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Helping Leaders Advance Child Health Care Transformation

FROM EFFICACY TO EFFECTIVENESS:

Community Health Workers, Medical Homes for Children, and the Measurement Systems to Support Them

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Scope and Purpose of Paper. This paper begins to outline a metrics framework for incorporating community health workers (CHWs) into primary health care and medical homes. This paper grew out work with the MCH Measurement Research Network a Rutgers University. It draws upon the extensive research in the field on the efficacy of CHWs and the impacts they have been shown to produce. It contrasts that with the current, largely clinical and child-specific metrics in use in child health care practice and their inadequacy to either measure the impact of CHWs or effectively incorporate CHWS into practice. Drawing upon other literatures, the paper develops a framework for a more integrated and comprehensive set of measures related to both implementation and impact. This paper is designed as a working paper and source for further discussion and action in the field.

Introduction: Why community health workers matter to child health practice.

The medical community long has recognized that health itself is not confined to the absence of disease or infirmity.[1] Increasingly, child health's role is being defined as advancing healthy, life-course development,[2] including physical/medical, cognitive/developmental, social/relational, and emotional/behavioral development.[3]

Over the past 20 plus years, there has been growing and compelling multi-disciplinary research evidence from The P.A.R.E.N.T.S. Science (**P**rotective factors,[4] **A**dverse childhood experiences,[5] **R**esiliency,[6] **E**pigenetics,[7] **N**urturing,[8] **T**oxic stress,[9] and **S**ocial determinants of health[10]) on the need to use a comprehensive approach to advance child health. The Office of Disease Prevention and Health Promotion's *Healthy People 2030* emphasizes that child health is most dependent upon the safety, stability, and nurturing in the home environment, including the parent's health and mental wellness.[11] The pediatric field – in adoption of the principles of a medical home,[12] the development of *Bright*

Futures guidelines for well-child care,[13] and the production of various reports on poverty,[14] trauma and stress,[15] and other topics[16] – has further emphasized the need for child health practices to recognize and respond to non-medical conditions that affect child health. The challenge for the child health care community has been how best to address these needs in practice, recognizing that this work extends beyond medical expertise and response.

Community health workers (CHWs) can play a major and often a primary role in doing so. Child health practitioner champions and innovators, often with foundation funding and strong research components, have demonstrated the efficacy of expanding the purview of pediatric practice to extend beyond medical care and respond to social determinants.[17] Particularly in serving children and their families in poor and medically-underserved neighborhoods, these champions typically have added staff recruited from within these communities to serve key relational roles with the families and with the practices themselves. While these additional staff come by many different names (community health workers, doulas, promotores, health realization coaches, family advocates, relational care coordinators, family support workers, peer leaders, lay healers, accompagneurs, resiliency catalysts, and door openers, among them), they will be referred to in this paper as CHWs. Research has demonstrated the efficacy of CHWs in improving the safety, stability, and nurturing in the home environment and the child's healthy growth and development.

Moving from demonstrating efficacy in research settings to ensuring effectiveness in broader applications, however, requires an understanding of – and developing appropriate measurement systems for – the core characteristics or attributes essential to producing those impacts. This paper focuses upon constructing such measurement systems -- to guide development and effective implementation, to provide for meaningful accountability and continuous quality improvement, and to build the confidence and political will to make investments in the first place.[18] Moving from demonstrating efficacy in research settings to ensuring effectiveness in broader applications requires an understanding of – and developing appropriate measurement systems for – the core characteristics that produce their impacts. The adages "you measure what you treasure" and "what gets measured gets done" both speak to the importance of developing sound metrics appropriate to the work CHWs do and the contributions they make.

CHWs in the context of medical homes. CHWs existed long before the modern medical care system. They have played a core role in almost every society as a repository of health information, a conveyor of handed-down remedies known for the treatment of ailments and disease, and a trusted voice on providing care and treatment. They have played community-building roles for immigrants in the United States, as exemplified in the settlement houses in the 1880s through 1920s.[19]

CHWs are generally defined by the work they do and not by credentials they hold. According to the National Association of Community Health Workers, "Community Health Workers (CHWs) are frontline public health workers who are trusted members of and/or have an unusually close understanding of the community served. This trusting relationship enables CHWs to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery. CHWs also build individual and community capacity by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, social support and advocacy."[20]

Increasingly, CHWs have been incorporated into primary health care practices as part of the medical home team. As members of that team, CHWs often serve as the essential bridge between the patient and the patient's community and the medical practitioners providing care. They aid in developing integrated and systemic responses to children and their families across systems, generally described in early childhood as encompassing health care, early care and education, and family and community economic and social supports.[21]

