *Health Serv Res.* 2008;43(4):1128-1144.

23. Chang CH, Stukel TA, Flood AB, Goodman DC. Primary care physician workforce and Medicare beneficiaries' health outcomes. *Jama.* 2010;305(20):2096-2104.

24. Kringos DS, Boerma W, van der Zee J, Groenewegen P. Europe's strong primary care systems are linked to better population health but also to higher health spending. *Health Aff (Millwood)* 2013;32(4):686-694.

25. Shi L. The impact of primary care: a focused review. *Scientifica (Cairo).* 2012;2012:432892.

26. Institute of Medicine. Division of Health Care Services. Committee on the Future of Primary Care, Donaldson MS. *Primary care : America's health in a new era.* Washington, D.C.: National Academy Press; 1996.

27. Haggerty J, Burge F, Levesque JF, et al. Operational definitions of attributes of primary health care: consensus among Canadian experts. *Ann Fam Med.* 2007;5(4):336-344.

28. Kringos DS, Boerma WG, Hutchinson A, van der Zee J, Groenewegen PP. The breadth of primary care: a systematic literature review of its core dimensions. *BMC Health Serv Res.* 2010;10(65):<http://www.biomedcentral.com/content/pdf/1472-6963-1410-1465.pdf>.

29. Malterud K. The legitimacy of clinical knowledge: towards a medical epistemology embracing the art of medicine. *Theor Med.* 1995;16(2):183-198.

30. Solomon M. Epistemological reflections on the art of medicine and narrative medicine. *Perspect Biol Med.* 2008;51(3):406-417.

31. Reyes H, Perez-Cuevas R, Salmeron J, Tome P, Guiscafre H, Gutierrez G. Infant mortality due to acute respiratory infections: the influence of primary care processes. *Health Policy Plan.* 1997;12(3):214-223.

32. Shi L, Starfield B, Kennedy B, Kawachi I. Income inequality, primary care, and health indicators. *J Fam Pract.* 1999;48(4):275-284.

33. Campbell RJ, Ramirez AM, Perez K, Roetzheim RG. Cervical cancer rates and the supply of primary care physicians in Florida. *Fam Med.* 2003;35(1):60-64.

34. Jerant A, Fenton JJ, Franks P. Primary care attributes and mortality: a national person-level study. *Ann Fam Med.* 2012;10(1):34-41.

35. Macinko J, Starfield B, Shi L. Quantifying the health benefits of primary care physician supply in the United States. *Int J Health Serv.* 2007;37(1):111-126.

36. Farmer FL, Stokes CS, Fiser RH, Papini DP. Poverty, primary care and age-specific mortality. *J Rural Health.* 1991;7(2):153-169.

37. Mansfield CJ, Wilson JL, Kobrinski EJ, Mitchell J. Premature mortality in the United States: the roles of geographic area, socioeconomic status, household type, and availability of medical care. *Am J Public Health.* 1999;89(6):893-898.

38. Radu A. Eudaimonia, existentialism, and the practice of medicine. *The Pharos.* 2010;73(2):27-33.

39. Schwartz CE, Sprangers MA. *Adaptation to Changing Health: Response Shift in Quality-of-Life Research.* Washington, DC: American Psychological Association; 2000.

40. Servoss TJ. Having a personal doctor, emotional support, and health-related quality of life [Abstract P131]. NAPCRG Annual Meeting; November 13, 2011; Alberta/New Brunswick, Canada.

41. Fendrick AM, Jinnett K, Parry T. *Synergies at Work: Realizing the Full Value of Health Investments.* Washington, DC: National Pharmaceutical Council;2011.

42. Workforce Health And Productivity. *Health Aff (Millwood).* 2017;36(2):200-201.

43. Burton WN, Conti DJ, Chen CY, Schultz AB, Edington DW. The role of health risk factors and disease on worker productivity. *J Occup Environ Med.* 1999;41(10):863-877.

44. Rost K, Smith JL, Dickinson M. The effect of improving primary care depression management on employee absenteeism and productivity. A randomized trial. *Med Care* 2004;42(12):1202-1210.

45. Institute of Medicine, Division of Health Care Services: Committee on Care at the End of Life. *Approaching Death: Improving Care at the End of Life.* Washington, DC: National Academy Press; 1997.

46. Forrest CB, Shi L, von Schrader S, Ng J. Managed care, primary care, and the patient-practitioner relationship. *J Gen Intern Med.* 2002;17(4):270-277.

47. DeVoe JE, Wallace LS, Pandhi N, Solotaroff R, Fryer GE, Jr. Comprehending care in a medical home: a usual source of care and patient perceptions about healthcare communication. *J Am Board Fam Med.* 2008;21(5):441-450.

48. Papanicolas I, Cylus J, Smith PC. An analysis of survey data from eleven countries finds that 'satisfaction' with health system performance means many things. *Health Aff (Millwood)* 2013;32(4):734-742.

49. Montgomery JE, Irish JT, Wilson IB, et al. Primary care experiences of medicare beneficiaries, 1998 to 2000. *J Gen Intern Med.* 2004;19(10):991-998.

50. Fenton JJ, Jerant AF, Bertakis KD, Franks P. The cost of satisfaction: a national study of patient satisfaction, health care utilization, expenditures, and mortality. *Arch Intern Med.* 2012;172(5):405-411.

51. Mold JW, Lawler F, Schauf KJ, Aspy CB. Does patient assessment of the quality of the primary care they receive predict subsequent outcomes? An Oklahoma Physicians Resource/Research Network (OKPRN) Study. *J Am Board Fam Med.* 2012;25(4):e1-e12.

52. Stevens GD, Shi L. Racial and ethnic disparities in the primary care experiences of children: a review of the literature. *Med Care Res Rev.* 2003;60(1):3-30.

53. Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J. Primary care, social inequalities and all-cause, heart disease and cancer mortality in US counties: a comparison between urban and non-urban areas. *Public Health.* 2005;119(8):699-710.

54. Detollenaere J, Hanssens L, Vyncke V, De Maeseneer J, Willems S. Do We Reap What We Sow? Exploring the Association between the Strength of European Primary Healthcare Systems and Inequity in Unmet Need. *PLoS One.* 2017;12(1):e0169274.

55. Greenwald HP, Peterson ML, Garrison LP, et al. Interspecialty variation in office-based care. *Med Care.* 1984;22(1):14-29.

56. Freund DA, Stein J, Hurley R, Engel W, Woomert A, Lee B. The Kansas City Asthma Care Project: specialty differences in the cost of treating asthma. *Ann Allergy.* 1988;60(1):3-7.

57. MacLean DS. Outcome and cost of family physicians' care--pilot study of three diagnosis-related groups in elderly inpatients. *J Am Board Fam Pract.* 1993;6(6):588-593.

58. Welch WP, Miller ME, Welch HG, Fisher ES, Wennberg JE. Geographic variation in expenditures for physicians' services in the United States. *N Engl J Med.* 1993;328(9):621-627.

59. Maciejewski ML, Chapko MK, Hedeen AN, Fortney JC. VA community-based outpatient clinics: cost performance measures. *Med Care.* 2002;40(7):587-595.

60. Chernew ME, Sabik L, Chandra A, Newhouse JP. Would having more primary care doctors cut health spending growth? *Health Aff (Millwood).* 2009;28(5):1327-1335.

61. Linzer M, Sinsky CA, Poplau S, Brown R, Williams E, Healthy Work Place I. Joy In Medical Practice: Clinician Satisfaction In The Healthy Work Place Trial. *Health Aff (Millwood).* 2017;36(10):1808-1814.

62. Linzer M, Manwell LB, Williams ES, et al. Working conditions in primary care: physician reactions and care quality. *Ann Intern Med.* 2009;151(1):28-36, W26-29.

63. Casalino LP, Li J, Peterson LE, et al. Relationship Between Physician Burnout And The Quality And Cost Of Care For Medicare Beneficiaries Is Complex. *Health Aff (Millwood).* 2022;41(4):549-556.

64. Wallace JE, Lemaire JB, Ghali WA. Physician wellness: a missing quality indicator. *Lancet.* 2009;374(9702):1714-1721.

65. Williams ES, Manwell LB, Konrad TR, Linzer M. The relationship of organizational culture, stress, satisfaction, and burnout with physician-reported error and suboptimal patient care: results from the MEMO study. *Health Care Manage Rev.* 2007;32(3):203-212.