Evidence for the efficacy of community health workers. There is a diverse, deep, and multidisciplinary research base showing the efficacy of CHWs in improving health and health-related outcomes of patients, including children and their families. A recent international journal devoted to the role of CHWs concluded that the evidence for the effectiveness of well-designed and implemented CHWs is "incontrovertible".[22] The Office of Homeland Security has included CHWs on its list of critical infrastructure workers during the COVID-19 pandemic[23] ;and the Centers for Disease Control and Prevention has emphasized the importance of CHWs in improving responses to both general and specific health conditions.[24] Community health workers have demonstrated immediate health impacts in responding to patients with complex and chronic health conditions – in following medical protocols and in better maintaining patients' overall health through strengthening their resiliency,[25, 26] often with high returns-on-investment.[27,28]

CHWs have strengthened community-clinical linkages that respond to social as well as clinical determinants of health.[29] They have proved effective in helping reduce racial and ethnic health inequities.[30,31, 32] While much of the research on engaging CHWs in medical practices has been directed to adults and persons with special health care needs or disabilities[33], their impacts both on population health and racial equity are greatest in supporting children in their development through responding to social determinants of health,[34,35] particularly young children and children in low-income and underserved communities.[36] What CHWs are able to achieve and how they are successful in doing so often extends beyond a specific medical outcome or treating a specific health condition.

From efficacy to effectiveness and population health. To move from demonstrating efficacy within research-based programs to ensuring effectiveness in broader implementation requires a systemic approach that attends to the multiple levels of support CHWs need. From an implementation perspective, this means describing and measuring the core elements that produce success.[37] From an outcome perspective, this means describing and measuring the specific, most proximate outcomes that CHWs produce in the children, families, practices, and communities they serve.[38]

Research also is clear that for CHWs to be effective and overcome current gaps in both employing and supporting them,[39] they must be well-resourced, integrated, and truly valued by the practice – in terms of training, ongoing reflective supervision, manageable workloads, and overall support and recognition within the practice.[40] This includes recruiting and selecting them for their relational skills and giving them flexibility in building relationships to provide patient-centered and -driven responses – which is different from most medical services providing specific treatments for specific identified health conditions. One reason for the effectiveness of CHWs is their knowledge of, and connection to, the communities in which their families live, which often requires substantial time in communicating and working with community partners as well as families.

This also means supporting them in a way that does not medicalize and narrow their focus to the medical model. CHWs serve multiple roles, characterized by one research synthesis as including 12 functions (e.g., care coordination, health coaching, social support, health assessment, resource linking, case management, medication management, remote care, follow-up, administration, health education, and literacy support) across three areas of focus: clinical services, community resource connections, and health education and coaching.[41] These functions are aligned with the National Committee for Quality Improvement and the Penn Center for Community Health Workers enumeration of nine critical inputs for effective CHW programs: recruitment and hiring, training, supervision, support, scope of work, workforce development, health and social care team integration, organizational data systems and engagement, and program stability.[42] When CHWs are supported for what they do – and not directed by the practice to focus solely on a specific medical concern – they also inform and change practices to be more responsive to children and family needs (including being culturally and racially responsive) and effective in what they do.[43]

Table One provides a framework for developing metrics at both the implementation and outcome levels, based upon what the core CHW roles and objectives are within the practice, what is known is needed to perform those roles practice, and what outcomes can result from focused implementation and capacity development.

TABLE ONE: METRICS FRAMEWORK FOR INCORPORATING COMMUNITY HEALTH WORKERS INTO PRIMARY PEDIATRIC SETTINGS

CORE CHW ROLES AND OBJECTIVES	METRICS -- LEVELS OF IMPLEMENTATION	METRICS -- LEVELS OF OUTCOMES/IMPACTS
Establish trust and engage families with practice Identify and **build on** child and family **strengths and goals** as well as needs **Increase practice responsiveness** to the child and family's needs, strengths, and goals **Strengthen the child and family's protective factors** (concrete services and supports, knowledge of child development, resiliency, social ties, and relationships) Know and **enhance the child and family's connections to community (**professional,	**Funder Level** (overall financing adequacy to achieve CHW purposes) **Institutional Level** (valuing CHW roles as integral to practice's effectiveness and key contributor to healthy development) **Operational Level** (providing necessary CHW training, compensation, development, and supervision) **Worker Level** (meeting CHW work goals and expectations) **Community Level** (securing enhanced collaboration with CHWs and with practice)	**Family Level** (greater nurturing, safety and stability) **Child Level** (improved physical, cognitive, social/relational, emotional/behavioral development, e.g. attachment, resilience, hope, mindfulness, self-identity, empathy) **Practice Level** (improved communication and cultural and linguistic responsiveness to patients) **Community Level** (increased community responsiveness to and coordination with practice and family; greater child and family-friendly supports, activities, and opportunities)

financial, and voluntary) resources		

The first column of Table One shows the roles and objectives of CHWs as multidimensional and dependent upon the specific needs and goals of the child, family, and community being served. Compared to other members of the medical home team, the CHW's role is much more systemic and integrative. Often, the CHW is core to establishing the needed trust with children and families and represents the individual most continuously engaging them. In that capacity, the CHW identifies and builds on child and family strengths and goals**,** as well as needs. In doing so and working with other members of the medical home team, the clinical practice's responsiveness and effectiveness is improved. In turn, the CHW plays a key role in connecting families with their communities and better integrating services and supports, including accessing the needed professional services and resources but also building social ties and connections in the community. The CHW's role is to respond accordingly, depending upon whether the child and family face child-specific health complexities, family complexities, community complexities, or a combination of these.

The second column of Table One shows the multiple levels at which metrics are needed to ensure effective implementation – ones that extend well beyond what can be measured at the CHW level alone. The third column shows the multiple levels at which the CHW work can have an impact on health – at the family, child, practice, and community levels. Simply expressed, effectively incorporating CHWs into practice places demands and responsibilities upon the clinical practices and the larger health system as well as the CHW.. The next two sections go into more detail on building a metrics framework for the different levels for implementation (column two) and impact or outcomes (column three).

Developing implementation and management metrics. Implementation science refers to the study of methods to promote the systematic uptake of clinical research findings into routine practice. It is designed to close persistent knowledge-to-practice gaps moving from controlled implementation in a research setting to diffusion and application in broader practice. Metrics can be a powerful tool for informing and guiding decision making at all levels of an organization. They also can be detrimental if not designed and implemented properly. The role of CHWs is systemic, more than the roles of other members of the medical home team, CHWs, engage with children and families and connect them with their communities to better integrate services and align responses in ways consonant with their goals and aspirations.

Developing and implementing a robust metrics system to ensure CHW effectiveness requires measures related to those attributes, qualities, and supports (e.g. process/performance measures or, simply, implementation measures). The broader systems reform literature provides both frameworks and measurement approaches for doing so – but not always applied to CHWs.

Recognizing that CHWs represent a systemic response and not a discrete intervention for a specific medical need or condition requires funder, institutional, operational, and even community-level actions to be effective. Table Two spells out the five implementation levels and some of the many core questions that implementation and performance accountability metrics should address. [44]

TABLE TWO: IMPLEMENTATION METRICS FOR CHWs IN PRIMARY HEALTH CARE SYSTEMS – FIVE LEVELS AND CORE QUESTIONS METRICS SHOULD ADDRESS

LEVEL	KEY QUESTIONS THAT METRICS SHOULD TAKE STEPS TO MEASURE
Funder Level	Is the overall funding sufficient to cover the employment, training, and operational costs for the CHWs? Are the numbers of CHWs employed sufficient to address the populations they are designed to serve, accounting for the needed caseloads to provide necessary dosage and duration of services? If the programmatic goal is to achieve population-level health impacts in a particular geographic area, are the numbers of CHWs sufficient to produce that impact?
Health Care Institutional [Systems] Level	Does the health care institution place a high value on these CHWs and view them as essential to their work and mission? Are the CHWs provided support and recognition for their expertise about the families and the neighborhoods they serve? Are CHWs full participants in medical home teams? Are CHWs encouraged to represent and advocate for institutional changes that can better respond to the families, their communities, and their cultures?
Operational (Administrative/ Program) Level	Is the recruitment and selection of CHWs consistent with best practices and guidelines? Is there an overall reflective supervisory structure for CHWs that provides for continuous learning and improvement, peer networking and mutual support, and staff development? Are there career advancement opportunities for CHWs who want to continue to engage in frontline practice? Are CHWs paid sustainable salaries and provided related benefits/supports?
Worker Level	Do CHWs meet the work expectations set out in the job description, including setting schedules and meeting with families and community members, and participating in medical home teams? Do CHWs work to build ties and community-clinical linkages with other community-based organizations? Do CHWs facilitate family growth through relationships with the family, using facilitative skills in the process? Do CHWs contribute to the medical home team in meeting overall goals for providing health care and supporting healthy development?

Community Level	Are the community and its organizations and members engaged and supportive of the health practice efforts in employing CHWs and using them for community outreach/engagement? Are the community and its organizations part of ongoing review and continuous improvement activities for building on the work of the CHWs and the larger role of the clinical practice in advancing population health?

Research is needed to continue the development, both validation and reliability testing, of CHW implementation measures appropriate for the types of questions in Table Two. In this section, we further discuss each level and the factors to consider in developing those measures.[45, 46]

Financing, however, may not match the capability of even very effective CHWs working in strong and supportive programs to reach these objectives. A teen pregnancy program financed to reach 100 at-risk adolescent girls, even if wildly successful, will not produce measurable gains in pregnancy reduction as measured at a population level within a community of one hundred thousand. Moreover, if the grant funds only one CHW to serve 100 adolescent girls, there is a limitation to the time and connections the worker can make and the impact that he or she will have. If the funding and the outcome expectations are for only a year or two, the worker may only be able to set in motion the interactions and relationships with the adolescent girls that are needed as a basis for supporting their development and only begin to show the impacts of doing so. The funding for a CHW program must be commensurate with its larger goals; adequate funding is a key implementation reality.