66. Tawfik DS, Scheid A, Profit J, et al. Evidence Relating Health Care Provider Burnout and Quality of Care: A Systematic Review and Meta-analysis. *Ann Intern Med.* 2019;171(8):555-556.

67. Noroxe KB, Pedersen AF, Carlsen AH, Bro F, Vedsted P. Mental well-being, job satisfaction and self-rated workability in general practitioners and hospitalisations for ambulatory care sensitive conditions among listed patients: a cohort study combining survey data on GPs and register data on patients. *BMJ Qual Saf.* 2019;28(12):997-1006.

68. Grol R, Mokkink H, Smits A, et al. Work satisfaction of general practitioners and the quality of patient care. *Fam Pract.* 1985;2(3):128-135.

69. Chung S, Dillon EC, Meehan AE, Nordgren R, Frosch DL. The Relationship Between Primary Care Physician Burnout and Patient-Reported Care Experiences: a Cross-sectional Study. *J Gen Intern Med.* 2020;35(8):2357-2364.

70. Szecsenyi J, Goetz K, Campbell S, Broge B, Reuschenbach B, Wensing M. Is the job satisfaction of primary care team members associated with patient satisfaction? *BMJ Qual Saf.* 2011;20(6):508-514.

71. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among U.S. physicians relative to the general population. *Arch Intern Med* 2012;172(18):1377-1385.

72. Mirrakhimov AE, Rimoin LP, Kwatra SG. Physician burnout: an urgent call for early intervention. *JAMA Intern Med.* 2013;173(8):710-711.

73. Spinelli WM, Fernstrom KM, Britt H, Pratt R. "Seeing the Patient Is the Joy:" A Focus Group Analysis of Burnout in Outpatient Providers. *Fam Med.* 2016;48(4):273-278.

74. Puffer JC, Knight HC, O'Neill TR, et al. Prevalence of Burnout in Board Certified Family Physicians. *J Am Board Fam Med.* 2017;30(2):125-126.

75. Hoff T, Lee DR. Burnout and Physician Gender: What Do We Know? *Med Care.* 2021;59(8):711-720.

76. Edwards ST, Marino M, Balasubramanian BA, et al. Burnout among physicians, advanced practice clinicians and staff in smaller primary care practices. *J Gen Intern Med.* 2018;33(12):2138-2146.

77. Edwards ST, Marino M, Solberg LI, et al. Cultural And Structural Features Of Zero-Burnout Primary Care Practices. *Health Aff (Millwood).* 2021;40(6):928-936.

78. Bruhl EJ, MacLaughlin KL, Allen SV, et al. Association of Primary Care Team Composition and Clinician Burnout in a Primary Care Practice Network. *Mayo Clin Proc Innov Qual Outcomes.* 2020;4(2):135-142.

79. Creager J, Coutinho AJ, Peterson LE. Associations Between Burnout and Practice Organization in Family Physicians. *Ann Fam Med.* 2019;17(6):502-509.

80. McWhinney IR. Family medicine in perspective. *N Engl J Med.* 1975;293(4):176-181.

81. Dean W, Talbot S, Dean A. Reframing Clinician Distress: Moral Injury Not Burnout. *Fed Pract.* 2019;36(9):400-402.

82. Houtrow AJ. Addressing Burnout: Symptom Management Versus Treating the Cause. *J Pediatr.* 2020;224:18-19.

83. Rasinski KA, Lawrence RE, Yoon JD, Curlin FA. A sense of calling and primary care physicians' satisfaction in treating smoking, alcoholism, and obesity. *Arch Intern Med* 2012;172(18):1423-1424.

84. Friedberg MW, Chen PG, Van Busum KR, et al. *Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy.* Rand Corporation, American Medical Association; 2013.

85. Sinsky CA, Willard-Grace R, Schutzbank AM, Sinsky TA, Margolius D, Bodenheimer T. In search of joy in practice: a report of 23 high-functioning primary care practices. *Ann Fam Med.* 2013;11(3):272-278.

86. Day J, Scammon DI, Kim J, et al. Quality, satisfaction, and financial efficiency associated with elements of primary care practice transformation: Preliminary findings. *Ann Fam Med.* 2013;11 (Suppl):S50-S58.

87. Willard-Grace R, Hessler D, Rogers E, Dube K, Bodenheimer T, Grumbach K. Team structure and culture are associated with lower burnout in primary care. *J Am Board Fam Med.* 2014;27(2):229-238.

88. Willard-Grace R, Dube K, Hessler D, et al. Panel management, team culture, and worklife experience. *Fam Syst Health.* 2015;33(3):231-241.

89. DeChant PF, Acs A, Rhee KB, et al. Effect of Organization-Directed Workplace Interventions on Physician Burnout: A Systematic Review. *Mayo Clin Proc Innov Qual Outcomes.* 2019;3(4):384-408.

90. Chan BT. The declining comprehensiveness of primary care. *CMAJ.* 2002;166(4):429-434.

91. Bazemore A, Petterson S. The scope of family medicine and Medicare cost: More means less [Abstract HC16]. NAPCRG Annual Meeting; November 13, 2011; Banff, Alberta, Canada.

92. Saultz J. The importance of being comprehensive. *Fam Med.* 2012;44(3):157-158.

93. Tong ST, Makaroff LA, Xierali IM, et al. Proportion of family physicians providing maternity care continues to decline. *J Am Board Fam Med.* 2012;25(3):270-271.

94. Mawardi BH. Satisfaction, dissatisfaction, and causes of stress in medical practice. *Jama.* 1979;241(14):1483-1486.

95. Alidina S, Rosenthal MB, Schneider EC, Singer SJ, Friedberg MW. Practice environments and job satisfaction in patient-centered medical homes. *Ann Fam Med.* 2014;12(4):331-337.

96. Blechter B, Jiang N, Cleland C, Berry C, Ogedegbe O, Shelley D. Correlates of Burnout in Small Independent Primary Care Practices in an Urban Setting. *J Am Board Fam Med.* 2018;31(4):529-536.

97. Buchbinder SB, Wilson M, Melick CF, Powe NR. Primary care physician job satisfaction and turnover. *Am J Manag Care.* 2001;7(7):701-713.

98. Dyrbye LN, West CP, Burriss TC, Shanafelt TD. Providing primary care in the United States: the work no one sees. *Arch Intern Med* 2012;172(18):1420-1421.

99. Lewis SE, Nocon RS, Tang H, et al. Patient-centered medical home characteristics and staff morale in safety net clinics. *Arch Intern Med.* 2012;172(1):23-31.

100. Linzer M, Poplau S, Grossman E, et al. A cluster randomized trial of interventions to improve work conditions and clinician burnout in primary care: results from the Healthy Work Place (HWP) study. *J Gen Intern Med.* 2015;30(8):1105-1111.

101. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet.* 2016;388(10057):2272-2281.

102. Shanafelt TD, Noseworthy JH. Executive Leadership and Physician Well-being: Nine Organizational Strategies to Promote Engagement and Reduce Burnout. *Mayo Clin Proc.* 2017;92(1):129-146.

103. Khanna N, Montgomery R, Klyushnenkova E. Joy in Work for Clinicians and Staff: Identifying Remedial Predictors of Burnout from the Mini Z Survey. *J Am Board Fam Med.* 2020;33(3):357-367.

104. Dai M, Willard-Grace R, Knox M, et al. Team Configurations, Efficiency, and Family Physician Burnout. *J Am Board Fam Med.* 2020;33(3):368-377.

105. Zwack J, Schweitzer J. If every fifth physician is affected by burnout, what about the other four? Resilience strategies of experienced physicians. *Acad Med.* 2013;88(3):382-389.

106. West CP, Dyrbye LN, Rabatin JT, et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med.* 2014;174(4):527-533.

107. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *Jama.* 2004;291(10):1238-1245.

108. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Correction: actual causes of death in the United States, 2000. *Jama.* 2005;293(3):293-294.

109. Danaei G, Ding EL, Mozaffarian D, et al. The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med.* 2009;6(4):e1000058.

110. Orenstein WA, Douglas RG, Rodewald LE, Hinman AR. Immunizations in the United States: success, structure, and stress. *Health Aff (Millwood).* 2005;24(3):599-610.

111. Bridges CB, Thompson WW, Meltzer MI, et al. Effectiveness and cost-benefit of influenza vaccination of healthy working adults: a randomized controlled trial. *Jama.* 2000;284(13):1655-1663.