Most importantly, to be effective, adolescent-focused CHWs, as above, must establish relationships with adolescents and then support them in their overall development – including increasing positive peer activities, success in school, expectations for the future, and overall resiliency. These all can impact upon sexual activity, but they are not sole determinatives of that activity nor is that their sole impact. A CHW working with such adolescents certainly would provide information and guidance regarding responsible sexuality, particularly when this is raised as a topic or concern – but might start in building relationships with the adolescents around the adolescents' own concerns, which might or might not be around pregnancy prevention. Directing attention to just one [teen pregnancy] of a constellation of impacts that contribute to that end may result in workers feeling pressured to "teach to the test" and for their other overall set of impacts to go unrecognized.

If there is a mismatch between the funder's expectations and the amount, duration, and direction of funding being provided, the result will be that the selected metrics will be inappropriate and might further deflect actions away from where they can be most beneficial. Funders must support CHWs (financially and with the time) to utilize all their core practice roles to achieve the overall healthy development, including reduced teen pregnancy, without setting too narrow or under-resourced specific goals.

Institutional Level. At the institutional or systems level, it is essential that CHWs be recognized and valued as integral to the institution's success. Health institutions tend to be dominated by people with medical backgrounds and expertise, with their necessary focus upon clinical practice. This also can mean that they have limitations in understanding and valuing the importance of responding to social determinants of ill health. Fully utilizing and benefiting from CHWs requires an institutional commitment

to integrating CHWs into the practice, supporting and valuing CHWs for what they do, and ensuring their participation in institutional planning and decision-making.

This includes institutional recognition of CHWs as a core part of the medical home team and as experts on family needs and hopes, community context, and the cultural, linguistic, and ethnic environments needed to support health and wellness. Practitioners and other professionals in the institution must be open to learning from CHWs and to responding to their insights. *Partners in Health*, for instance, considers its CHWs (accompagnuers) as the lynchpin to their effectiveness in providing medical care and the key to their establishing trust with and being responsive to the people they serve.[47]

This institutional level of support for CHWs is one of the most critical levels for implementing successful CHW programs, reflecting both the "institutional political will" and "operational function."[48] While these might be conceptually acknowledged, they often are not supported, and certainly not systematically measured or assessed.

Operational Level. In addition to the funding and institutional level commitments, operational level practices and protocols are needed to ensure CHWs can perform and learn in their roles. First, this requires a recruitment strategy that ensures CHWs have knowledge of connections with the community and have the attributes to perform the CHW role, particularly relational and motivational skills. Second. this requires that CHWs receive skilled, reflective supervision and training and professional development within the practice itself.

Third, this requires a structure that enables them to provide feedback and advice and share grievances. Since part of their role is to affect change in the overall practice in becoming more culturally and ethnically responsive, CWHs need institutional level and operational program back-up when they do so.

Fourth, and particularly when practices are employing or contracting with multiple CHWs, supporting a peer support network is key to learning, solidarity, and workforce continuity. Even when practices employ or contract with a sole or only a few CHWs, finding a peer support network for them in the larger community or field is important to their growth and resiliency.

This very important operational level is too often neglected in both support and continuous measurement, with opportunities for continuous learning and improvement often lost.

Worker Level. CHWs work is designed to be both family- and community-driven. and therefore informed and dependent upon their establishing trusting relationships – with the child and family, in the practice, and within the larger community. CHWs need to be assessed, both in terms of their ongoing development and improvement (through supervision and guidance) and in terms of performance accountability (for advancement, salaries, corrective action, and continued employment). This also may include some measures of specific child and family impacts and outcomes (see next section), but the primary way to assess CHW performance is in terms of the above relational and empowerment work, which should be reflected in the overall job description and its responsibilities. This also means recognizing the flexibility and adaptability that such work entails, supporting CHWs as opportunity seekers and problem-solvers.

Community Level. The community plays a critical role in supporting the healthy development of children and families. In poor and underserved communities, the supports for healthy child development often are limited and strained. Such communities may be marginalized by the larger community in terms of

their access to opportunities and resources, whether through historical impacts of discrimination or current discriminatory practices. These can produce, for people in the community, ambivalent or even hostile views of public systems, including health institutions.

Developing metrics at the community level involves mapping the assets and resources that do exist at the community level, along with their capacities. It then involves gaining the community's perspectives on the clinical practices and on the practices' contribution to the community. Depending upon the clinical practice, there may be good relationships with community-based organizations and institutions, limited or no interaction, or levels of distrust. Rarely are there metrics on these important community-clinical practice dimensions; but there can be and should be. Given that one of the roles of CHWs is to strengthen such relationships, it is important to look at the progress made over time in developing and fostering more positive community-practice interactions and relationships.

Developing Metrics. Developing metrics and measures for each of these implementation levels is not a simple act of selecting one measure (particularly a clinical one) or a set of discrete measures. In fact, a mixed methodology that involves surveys (including patient satisfaction surveys), focus groups, and confidential assessments from the CHWs themselves, can be a big part of securing many of the answers. Since many involve the perceptions and behaviors across clinical practices, engaging practices through use of the growing array of self-assessment tools in the family support, family engagement, and systems integration fields can contribute to identifying progress and performance and highlighting areas for further growth and development.