112. Woolf SH. A closer look at the economic argument for disease prevention. *Jama.* 2009;301(5):536-538.

113. McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. *N Engl J Med.* 1985;312(2):82-90.

114. Matsuo H. The health consequences of low birth weight: Literature review and critique. *Des sciences de la population et du development (SPED)*. 23 ed. Louvain, Belgium: Universite catholique de Louvain; 2005:1-37.

115. Institute of Medicine, Committee on Understanding Premature Birth and Assuring Healthy Outcomes. *Preterm Birth: Causes, Consequences, and Prevention.* Washington, DC: The National Academies Press; 2007.

116. Avchen RN, Scott KG, Mason CA. Birth weight and school-age disabilities: a population-based study. *Am J Epidemiol.* 2001;154(10):895-901.

117. Shi L, Macinko J, Starfield B, et al. Primary care, infant mortality, and low birth weight in the states of the USA. *J Epidemiol Community Health.* 2004;58(5):374-380.

118. Nesbitt TS, Larson EH, Rosenblatt RA, Hart LG. Access to maternity care in rural Washington: its effect on neonatal outcomes and resource use. *Am J Public Health.* 1997;87(1):85-90.

119. US Preventive Services Task Force. Published Recommendations for Primary Care Practice. <http://www.uspreventiveservicestaskforce.org/BrowseRec/Index>.

120. Ferrante JM, Lee JH, McCarthy EP, et al. Primary care utilization and colorectal cancer incidence and mortality among Medicare beneficiaries: a population-based, case-control study. *Ann Intern Med.* 2013;159(7):437-446.

121. Parchman M, Byrd T. Access to and use of ambulatory health care by a vulnerable Mexican American population on the U.S.-Mexico border. *J Health Care Poor Underserved.* 2001;12(4):404-414.

122. Pandhi N, Devoe JE, Schumacher JR, et al. Preventive service gains from first contact access in the primary care home. *J Am Board Fam Med.* 2011;24(4):351-359.

123. Roetzheim RG, Pal N, Gonzalez EC, et al. The effects of physician supply on the early detection of colorectal cancer. *J Fam Pract.* 1999;48(11):850-858.

124. Ferrante JM, Gonzalez EC, Pal N, Roetzheim RG. Effects of physician supply on early detection of breast cancer. *J Am Board Fam Pract.* 2000;13(6):408-414.

125. Roetzheim RG, Pal N, van Durme DJ, et al. Increasing supplies of dermatologists and family physicians are associated with earlier stage of melanoma detection. *J Am Acad Dermatol.* 2000;43(2 Pt 1):211-218.

126. Maly RC, Liu Y, Diamant AL, Thind A. The Impact of Primary Care Physicians on Follow-up Care of Underserved Breast Cancer Survivors. *J Am Board Fam Med.* 2013;26(6):628-636.

127. Vermeire E, Hearnshaw H, Van Royen P, Denekens J. Patient adherence to treatment: three decades of research. A comprehensive review. *J Clin Pharm Ther.* 2001;26(5):331-342.

128. Berg JS, Dischler J, Wagner DJ, Raia JJ, Palmer-Shevlin N. Medication compliance: a healthcare problem. *Ann Pharmacother.* 1993;27(9 Suppl):S1-S24.

129. McCarthy R. The price you pay for the drug not taken. *Business Health.* 1998;16(10):27-33.

130. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med.* 2005;353(5):487-497.

131. Coronary Drug Project Research Group. Influence of adherence to treatment and response of cholesterol on mortality in the Coronary Drug Project. *N Engl J Med.* 1980;303(18):1038-1041.

132. Einarson TR. Drug-related hospital admissions. *Ann Pharmacother.* 1993;27(7-8):832-840.

133. Gallagher EJ, Viscoli CM, Horwitz RI. The relationship of treatment adherence to the risk of death after myocardial infarction in women. *Jama.* 1993;270(6):742-744.

134. Horowitz CR, Suchman AL, Branch WT, Jr., Frankel RM. What do doctors find meaningful about their work? *Ann Fam Med.* 2003;138(9):772-775.

135. Horwitz RI, Horwitz SM. Adherence to treatment and health outcomes. *Arch Intern Med* 1993;153(16):1863-1868.

136. Hays RD, Kravitz RL, Mazel RM, et al. The impact of patient adherence on health outcomes for patients with chronic disease in the Medical Outcomes Study. *J Behav Med.* 1994;17(4):347-360.

137. Kravitz RL, Greenfield S, Rogers W, et al. Differences in the mix of patients among medical specialties and systems of care. Results from the medical outcomes study. *Jama.* 1992;267(12):1617-1623.

138. Burke LE, Ockene IS. *Compliance in Healthcare and Research.* Armonk, NY: Furtura Publishing Company, Inc.; 2001.

139. Sofi F, Cesari F, Abbate R, Gensini GF, Casini A. Adherence to Mediterranean diet and health status: meta-analysis. *Bmj.* 2008;337.

140. Roebuck MC, Liberman JN, Gemmill-Toyama M, Brennan TA. Medication adherence leads to lower health care use and costs despite increased drug spending. *Health Aff (Millwood).* 2011;30(1):91-99.

141. Weisman CS, Nathanson CA. Professional satisfaction and client outcomes. A comparative organizational analysis. *Med Care.* 1985;23(10):1179-1192.

142. Ley P, Spelman MS. Communications in an out-patient setting. *Br J Soc Clin Psychol.* 1965;4(2):114-116.

143. Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. A controlled trial. *Ann Intern Med.* 1976;84(6):646-651.

144. Roter DL. Patient participation in the patient-provider interaction: the effects of patient question asking on the quality of interaction, satisfaction and compliance. *Health Educ Monogr.* 1977;5(4):281-315.

145. Peck CL, King NJ. Increasing patient compliance with prescriptions. *Jama.* 1982;248(21):2874-2878.

146. Eraker SA, Kirscht JP, Becker MH. Understanding and improving patient compliance. *Ann Intern Med.* 1984;100(2):258-268.

147. Hall JA, Roter DL, Katz NR. Meta-analysis of correlates of provider behavior in medical encounters. *Med Care.* 1988;26(7):657-675.

148. Armstrong D, Glanville T, Bailey E, O'Keefe G. Doctor-initiated consultations: a study of communication between general practitioners and patients about the need for reattendance. *Br J Gen Pract.* 1990;40(335):241-242.

149. Donovan JL, Blake DR. Patient non-compliance: deviance or reasoned decision-making? *Soc Sci Med.* 1992;34(5):507-513.

150. Beach MC, Sugarman J, Johnson RL, Arbelaez JJ, Duggan PS, Cooper LA. Do patients treated with dignity report higher satisfaction, adherence, and receipt of preventive care? *Ann Fam Med.* 2005;3(4):331-338.

151. Robinson JH, Callister LC, Berry JA, Dearing KA. Patient-centered care and adherence: definitions and applications to improve outcomes. *J Am Acad Nurse Pract.* 2008;20(12):600-607.

152. Safran DG, Taira DA, Rogers WH, Kosinski M, Ware JE, Tarlov AR. Linking primary care performance to outcomes of care. *J Fam Pract.* 1998;47(3):213-220.

153. Charney E, Bynum R, Eldredge D, et al. How well do patients take oral penicillin? A collaborative study in private practice. *Pediatrics.* 1967;40(2):188-195.

154. Gilbody S, Whitty P, Grimshaw JM, Thomas R. Educational and organizational interventions to improve the management of depression in primary care: a systematic review. *Jama.* 2003;289(23):3145-3151.

155. Sharma MA, Cheng N, Moore M, Coffman M, Bazemore AW. Patients with high-cost chronic conditions rely heavily on primary care physicians. *J Am Board Fam Med.* 2014;27(1):11-12.

156. Shi L. The relationship between primary care and life chances. *J Health Care Poor Underserved.* 1992;3(2):321-335.

157. Villalbi JR, Guarga A, Pasarin MI, et al. [An evaluation of the impact of primary care reform on health]. *Aten Primaria.* 1999;24(8):468-474.

158. Shi L, Macinko J, Starfield B, Wulu J, Regan J, Politzer R. The relationship between primary care, income inequality, and mortality in US States, 1980-1995. *J Am Board Fam Pract.* 2003;16(5):412-422.

159. Xakellis GC. Are patients who use a generalist physician healthier than those who seek specialty care directly? *Fam Med.* 2005;37(10):719-726.

160. Hansen J, Groenewegen PP, Boerma WG, Kringos DS. Living in a country with a strong primary care system is beneficial to people with chronic conditions. *Health Aff (Millwood).* 2015;34(9):1531-1537.

161. Harrold LR, Field TS, Gurwitz JH. Knowledge, patterns of care, and outcomes of care for generalists and specialists. *J Gen Intern Med.* 1999;14(8):499-511.

162. Donohoe MT. Comparing generalist and specialty care: discrepancies, deficiencies, and excesses. *Arch Intern Med.* 1998;158(15):1596-1608.

163. Grumbach K, Selby JV, Schmittdiel JA, Quesenberry CP, Jr. Quality of primary care practice in a large HMO according to physician specialty. *Health Serv Res.* 1999;34(2):485-502.

164. Farquhar CM, Kofa EW, Slutsky JR. Clinicians' attitudes to clinical practice guidelines: a systematic review. *Med J Aust.* 2002;177(9):502-506.

165. Mold JW, Hamm R, Scheid D. Evidence-based medicine meets goal-directed health care. *Fam Med.* 2003;35(5):360-364.

166. Mold JW, Hamm RM, McCarthy LH. The law of diminishing returns in clinical medicine: how much risk reduction is enough? *J Am Board Fam Med.* 2010;23(3):371-375.

167. Hurley RE, Freund DA, Taylor DE. Emergency room use and primary care case management: evidence from four Medicaid demonstration programs. *Am J Public Health.* 1989;79(7):843-846.

168. Rosenblatt RA, Wright GE, Baldwin LM, et al. The effect of the doctor-patient relationship on emergency department use among the elderly. *Am J Public Health.* 2000;90(1):97-102.

169. Mold JW, Stein HF. The cascade effect in the clinical care of patients. *N Engl J Med.* 1986;314(8):512-514.

170. Kern LM, Seirup JK, Casalino LP, Safford MM. Healthcare Fragmentation and the Frequency of Radiology and Other Diagnostic Tests: A Cross-Sectional Study. *J Gen Intern Med.* 2017;32(2):175-181.

171. Ganguli I, Morden NE, Yang CW, Crawford M, Colla CH. Low-Value Care at the Actionable Level of Individual Health Systems. *JAMA Intern Med.* 2021;181(11):1490-1500.

172. Whittle J, Lin CJ, Lave JR, et al. Relationship of provider characteristics to outcomes, process, and costs of care for community-acquired pneumonia. *Med Care.* 1998;36(7):977-987.

173. Conry CM, Pace WD, Main DS. Practice style differences between family physicians and internists. *J Am Board Fam Pract.* 1991;4(6):399-406.

174. Fiscella K, Franks P, Zwanziger J, Mooney C, Sorbero M, Williams GC. Risk aversion and costs: a comparison of family physicians and general internists. *J Fam Pract.* 2000;49(1):12-17.

175. Paasche-Orlow M, Roter D. The communication patterns of internal medicine and family practice physicians. *J Am Board Fam Med.* 2003;16(6):485-493.

176. Bertakis KD, Azari R. Determinants and outcomes of patient-centered care. *Patient Educ Couns.* 2011;85:46-52.

177. Kohn LT, Corrigan JM, Donaldson MS, Institute of Medicine. Committee on Quality of Health Care in America. *To Err is Human: Building a Safer Health System.* Washington, DC: National Academy Press; 2000.

178. McDonald CJ, Weiner M, Hui SL. Deaths due to medical errors are exaggerated in Institute of Medicine report. *Jama.* 2000;284(1):93-95.

179. Sox HC, Jr., Woloshin S. How many deaths are due to medical error? Getting the number right. *Eff Clin Pract.* 2000;3(6):277-283.

180. Dovey SM, Meyers DS, Phillips RL, Jr., et al. A preliminary taxonomy of medical errors in family practice. *Qual Saf Health Care.* 2002;11(3):233-238.

181. Elder NC, Vonder Meulen M, Cassedy A. The identification of medical errors by family physicians during outpatient visits. *Ann Fam Med.* 2004;2(2):125-129.

182. Fernald DH, Pace WD, Harris DM, West DR, Main DS, Westfall JM. Event reporting to a primary care patient safety reporting system: a report from the ASIPS Collaborative. *Ann Fam Med.* 2004;2(4):327-332.

183. Bertakis KD, Azari R. Patient-Centered Care is Associated with Decreased Health Care Utilization. *J Am Board Fam Med.* 2011;24(3):229-239.

184. Brousseau DC, Hoffmann RG, Nattinger AB, Flores G, Zhang Y, Gorelick M. Quality of primary care and subsequent pediatric emergency department utilization. *Pediatrics.* 2007;119(6):1131-1138.

185. Brousseau DC, Gorelick MH, Hoffmann RG, Flores G, Nattinger AB. Primary care quality and subsequent emergency department utilization for children in Wisconsin Medicaid. *Acad Pediatr.* 2009;9(1):33-39.

186. Villani J, Mortensen K. Nonemergent emergency department use among patients with a usual source of care. *J Am Board Fam Med.* 2013;26(6):680-691.

187. de Brantes F, Rosenthal MB, Painter M. Building a bridge from fragmentation to accountability--the Prometheus Payment model. *N Engl J Med.* 2009;361(11):1033-1036.

188. Greenfield S, Nelson EC, Zubkoff M, et al. Variations in resource utilization among medical specialties and systems of care. Results from the medical outcomes study. *Jama.* 1992;267(12):1624-1630.

189. Schillinger D, Bibbins-Domingo K, Vranizan K, Bacchetti P, Luce JM, Bindman AB. Effects of primary care coordination on public hospital patients. *J Gen Intern Med.* 2000;15(5):329-336.

190. Kern LM, Ringel JB, Rajan M, et al. Ambulatory Care Fragmentation and Subsequent Hospitalization: Evidence From the REGARDS Study. *Med Care.* 2021;59(4):334-340.

191. Shea S, Misra D, Ehrlich MH, Field L, Francis CK. Predisposing factors for severe, uncontrolled hypertension in an inner-city minority population. *N Engl J Med.* 1992;327(11):776-781.

192. Parchman ML, Culler S. Primary care physicians and avoidable hospitalizations. *J Fam Pract.* 1994;39(2):123-128.

193. Bindman AB, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. *Jama.* 1995;274(4):305-311.

194. Casanova C, Starfield B. Hospitalizations of children and access to primary care: a cross-national comparison. *Int J Health Serv.* 1995;25(2):283-294.

195. Schreiber S, Zielinski T. The meaning of ambulatory care sensitive admissions: urban and rural perspectives. *J Rural Health.* 1997;13(4):276-284.

196. Gadomski A, Jenkins P, Nichols M. Impact of a Medicaid primary care provider and preventive care on pediatric hospitalization. *Pediatrics.* 1998;101(3):E1.

197. Parchman ML, Culler SD. Preventable hospitalizations in primary care shortage areas. An analysis of vulnerable Medicare beneficiaries. *Arch Fam Med.* 1999;8(6):487-491.

198. Friedman B, Basu J. Health insurance, primary care, and preventable hospitalization of children in a large state. *Am J Manag Care.* 2001;7(5):473-481.

199. Ricketts TC, Randolph R, Howard HA, Pathman D, Carey T. Hospitalization rates as indicators of access to primary care. *Health Place.* 2001;7(1):27-38.

200. Bronstein JM, Huang L, Shelley JP, et al. Primary care visits and ambulatory care sensitive diabetes hospitalizations among adult Alabama Medicaid beneficiaries. *Prim Care Diabetes.* 2022;16(1):116-121.

201. Weinberger M, Oddone EZ, Henderson WG. Does increased access to primary care reduce hospital readmissions? Veterans Affairs Cooperative Study Group on Primary Care and Hospital Readmission. *N Engl J Med.* 1996;334(22):1441-1447.

202. Roos LL, Roos NP, Gilbert P, Nicol JP. Continuity of care: does it contribute to quality of care? *Med Care.* 1980;18(2):174-184.

203. Chande VT, Kinnane JM. Role of the primary care provider in expediting care for children with acute appendicitis. *Arch Pediatr Adolesc Med.* 1996;150(7):703-706.

204. O'Toole SJ, Karamanoukian HL, Allen JE, et al. Insurance-related differences in the presentation of pediatric appendicitis. *J Pediatr Surg.* 1996;31(8):1032-1034.

205. McGann KP, Bowman MA. A comparison of morbidity and mortality for family physicians' and internists' admissions. *J Fam Pract.* 1990;31(5):541-545.

206. Lindenauer PK, Rothberg MB, Pekow PS, Kenwood C, Benjamin EM, Auerbach AD. Outcomes of care by hospitalists, general internists, and family physicians. *N Engl J Med.* 2007;357(25):2589-2600.