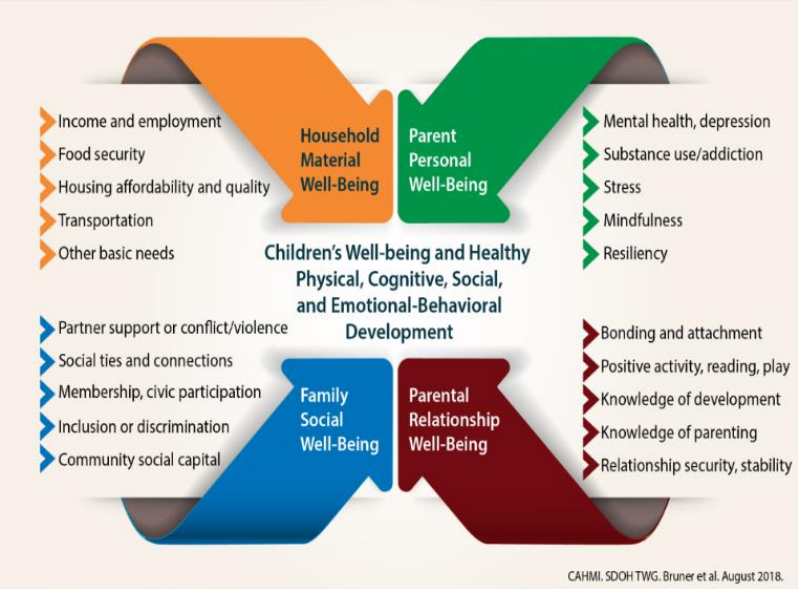
The ability of CHWs to improve the safety, stability, and nurturing in the home environment, the child's healthy development, and the responsiveness of the practice to them is contingent upon CHWs performing their jobs with operational structures that support them, the institutional commitment to them, and the funding that sustains them. In essence, these questions all address: "Did you [or your organization] put in place the elements of an effective and sustainable CHW program? Did you do what the existing research says you should do?"

Developing outcome and performance metrics. This section addresses developing measures to assess the impact of those implementation and management actions: "Did you [the CHW programs, practices and policies] get the results that sought?"[49] A measurement system for the purpose of assessing the CHW's impacts on children, families, and communities similarly requires developing metrics aligned to what CHWs are designed to do. Unlike medical treatments for a specific medical condition or concern, these impacts or outcomes are multidimensional, ecological, and often foundational for impacting longer-term medical health and long-term wellness outcomes.

For all children, this requires attention to changes or growth in healthy development at the child level and at the family and home environment level, and in the relationships of the child and the family to the practice and the community. At the child level, this includes healthy physical, cognitive, social/relational, and emotional/behavioral development. Specific measures, of course, must be age-appropriate. For young children, this requires paying particular attention to proximate relational impacts and outcomes such as secure attachment, self-regulation, engagement, autonomy, persistence, and resilience. For older children, this involves their relationships to schools, friends and their education, their social activities (including civic engagement), and their mental health.

In addition to child outcomes, CHWs also strengthen family and home environments (that then impact child outcomes over the life course). For young children, the CAHMI TWIG developed Chart One to describe four different home and family environments (social determinants of health as applied to young children) recognized as impacting healthy child development.[50] Different families may need support in different areas, and it is important to recognize this when measuring its impact on a family-by-family basis, through some form of results mapping or goal attainment scaling and not simply based on some threshold determination of adequacy.[51]

CHART ONE: WELL-BEING OUTCOMES THAT IMPACT OVERALL CHILD WELL-BEING



In addition to the chart itself, the CAHMI TWIG conducted a scoping review of screening or assessment tools that have been employed in practice to identify concerns in each of these four areas, conducted a cross-walk of various instruments, and produced an initial screening tool based upon the review for immediate use.[52]

As improvements are made at the family and home environment levels, the results will often differ by family circumstance and opportunity. Child needs and opportunities for development will differ by the child's developmental status and overall constitution. Children's well-being and health is impacted across physical health (including the absence of childhood diseases, morbidity, or disability) but also across cognitive, social/relational, and emotional/behavioral health. Measures of children's health therefore should include all these domains (aligned with those established for school readiness).[53]

Current child health outcome and quality measures. Health care generally has focused on measures of health related to the presence of specific diseases and infirmities, screened for, and diagnosed in a clinical setting. For adults, where the major locus of such diseases and infirmities and health care costs resides, there are a wide variety of outcome and quality measures. The same does not hold for children. In fact, only a few of the Health Plan Employer Data and Information Set (HEDIS) of 53 measures are applicable to children and even fewer apply to young children.[54] The CMS Core Set of Child Health Quality Measures for Medicaid and CHIP, designed to develop more child-specific measures, currently is similarly limited.[55] While HEDIS and the Core Set are a starting point, they are incomplete for purposes

of the work CHWs (and those practices aspiring to responding to social determinants of health) do. Table Three depicts the measures, which, except for the developmental screening items, are limited to biomedical health.