207. Martin DP, Diehr P, Price KF, Richardson WC. Effect of a gatekeeper plan on health services use and charges: a randomized trial. *Am J Public Health.* 1989;79(12):1628-1632.

208. Pathman DE, Steiner BD, Williams E, Riggins T. The four community dimensions of primary care practice. *J Fam Pract.* 1998;46(4):293-303.

209. Beckman HB, Markakis KM, Suchman AL, Frankel RM. The doctor-patient relationship and malpractice. Lessons from plaintiff depositions. *Arch Intern Med.* 1994;154(12):1365-1370.

210. Rubin RJ, Mendelson DN. *Estimating the Costs of Defensive Medicine.* Fairfax, VA: Lewin-VHI, Inc.; 1993.

211. Waterman AD, Garbutt J, Hazel E, et al. The emotional impact of medical errors on practicing physicians in the United States and Canada. *Jt Comm J Qual Patient Saf.* 2007;33(8):467-476.

212. Wennberg JE, Fisher ES, Skinner JS. Geography and the debate over Medicare reform. *Health Aff (Millwood).* 2002(Suppl Web Exclusive):W96-114.

213. Raphael C, Ahrens J, Fowler N. Financing end-of-life care in the USA. *J R Soc Med.* 2001;94(9):458-461.

214. Connor SR, Pyenson B, Fitch K, Spence C, Iwasaki K. Comparing hospice and nonhospice patient survival among patients who die within a three-year window. *J Pain Symptom Manage.* 2007;33(3):238-246.

215. A controlled trial to improve care for seriously ill hospitalized patients. The study to understand prognoses and preferences for outcomes and risks of treatments (SUPPORT). The SUPPORT Principal Investigators. *Jama.* 1995;274(20):1591-1598.

216. Teno JM, Clarridge BR, Casey V, et al. Family perspectives on end-of-life care at the last place of care. *Jama.* 2004;291(1):88-93.

217. Wright AA, Zhang B, Ray A, et al. Associations between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. *Jama.* 2008;300(14):1665-1673.

218. Prater LC, Wickizer T, Bower JK, Bose-Brill S. The Impact of Advance Care Planning on End-of-Life Care: Do the Type and Timing Make a Difference for Patients With Advanced Cancer Referred to Hospice? *Am J Hosp Palliat Care.* 2019;36(12):1089-1095.

219. Ashana DC, Chen X, Agiro A, et al. Advance care planning claims and health care utilization among seriously ill patients near the end of life. *JAMA Netw Open.* 2019;2(11):e1914471.

220. Friedberg MW, Hussey PS, Schneider EC. Primary care: a critical review of the evidence on quality and costs of health care. *Health Aff (Millwood).* 2010;29(5):766-772.

221. Povar GJ. Primary care: questions raised by a definition. *J Fam Pract.* 1996;42(2):124-128.

222. Rogers JC. The patient-centered medical home movement--promise and peril for family medicine. *J Am Board Fam Med.* 2008;21(5):370-374.

223. Nutting PA, Crabtree BF, Miller WL, Stewart EE, Stange KC, Jaen CR. Journey to the patient-centered medical home: a qualitative analysis of the experiences of practices in the National Demonstration Project. *Ann Fam Med.* 2010;8 Suppl 1:S45-56; S92.

224. Cook LL, Golonka RP, Cook CM, et al. Association between continuity and access in primary care: a retrospective cohort study. *CMAJ Open.* 2020;8(4):E722-E730.

225. Wasson J, Gaudette C, Whaley F, Sauvigne A, Baribeau P, Welch HG. Telephone care as a substitute for routine clinic follow-up. *Jama.* 1992;267(13):1788-1793.

226. Grabois EW, Nosek MA, Rossi CD. Accessibility of primary care physicians' offices for people with disabilities. An analysis of compliance with the Americans With Disabilities Act. *Arch Fam Med.* 1999;8(1):44-51.

227. Barnett S. Clinical and cultural issues in caring for deaf people. *Fam Med.* 1999;31(1):17-22.

228. Baker DW, Parker RM, Williams MV, et al. The health care experience of patients with low literacy. *Arch Fam Med.* 1996;5(6):329-334.

229. Woloshin S, Schwartz LM, Katz SJ, Welch HG. Is language a barrier to the use of preventive services? *J Gen Intern Med.* 1997;12(8):472-477.

230. Baker DW, Parker RM, Williams MV, Coates WC, Pitkin K. Use and effectiveness of interpreters in an emergency department. *Jama.* 1996;275(10):783-788.

231. Cheng TL, Klein JD. The adolescent viewpoint. Implications for access and prevention. *Jama.* 1995;273(24):1957-1958.

232. Solis JM, Marks G, Garcia M, Shelton D. Acculturation, access to care, and use of preventive services by Hispanics: findings from HHANES 1982-84. *Am J Public Health.* 1990;80 Suppl:11-19.

233. Steinwachs DM. Measuring provider continuity in ambulatory care: an assessment of alternative approaches. *Med Care.* 1979;17(6):551-565.

234. Berry LL, Seiders K, Wilder SS. Innovations in access to care: a patient-centered approach. *Ann Intern Med.* 2003;139(7):568-574.

235. Farber J, Siu A, Bloom P. How much time do physicians spend providing care outside of office visits? *Ann Intern Med.* 2007;147(10):693-698.

236. Baron RJ. What's keeping us so busy in primary care? A snapshot from one practice. *N Engl J Med.* 2010;362(17):1632-1636.

237. Bodenheimer T. Coordinating care: a major (unreimbursed) task of primary care. *Ann Intern Med.* 2007;147(10):730-731.

238. Woolf SH, Kuzel AJ, Dovey SM, Phillips RL, Jr. A string of mistakes: the importance of cascade analysis in describing, counting, and preventing medical errors. *Ann Fam Med.* 2004;2(4):317-326.

239. Davis Giardina T, King BJ, Ignaczak AP, et al. Root cause analysis reports help identify common factors in delayed diagnosis and treatment of outpatients. *Health Aff (Millwood).* 2013;32(8):1368-1375.

240. Tubbesing G, Chen FM. Insights from exemplar practices on achieving organizational structures in primary care. *J Am Board Fam Med.* 2015;28(2):190-194.

241. Bodenheimer T. Coordinating care--a perilous journey through the health care system. *N Engl J Med.* 2008;358(10):1064-1071.

242. Pham HH, O'Malley AS, Bach PB, Saiontz-Martinez C, Schrag D. Primary care physicians' links to other physicians through Medicare patients: the scope of care coordination. *Ann Intern Med.* 2009;150(4):236-242.

243. Elliott MN, Adams JL, Klein DJ, et al. Patient-Reported Care Coordination is Associated with Better Performance on Clinical Care Measures. *J Gen Intern Med.* 2021;36(12):3665-3671.

244. Alpert JJ, Charney E. *The Education of Physicians for Primary Care.* Rockville, MD: Public Health Service; Health Resources Administration; US Department of Health, Education and Welfare 1973.

245. Starfield B, Lemke KW, Bernhardt T, Foldes SS, Forrest CB, Weiner JP. Comorbidity: implications for the importance of primary care in 'case' management. *Ann Fam Med.* 2003;1(1):8-14.

246. Rodriguez HP, Rogers WH, Marshall RE, Safran DG. The effects of primary care physician visit continuity on patients' experiences with care. *J Gen Intern Med.* 2007;22(6):787-793.

247. Shortell SM. Continuity of medical care: conceptualization and measurement. *Med Care.* 1976;14(5):377-391.

248. Becker MH, Drachman RH, Kirscht JP. Predicting mothers' compliance with pediatric medical regimens. *J Pediatr.* 1972;81(4):843-854.

249. DiMatteo MR, Hays R. The significance of patients' perceptions of physician conduct: a study of patient satisfaction in a family practice center. *J Community Health.* 1980;6(1):18-34.

250. Shear CL, Gipe BT, Mattheis JK, Levy MR. Provider continuity and quality of medical care. A retrospective analysis of prenatal and perinatal outcome. *Med Care* 1983;21(12):1204-1210.

251. Wasson JH, Sauvigne AE, Mogielnicki RP, et al. Continuity of outpatient medical care in elderly men. A randomized trial. *Jama.* 1984;252(17):2413-2417.

252. Billings J, Teicholz N. Uninsured patient in District of Columbia hospitals. *Health Aff (Millwood).* 1990;9(4):158-165.

253. Blankfield RP, Kelly RB, Alemagno SA, King CM. Continuity of care in a family practice residency program. Impact on physician satisfaction. *J Fam Pract.* 1990;31(1):69-73.

254. Hjortdahl P. Continuity of care: general practitioners' knowledge about, and sense of responsibility toward their patients. *Fam Pract* 1992;9(1):3-8.

255. Weiss LJ, Blustein J. Faithful patients: the effect of long-term physician-patient relationships on the costs and use of health care by older Americans. *Am J Public Health.* 1996;86(12):1742-1747.

256. Weyrauch KF. Does continuity of care increase HMO patients' satisfaction with physician performance. *J Am Board Fam Pract.* 1996;9(1):31-36.

257. Gill JM, Mainous AG, 3rd. The role of provider continuity in preventing hospitalizations. *Arch Fam Med.* 1998;7(4):352-357.

258. Mainous AG, 3rd, Gill JM. The importance of continuity of care in the likelihood of future hospitalization: is site of care equivalent to a primary clinician? *Am J Public Health.* 1998;88(10):1539-1541.

259. Raddish M, Horn SD, Sharkey PD. Continuity of care: is it cost effective? *Am J Manag Care.* 1999;5(6):727-734.

260. Christakis DA, Mell L, Koepsell TD, Zimmerman FJ, Connell FA. Association of lower continuity of care with greater risk of emergency department use and hospitalization in children. *Pediatrics.* 2001;107(3):524-529.

261. Christakis DA, Wright JA, Zimmerman FJ, Bassett AL, Connell FA. Continuity of care is associated with high-quality care by parental report. *Pediatrics.* 2002;109(4):e54.

262. Cabana MD, Jee SH. Does continuity of care improve patient outcomes? *J Fam Pract.* 2004;53(12):974-980.

263. Doescher MP, Saver BG, Fiscella K, Franks P. Preventive care. *J Gen Intern Med.* 2004;19(6):632-637.

264. Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes: A critical review. *Ann Fam Med.* 2005;3(2):159-166.

265. Nyweide DJ, Anthony DL, Bynum JP, et al. Continuity of care and the risk of preventable hospitalization in older adults. *JAMA Intern Med.* 2013;173(20):1879-1885.

266. Hussey PS, Schneider EC, Rudin RS, Fox DS, Lai J, Pollack CE. Continuity and the costs of care for chronic disease. *JAMA Intern Med.* 2014;174(5):742-748.

267. Turner J, Hansen L, Hinami K, et al. The impact of hospitalist discontinuity on hospital cost, readmissions, and patient satisfaction. *J Gen Intern Med.* 2014;29(7):1004-1008.

268. Knight JC, Dowden JJ, Worrall GJ, Gadag VG, Murphy MM. Does higher continuity of family physician care reduce hospitalizations in elderly people with diabetes? *Popul Health Manag.* 2009;12(2):81-86.

269. Lin W, Huang IC, Wang SL, Yang MC, Yaung CL. Continuity of diabetes care is associated with avoidable hospitalizations: evidence from Taiwan's National Health Insurance scheme. *Int J Qual Health Care.* 2010;22(1):3-8.

270. Burge F, Lawson B, Johnston G. Family physician continuity of care and emergency department use in end-of-life cancer care. *Med Care.* 2003;41(8):992-1001.

271. Health Quality O. Continuity of care to optimize chronic disease management in the community setting: an evidence-based analysis. *Ont Health Technol Assess Ser.* 2013;13(6):1-41.

272. Pourat N, Davis AC, Chen X, Vrungos S, Kominski GF. In California, primary care continuity was associated with reduced emergency department use and fewer hospitalizations. *Health Aff (Millwood).* 2015;34(7):1113-1120.

273. Lin IP, Wu SC, Huang ST. Continuity of care and avoidable hospitalizations for chronic obstructive pulmonary disease (COPD). *J Am Board Fam Med.* 2015;28(2):222-230.

274. Marshall EG, Clarke B, Burge F, Varatharasan N, Archibald G, Andrew MK. Improving continuity of care reduces emergency department visits by long-term care residents. *J Am Board Fam Med.* 2016;29(2):201-208.

275. Barker I, Steventon A, Deeny SR. Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data. *Bmj.* 2017;356:j84.

276. Nyweide DJ, Bynum JPW. Relationship Between Continuity of Ambulatory Care and Risk of Emergency Department Episodes Among Older Adults. *Ann Emerg Med.* 2017;69(4):407-415 e403.

277. Bazemore A, Petterson S, Peterson LE, Bruno R, Chung Y, Phillips RL, Jr. Higher primary care physician continuity is associated with lower costs and hospitalizations. *Ann Fam Med.* 2018;16(6):492-497.

278. Worrall G, Knight J. Continuity of care is good for elderly people with diabetes: retrospective cohort study of mortality and hospitalization. *Can Fam Physician.* 2011;57(1):e16-20.

279. Lei L, Cai S, Conwell Y, Fortinsky RH, Intrator O. Can Continuity of Care Reduce Hospitalization Among Community-dwelling Older Adult Veterans Living With Dementia? *Med Care.* 2020;58(11):988-995.

280. Pereira Gray DJ, Sidaway-Lee K, White E, Thorne A, Evans PH. Continuity of care with doctors-a matter of life and death? A systematic review of continuity of care and mortality. *BMJ Open.* 2018;8(6):e021161.

281. Nutting PA, Goodwin MA, Flocke SA, Zyzanski SJ, Stange KC. Continuity of primary care: to whom does it matter and when? *Ann Fam Med.* 2003;1(3):149-155.

282. Kristjansson E, Hogg W, Dahrouge S, Tuna M, Mayo-Bruinsma L, Gebremichael G. Predictors of relational continuity in primary care: patient, provider, and practice factors. *BMC Fam Pract.* 2013;14(72):<http://www.biomedcentral.com/1471-2296/1414/1472>.

283. Sharma G, Fletcher KE, Zhang D, Kuo YF, Freeman JL, Goodwin JS. Continuity of outpatient and inpatient care by primary care physicians for hospitalized older adults. *Jama.* 2009;301(16):1671-1680.

284. Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P, Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. *Jama.* 2007;297(8):831-841.

285. Spatz ES, Sheth SD, Gosch KL, et al. Usual source of care and outcomes following acute myocardial infarction. *J Gen Intern Med.* 2014;29(6):862-869.

286. van Walraven C, Taljaard M, Etchells E, et al. The independent association of provider and information continuity on outcomes after hospital discharge: implications for hospitalists. *J Hosp Med.* 2010;5(7):398-405.

287. Flocke SA, Stange KC, Zyzanski SJ. The impact of insurance type and forced discontinuity on the delivery of primary care. *J Fam Pract.* 1997;45(2):129-135.

288. Kahana E, Stange K, Meehan R, Raff L. Forced disruption in continuity of primary care: the patients' perspective. *Sociological Focus.* 1997;30(2):177-187.

289. Sabety AH, Jena AB, Barnett ML. Changes in Health Care Use and Outcomes After Turnover in Primary Care. *JAMA Intern Med.* 2021;181(2):186-194.

290. Mold JW, Fryer GE, Roberts AM. When do older patients change primary care physicians? *J Am Board Fam Pract.* 2004;17(6):453-460.

291. World Bank. *Better Health in Africa: Experience and Lessons Learned.* Washington, DC: World Bank; 1994.

292. Forrest CB, Nutting PA, von Schrader S, Rohde C, Starfield B. Primary care physician specialty referral decision making: patient, physician, and health care system determinants. *Med Decis Making.* 2006;26(1):76-85.

293. Holt C. An argument for comprehensiveness as the "special sauce" in a recipe for the patient-centered medical home. *J Am Board Fam Med.* 2014;27(1):8-10.

294. Bazemore A, Petterson S, Peterson LE, Phillips RL, Jr. More comprehensive care among family physicians is associated with lower costs and fewer hospitalizations. *Ann Fam Med.* 2015;13(3):206-213.

295. Rich EC, O'Malley AS, Burkhart C, Shang L, Ghosh A, Niedzwiecki MJ. Primary Care Practices Providing a Broader Range of Services Have Lower Medicare Expenditures and Emergency Department Utilization. *J Gen Intern Med.* 2021;36(9):2796-2802.

296. McWhinney IR. The primary physician in a comprehensive health service. Further reflections after a visit to the United States. *Lancet.* 1967;1(7481):91-96.