TABLE THREE: HEDIS AND MEDICAID/CHIP CORE MEASURES APPLICABLE TO YOUNG CHILDREN

HEDIS Measures (Applicable to Young Children)

- Weight assessment and counseling for nutrition and physical activity
- Childhood immunization status
- Lead screening in children
- Well-care visits
- Annual dental visit

Medicaid/CHIP Core Measures (Applicable to Young Children)

- Weight assessment and counseling for nutrition and physical activity
- Childhood immunization status
- Well-child visits in first 30 months of life
- Developmental screening in the first 30 months of life
- Ambulatory care emergency department visits
- Oral evaluation, dental services
- Consumer assessment of healthcare providers and systems

While not generally part of most current pediatric screening, and often requiring observation and parental reporting to detect, there are validated and recognized metrics for measuring child health beyond clinical/medical health, e.g. across cognitive, social/relational, and emotional/behavior health.. Particularly for young children, these relate to the foundations for healthy development such as bonding, secure attachment, nurturing, and resilience.

In addition to child-specific outcomes related to health and development, there also are outcomes related to family safety, stability, and nurturing and to practice and community responses. All have impacts upon the child's overall healthy development and life course health.

Table Four provides questions that metrics could help answer related to the outcomes that CHWs are expected to achieve at these different levels. Since each developmental stage of a child's life involves different expected milestones, Table Four first includes child outcomes during early childhood specifically before providing more generic outcome areas for all children.

TABLE FOUR: OUTCOMES METRICS FOR CHWs IN PRIMARY HEALTH CARE SYSTEMS – LEVELS AND CORE QUESTIONS METRICS SHOULD ADDRESS

LEVEL	KEY QUESTIONS THAT METRICS SHOULD TAKE STEPS TO MEASURE
Young Child Level	Does the child demonstrate secure attachment to caregivers and explore the environment from a circle of security?

	Has the child developed early self-regulation that includes patience, persistence and resiliency when experiencing obstacles? Does the child exhibit appropriate: • motor development • language development • early socialization • autonomy • problem-solving • emotional development? Does the child exhibit a positive view toward self, mindfulness and beginning empathy to others? Is the child happy, healthy, loving and eager?
Child Level Generally	Is the child growing, developing, behaving, learning, and establishing relationships with others reflective of the child's age and abilities? Is the child building upon strengths and sharing with and contributing those with others?
Home and Family Level	Are the child's primary caregivers (e.g. parents) bonded with the child and nurturing and attentive? Do the parents provide a safe and stable home environment? Do the parents meet the child's basic needs? Do the parents recognize and respond to any special needs the child may have? Do the parents read, sing, laugh, and engage in serve-and-return activities in their time with the child? Do the parents seek to minimize stress for the child? Do the parents expose the child to the larger world through a positive support system of family and friends?
Practice Level	Do the parents and does the child feel more valued by and have greater trust in the health practice? Are the parents more likely to follow the medical actions recommended by the practice for the child? Do other members of the practice and medical home team incorporate the expertise of the CHW about the child and family into their work? Does the practice make better use of child and family goals and desires in its overall responses, including in its planning and governance?

Community Level	Is the clinical practice better known and recognized in the community as a positive source of support to families and a good collaborator with the community? Does other organizations and institutions in the community collaborate with CHWs and the practice in support children and families? Have there been enhancements in the community to support healthy child development as a result of the CHW's activity and advocacy?

CHWs are not solely responsible for achieving these outcomes and impacts, but they can contribute to and often are difference makers in achieving them. While these questions generally cannot be measured through traditional medical testing, they can and should be subject to measurement, largely through screening and observation. Different scientific literatures – largely in the social sciences [and not medicine] – have developed validated screening tools, survey questions, and other reporting systems which can be built upon to better appreciate the multiple, multi-level contributions of CHWs to the child, family and community health.

Young Child Level. Brain research has pointed to the critical importance of the earliest years to setting the foundation for lifelong health and learning, with child's health most dependent upon secure attachment. Constructs and measures have been developed for young child well-being during these years around bonding and attachment, motor development, language, socialization, and emotional development. They include early self-regulation, early mental health, and early socialization. While different research efforts have focused upon different constructs (often establishing validated measures for them) – bonding, hope, mindfulness,[56] flourishing,[57] self-regulation, resilience, persistence, autonomy, empathy, early mental health – there is considerable overlap in the measurement definitions.