297. Russell G, Dahrouge S, Tuna M, Hogg W, Geneau R, Gebremichael G. Getting it all done. Organizational factors linked with comprehensive primary care. *Fam Pract* 2010;27(5):535-541.

298. Tresolini CP, Pew-Fetzer Task Force. *Health Professions Education and Relationship-Centered Care.* San Francisco, CA: Pew Health Professions Commission;1994.

299. Parchman ML, Burge SK. The patient-physician relationship, primary care attributes, and preventive services. *Fam Med.* 2004;36(1):22-27.

300. Silverman J, Kurtz S, Draper J. *Skills for Communicating with Patients.* Second ed. Abingdon, Oxon, UK: Radcliffe Medical Press; 2004.

301. Street RL, Jr., Makoul G, Arora NK, Epstein RM. How does communication heal? Pathways linking clinician-patient communication to health outcomes. *Patient Educ Couns.* 2009;74(3):295-301.

302. Neumann M, Edelhauser F, Kreps GL, et al. Can patient-provider interaction increase the effectiveness of medical treatment or even substitute it?--an exploration on why and how to study the specific effect of the provider. *Patient Educ Couns.* 2010;80(3):307-314.

303. Olaisen RH, Schluchter MD, Flocke SA, Smyth KA, Koroukian SM, Stange KC. Assessing the Longitudinal Impact of Physician-Patient Relationship on Functional Health. *Ann Fam Med.* 2020;18(5):422-429.

304. Fuertes JN, Mislowack A, Bennett J, et al. The physician-patient working alliance. *Patient Educ Couns.* 2007;66(1):29-36.

305. Kim SC, Kim S, Boren D. The quality of therapeutic alliance between patient and provider predicts general satisfaction. *Mil Med.* 2008;173(1):85-90.

306. Suchman AL. Physician job satisfaction: reversing the decline. *Cleve Clin J Med.* 1996;63(3):137-138.

307. Mathews DA, Suchman AL, Branch WT, Jr. Making "connexions": enhancing the therapeutic potential of patient-clinician relationships. *Ann Intern Med.* 1993;118(12):973-977.

308. Frosch DL, Kaplan RM. Shared decision making in clinical medicine: past research and future directions. *Am J Prev Med.* 1999;17(4):285-294.

309. Schwartz L. Is there an advocate in the house? The role of health care professionals in patient advocacy. *J Med Ethics.* 2002;28(1):37-40.

310. Joosten EA, DeFuentes-Merillas L, de Weert GH, Sensky T, van der Staak CP, de Jong CA. Systematic review of the effects of shared decision-making on patient satisfaction, treatment adherence and health status. *Psychother Psychosom.* 2008;77(4):219-226.

311. Earnest MA, Wong SL, Federico SG. Physician advocacy: what kind is it and how do we do it? *Acad Med.* 2010;85(1):63-67.

312. Charon R. *Narrative Medicine - Honoring the Stories of Illness.* New York: Oxford University Press; 2006.

313. Mold JW, Blake GH, Becker LA. Goal-oriented medical care. *Fam Med.* 1991;23(1):46-51.

314. Mold JW. An alternative conceptualization of health and health care: its implications for geriatrics and gerontology. *Educational Gerontology.* 1995;21(1):85-101.

315. Stewart M. Studies of health outcomes and patient-centered communication. In: Stewart M, Brown JB, Weston WW, McWhinney IR, McWilliam C, Freeman TR, eds. *Patient-Centered Medicine: Transforming the Clinical Method*. Thousand Oaks, CA: Sage; 1995:3-15.

316. Phillips WR. The value of evidence. The evidence of value. NAPCRG (North American Primary Care Research Group) Newsletter; 1996; Kansas City, MO.

317. Gulbrandsen P, Hjortdahl P, Fugelli P. General practitioners' knowledge of their patients' psychosocial problems: multipractice questionnaire survey. *Bmj.* 1997;314(7086):1014-1018.

318. Anandarajah G, Hight E. Spirituality and medical practice: using the HOPE questions as a practical tool for spiritual assessment. *Am Fam Physician.* 2001;63(1):81-89.

319. Steffen GE. Quality medical care. A definition. *Jama.* 1988;260(1):56-61.

320. Berwick DM. Measuring physicians' quality and performance: adrift on Lake Wobegon. *Jama.* 2009;302(22):2485-2486.

321. Flocke SA, Miller WL, Crabtree BF. Relationships between physician practice style, patient satisfaction, and attributes of primary care. *J Fam Pract.* 2002;51(10):835-840.

322. Stewart M. Towards a global definition of patient centred care. *Bmj* 2001;322(7284):444-445.

323. Stewart M, Brown JB, Donner A, et al. The impact of patient-centered care on outcomes. *J Fam Pract.* 2000;49(9):796-804.

324. Epstein RM, Street RL, Jr. Shared mind: communication, decision making, and autonomy in serious illness. *Ann Fam Med.* 2011;9(5):454-461.

325. Rakel RE. *Textbook of Family Practice.* 6th ed. Philadelphia, PA: W.B. Saunders Co.; 2001.

326. Doherty WJ, Baird MA. *Family-Centered Medical Care: A Clinical Casebook.* New York, NY: The Guilford Press 1987.

327. McDaniel SH, Campbell TL, Hepworth J, Lorenz A. *Family-Oriented Primary Care.* Second ed. New York, NY: Springer; 2005.

328. National Commission on Community Health Services. *Health is a Community Affair.* Cambridge, MA: Harvard University Press; 1966.

329. Institute of Medicine, Committee on Integrating Primary Care and Public Health, Board on Population Health and Public Health Practice. *Primary Care and Public Health: Exploring Integration to Improve Population Health.* Washington, DC: The National Academies Press; 2012.

330. Lienke NW. From her personal notes. circa 1963. 1963.

331. Starfield B, Simborg D, Johns C, Horn S. Coordination of care and its relationship to continuity and medical records. *Med Care.* 1977;15(11):929-938.

332. Kale MS, Federman AD, Ross JS. Visits for primary care services to primary care and specialty care physicians, 1999 and 2007. *Arch Intern Med* 2012;172(18):1421-1423.

333. Stephens GG. On the teaching and learning of clinical wisdom. *J Fam Pract.* 1974;1(1):24-27.

334. Epstein RM. Whole mind and shared mind in clinical decision-making. *Patient Educ Couns.* 2013;90(2):200-206.

335. Emanuel EJ, Emanuel LL. What is accountability in health care? *Ann Intern Med.* 1996;124(2):229-239.

336. Allen P. Accountability for clinical governance: developing collective responsibility for quality in primary care. *Bmj* 2000;321(7261):608-611.

337. Communities of solution: the Folsom Report revisited. *Ann Fam Med.* 2012;10(3):250-260.

338. Young RA, Bayles B, Benold TB, Hill JH, Kumar KA, Burge SK. Family physicians' perceptions on how they deliver cost-effective care: a qualitative study from the Residency Research Network of Texas (RRNeT). *Fam Med.* 2013;45(5):311-318.

339. Siu AL, Manning WG, Benjamin B. Patient, provider and hospital characteristics associated with inappropriate hospitalization. *Am J Public Health.* 1990;80(10):1253-1256.

340. Franks P, Clancy CM, Nutting PA. Gatekeeping revisited--protecting patients from overtreatment. *N Engl J Med.* 1992;327(6):424-429.

341. Hashem A, Chi MT, Friedman CP. Medical errors as a result of specialization. *J Biomed Inform.* 2003;36(1-2):61-69.

342. Ely JW, Kaldjian LC, D'Alessandro DM. Diagnostic errors in primary care: lessons learned. *J Am Board Fam Med.* 2012;25(1):87-97.

343. Singh H, Giardina TD, Meyer AN, Forjuoh SN, Reis MD, Thomas EJ. Types and origins of diagnostic errors in primary care settings. *JAMA Intern Med.* 2013;173(6):418-425.

344. Kasper JD. The importance of type of usual source of care for children's physician access and expenditures. *Med Care* 1987;25(5):386-398.

345. Short PF, Lefkowitz DC. Encouraging preventive services for low-income children. The effect of expanding Medicaid. *Med Care.* 1992;30(9):766-780.

346. Lieu TA, Black SB, Ray P, Chellino M, Shinefield HR, Adler NE. Risk factors for delayed immunization among children in an HMO. *Am J Public Health.* 1994;84(10):1621-1625.

347. Bindman AB, Grumbach K, Osmond D, Vranizan K, Stewart AL. Primary care and receipt of preventive services. *J Gen Intern Med.* 1996;11(5):269-276.