Home and Family Level. The literatures on protective factors, social determinants of health, and parental nurturing have developed metrics for assessing the quality of home life along multiple dimensions, including the elements of household material well-being, parent personal well-being, family social well-being, and parental relational well-being, as shown in Chart One. Constructs such as family hardiness,[58] family self-sufficiency, family resilience, authoritative parenting, and family support also offer measures at this level. For both the child level and the home and family level, the National Survey of Children's Health provides a number of measures that go well beyond those found in either HEDIS or the Medicaid/CHIP Core Measures. A recent scoping review of measures of "family functioning identified 50 unique measures.[59]

Practice Level. Practices that decide to add a CHW to their staff initially often do so thinking that the CHW can fulfill the practice's responsibility for responding to social determinants of health, much as a referral to a subspecialist can respond to a specific medical condition, or can help to better integrate the medical recommendations into the family life, as a clinician extender. In fact, however, a key to the CHW's effectiveness often involves producing greater responsiveness within the practice to the child and family's multiple needs and desires. Because of their close ties and connections to the community as well as the family, CHWs often serve as bridges in ensuring the practice is culturally and linguistically responsive to the people it serves. Metrics that include patient satisfaction surveys and staff reflections should include their perceptions of the roles and impact of CHWs.

Community Level. The systems building, service integration, and community-building literatures have identified many of the qualities of safe and supportive communities.[60] While community itself can be a physical area or a set of social affiliations and networks with which a child and family are engaged, the focus most often is upon place, with a particular emphasis upon geographic areas (usually at a neighborhood level well below a city or county) with which residents identify.

Research has shown there is huge variation in the make-up of such neighborhoods, with the highest-vulnerability[61] or highest opportunity[62] neighborhoods requiring substantial community-building supports as well as individual services to children and families. One significant role for CHWs is to strengthen the relationships between the practice and the community and to support families and practices in strengthening their social (and economic and physical) capital within the community.

Obviously, there are limits to what any one CHW intervention or activity can do – at the child, family, and particularly at the community level – in affecting community-wide response and change. Measurable changes or gains in community response to both children and families or the practice itself are likely to be highly individualized and, in many respects, anecdotal. At the same time, broader community-level changes lend themselves to enumeration through measurement tools such as results mapping or goal attainment scaling. They include a focus upon assets and potential as well as deficits and current limitations.[63]

Developing Metrics. What should be clear from this discussion is how different contextual, outcome and process and performance measures are from those in the current limited federal child health outcomes frameworks. Developing these metrics, drawing upon many validated tools (largely from the child development and family support fields), is needed and involves combinations of practitioner observations, select screening tools, and a good deal of child and family reporting on health and development status. To fully assess impact also requires attention to additional impacts to others in the community, particularly those interacting with the family. CHWs, often through the actions with the families they serve, strengthen the social capital and web of positive connections and ties within the community that have benefits much beyond the individual children and families being served.

Finally, when government or health systems make investments in CHWs, new jobs are created and sustainable career opportunities and pathways for people within communities established. This in turn provides benefits to the community economically and socially, as these workers represent "points of light" and sources of community building within their communities. This also provides benefits to the CHW herself and to her own, immediate family. When CHWs speak of their own growth and development and what this work has meant to them, this can be viewed as anecdotal information but, in fact, the accumulation of such experiences and growth across the workforce can be a powerful outcome in its own right.

Summary and conclusions: The tasks ahead.

Well-designed and implemented CHWs in primary child health care represent a proven, holistic, and relational response to strengthening children, families, and their communities. CHWs can play a foundational role in a systemic response to advance racial equity and improve population health as part of a medical home team.

Present child health metrics, however, fail to reflect either what is needed to support CHW effectiveness in their roles or to measure what impacts they produce at the child, family, practice, and community levels. This paper attempts to outline the development of a comprehensive CHW metric framework –

both to enhance and synthesize and learn from the existing CHW research and evaluation literature and as a key element in advancing the design and implementation of CHWs.

For best implementation, CHWs require adequate financing, recruitment and selection according to the skills they need, supervision and support ensuring continuous learning and improvement, recognition and value as core members of the medical home team, and support as vital community partners.

This requires developing new metrics at the funding, institutional, organizational, worker, and community levels– to ensure effective implementation, improvement, and an authentic and sustaining learning system.[64]

The impacts that CHWs produce with children and their families relate to advancing child development appropriate to the child's age and stage of development, strengthening protective factors (parental safety, stability, and nurturing) in the home, improving overall clinical practices to be more responsive, and strengthening social connections and supports within the community. This requires developing metrics related to impacts and outcomes at the young child level such as secure attachment, positive identity, early self-regulation, and resilience and at the family level such as parenting stability and nurturing – all integral to life course health but rarely subject to measurement and attention in the clinical setting.

The health care system does not need to start from scratch in developing these. The child development, systems reform, and family support literatures – among others – provide a number of validated metrics that need to be incorporated into measurement, quality improvement, and accountability systems for primary child health care systems.

Moving from efficacy (demonstrated results in a controlled setting) to effectiveness (applied in the larger world) in deploying CHWs is not a simple matter of directing CHWs to carry out a specific task, treatment, activity, or protocol and then being held to a specific defined child outcome. It requires much more attention to the CHW's holistic and systemic roles and what supports must be in place to ensure CHWs succeed, feel valued and can perform this role sustainable development. The development of a CHW metrics framework is a key element to generate additional political will for CHWs to create more effective CHW learning systems, and to assure that there is a strong science base for CHW practice. It also is key to guiding practices in their role of promoting healthy child development, whether or not they employ CHWs as a core component of their practices and medical home teams.