348. O'Malley AS, Forrest CB. Continuity of care and delivery of ambulatory services to children in community health clinics. *J Community Health.* 1996;21(3):159-173.

349. Regan J, Schempf AH, Yoon J, Politzer RM. The role of federally funded health centers in serving the rural population. *J Rural Health.* 2003;19(2):117-124; discussion 115-116.

350. VanGompel EC, Jerant AF, Franks PM. Primary care attributes associated with receipt of preventive care services: a national study. *J Am Board Fam Med.* 2015;28(6):733-741.

351. Flocke SA, Stange KC, Zyzanski SJ. The association of attributes of primary care with the delivery of clinical preventive services. *Med Care* 1998;36(8 Suppl):AS21-30.

352. Mazzuca SA. Does patient education in chronic disease have therapeutic value? *J Chronic Dis.* 1982;35(7):521-529.

353. Mullen PD, Green LW, Persinger GS. Clinical trials of patient education for chronic conditions: a comparative meta-analysis of intervention types. *Prev Med.* 1985;14(6):753-781.

354. Ellis SE, Speroff T, Dittus RS, Brown A, Pichert JW, Elasy TA. Diabetes patient education: a meta-analysis and meta-regression. *Patient Educ Couns.* 2004;52(1):97-105.

355. Bertakis KD, Callahan EJ, Helms LJ, Azari R, Robbins JA, Miller J. Physician practice styles and patient outcomes: differences between family practice and general internal medicine. *Med Care.* 1998;36(6):879-891.

356. Hibbard JH, Mahoney ER, Stock R, Tusler M. Do increases in patient activation result in improved self-management behaviors? *Health Serv Res.* 2007;42(4):1443-1463.

357. Mosen DM, Schmittdiel J, Hibbard J, Sobel D, Remmers C, Bellows J. Is patient activation associated with outcomes of care for adults with chronic conditions? *J Ambul Care Manage.* 2007;30(1):21-29.

358. Remmers C, Hibbard J, Mosen DM, Wagenfield M, Hoye RE, Jones C. Is patient activation associated with future health outcomes and healthcare utilization among patients with diabetes? *J Ambul Care Manage.* 2009;32(4):320-327.

359. Griffin SJ, Kinmonth AL, Veltman MW, Gillard S, Grant J, Stewart M. Effect on health-related outcomes of interventions to alter the interaction between patients and practitioners: a systematic review of trials. *Ann Fam Med.* 2004;2(6):595-608.

360. Becker ER, Roblin DW. Translating primary care practice climate into patient activation: the role of patient trust in physician. *Med Care* 2008;46(8):795-805.

361. Pearson SD, Raeke LH. Patients' trust in physicians: many theories, few measures, and little data. *J Gen Intern Med.* 2000;15(7):509-513.

362. Bonds DE, Camacho F, Bell RA, Duren-Winfield VT, Anderson RT, Goff DC. The association of patient trust with self-care among patients with diabetes mellitus. *BMC Fam Pract.* 2004;5(26).

363. Calman NS, Hyman RB, Licht W. Variability in consultation rates and practitioner level of diagnostic certainty. *J Fam Pract.* 1992;35(1):31-38.

364. Weihs K, Fisher L, Baird MA. Families, health, and behavior - A section of the Commissioned Report by the Committee on Health and Behavior: Research, Practice, and Policy Division of Neuroscience and Behavioral Health and Division of Health Promotion and Disease Prevention Institute of Medicine, National Academy of Sciences. *Families, Systems & Health.* 2002;20(1):7-46.

365. Doescher MP, Franks P, Saver BG. Is family care associated with reduced health care expenditures? *J Fam Pract.* 1999;48(8):608-614.

366. Ryan RM, Deci EL. An overview of self-determination theory: an organismic-dialectical perspective. In: Deci EL, Ryan RM, eds. *Handbook of Self-Determination Research*. Rochester, NY: University of Rochester Press; 2002:3-33.

367. Johnson HA. Diminishing returns on the road to diagnostic certainty. *Jama.* 1991;265(17):2229-2231.

368. Welch HG, Schwartz LM, Woloshin S. *Overdiagnosed: Making People Sick in the Pursuit of Health.* Boston, MA: Beacon Press; 2011.

369. Epstein RM, Gramling RE. What is shared in shared decision making? Complex decisions when the evidence is unclear. *Med Care Res Rev.* 2013;70(1 Suppl):94S-112S.

370. Kaplan SH, Greenfield S, Ware JE, Jr. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Med Care* 1989;27(3 Suppl):S110-127.

371. Elwyn G, Edwards A, Kinnersley P. Shared decision-making in primary care: the neglected second half of the consultation. *Br J Gen Pract.* 1999;49(443):477-482.

372. Quaschning K, Korner M, Wirtz M. Analyzing the effects of shared decision-making, empathy and team interaction on patient satisfaction and treatment acceptance in medical rehabilitation using a structural equation modeling approach. *Patient Educ Couns.* 2013;91(2):167-175.

373. Schoenheimer R, Rittenberg D. Deuterium as an Indicator in the Study of Intermediary Metabolism. *Science.* 1935;82(2120):156-157.

374. Schoenheimer R. *The Dynamic State of Body Constituents.* Cambridge, Massachusetts: Harvard University Press; 1942.

375. Schottstaedt WW. Interviewing. In: Schottstaedt WW, ed. *Psychophysiologic Approach in Medical Practice*. Chicago: The Year Book Publishers; 1960:180-203.

376. Vedhara K, Irwin MR. *Human Psychoneuroimmunology.* Oxford University Press; 2005.

377. Benedetti F, Amanzio M. The placebo response: how words and rituals change the patient's brain. *Patient Educ Couns.* 2011;84(3):413-419.

378. Adler HM. The sociophysiology of caring in the doctor-patient relationship. *J Gen Intern Med.* 2002;17(11):874-881.

379. Wolf S. Disease as a way of life: neural integration in systemic pathology. *Perspect Biol Med.* 1961;4:288-305.

380. Riess H. Empathy in medicine--a neurobiological perspective. *Jama.* 2010;304(14):1604-1605.

381. Martin JC, Avant RF, Bowman MA, et al. The Future of Family Medicine: a collaborative project of the family medicine community. *Ann Fam Med.* 2004;2(Suppl 1):S3-32.

382. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, Part 2. *Jama.* 2002;288(15):1909-1914.

383. Hunt LM, Kreiner M, Brody H. The changing face of chronic illness management in primary care: a qualitative study of underlying influences and unintended consequences. *Ann Fam Med.* 2012;10(5):452-460.

384. Doherty RB, Crowley RA, Health, Public Policy Committee of the American College of P. Principles supporting dynamic clinical care teams: an American College of Physicians position paper. *Ann Intern Med.* 2013;159(9):620-626.

385. Yano EM, Fink A, Hirsch SH, Robbins AS, Rubenstein LV. Helping practices reach primary care goals. Lessons from the literature. *Arch Intern Med.* 1995;155(11):1146-1156.

386. Kamath JR, Osborn JB, Roger VL, Rohleder TR. Highlights from the third annual Mayo Clinic conference on systems engineering and operations research in health care. *Mayo Clin Proc.* 2011;86(8):781-786.

387. Mitka M. Patient-centered medical homes offer a model for better, cheaper health care. *Jama.* 2012;307(8):770-771.

388. Rosenthal TC. The medical home: growing evidence to support a new approach to primary care. *J Am Board Fam Med.* 2008;21(5):427-440.

389. Peikes D, Zutshi A, Genevro JL, Parchman ML, Meyers DS. Early evaluations of the medical home: building on a promising start. *Am J Manag Care.* 2012;18(2):105-116.

390. Friedberg MW. The potential impact of the medical home on job satisfaction in primary care. *Arch Intern Med.* 2012;172(1):31-32.

391. Berenson RA, Hammons T, Gans DN, et al. A house is not a home: keeping patients at the center of practice redesign. *Health Aff (Millwood).* 2008;27(5):1219-1230.

392. Bieck AD, Biggs WS, Crosley PW, Kozakowski SM. Results of the 2012 National Resident Matching Program: family medicine. *Fam Med.* 2012;44(9):615-619.

393. Park J, Jones K. Use of hospitalists and office-based primary care physicians' productivity. *J Gen Intern Med.* 2015;30(5):572-581.

**Figure 1. Structure of the logic model**

**Figure 2. Proposed links between intermediate and desired outcomes**

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**Figure 3a. Complete model.**



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