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[1] This is the first provision in the Constitution of the World Health Organization signed by sixty-one countries on July 22, 1946. The Constitution is retrievable at: https://www.who.int/about/governance/constitution "

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[3] Depending on the source, there are 5 or 7 or 8 dimensions of health and well-being. The formulation here includes the concepts and terminology from these different iterations. One of the newer concepts is that of "relational health" and, specifically, "early relational health" as represented, in particular, with the young child's relationship with the child's immediate family and caregivers. David Willis, now a Senior Fellow at the Center for the Study of Social Policy, has led in developing the concept of early relational health as key to overall healthy child development. CSSP's webpage about relational health and their national hub can be accessed at: https://cssp.org/our-work/project/advancing-early-relational-health/. Willis also provides a lead commentary in an

InCK Marks Working paper on a relational health workforce. Bruner C, with commentaries from Willis D, Hayes M, Bethell C, Dworkin P, Houshyar S and Gallion J, Johnson, K and Bailey, M (March 2021). *Building A Relational Health Workforce for Young Children: A Framework for Improving Child Well-Being*. InCK Marks Working Paper Series. No. 7. Retrievable at: https://www.inckmarks.org/rsrcs/RelationalHealthWorkforceWP7.pdf From the measurement side, Christine Bethell has advanced the concepts of "medical risk," "social risk," and "relational risk" as three constructs impacting overall optimal healthy development and growth, drawing upon the National Survey of Children's Health to show all have independent and interacting effects on healthy development. See: Bethell C, Blackwell C, Garner A, Davis M, and Bruner C (2021). Creating high value, integrated approaches to mitigate children's complex medical, social, and relational health risks: Validation and national findings on the whole child complexity index. Health Services Research. Abstract retrievable at: https://onlinelibrary.wiley.com/doi/epdf/10.1111/1475-6773.13837

[4] Risk and protective factors have a long history, starting in the juvenile justice literature by Catalano and Hawkins. Under a grant from the Doris Duke Foundation to the Center for the Study of Social Policy, Carol Hinton reviewed the literature to identify five protective factors related specifically to young children and child abuse prevention: parental resilience, social connections, knowledge of parenting and child development, concrete supports in times of need. This protective factors framework has been adopted by many working in the early childhood system, including in primary child health care. See: Horton C (2003). *Protective Factors Literature Review: Early Care and Education Programs and the Prevention of Child Abuse and Neglect*. Washington, DC: Center for the Study of Social Policy. Metzler, M. (2007). The CSSP webpage and information about the framework can be accessed at: https://cssp.org/our-work/projects/protective-factors-framework/ .

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[9] Jack Shonkoff has built upon the adverse childhood experience literature (see note 34) by describing the stresses that ACEs cause, with an emphasis upon distinguishing among positive stress, tolerable stress, and toxic (prolonged or extreme) stress, with the latter the cause of many adverse childhood outcomes. Shonkoff and the Center on the Developing Child have popularized the use of the term "toxic stress" and the importance of moving beyond counting ACEs in identifying causative factors for compromised children development to addressing underlying issues and concerns with stress. See: Shonkoff J, Garner A. Committee on Psychosocial Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*. 129 (1:e232-46. doi:10.1542/peds.2011- 2663.

[10] The Centers for Disease Control and Prevention and Healthy People 2030 describe social determinants of health as "conditions in the places where people live, learn, work, and play that affect a wide range of health outcomes" and outline five key areas for them: healthcare access and quality, education access and quality, social and community context, economic stability, and neighborhood and the build environment. This description is found on

the CDC webpage "Social Determinants of Health: Know What Affects Health," retrievable at: https://www.cdc.gov/socialdeterminants/about.html People differ on whether or not lifestyle issues are a consequence of social conditions and factors and should be treated as social determinants. The World Health Organization's seminal report on social determinants of health, *Social Determinants of Health: The Solid Facts,* includes stress, the social gradient, and addiction among social determinants of health, including addiction because "individuals turn to alcohol, drugs, and tobacco and suffer from their use, but use is influenced by the wider social setting." (p. 24). Wilkinson R, and Marmot, M (eds.) (2004). *Social Determinants of Health: The Solid Facts.* World Health Organization. Whether considered lifestyle or a social/economic factor, however, treating the condition generally requires a supportive social environment. The WHO website page on social determinants of health has a different enumeration of examples of social determinants of health than the initial study and suggests they account for between 30 and 55 percent of health, exceeding the contributions of the health sector. The examples on the webpage are: income and social protection; education; unemployment and job insecurity; working life conditions; food insecurity; housing, basic amenities and the environment; early childhood development; social inclusion and non-discrimination; structural conflict; and access to affordable health services of decent quality. The webpage can be accessed at: https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

[11] Healthy People 2030 stresses the critical role of parenting in healthy child development: "*Healthy People 2030* recognizes the primary role families play, with ecological goals that go well beyond medical care. … [It] focuses on ways to directly and indirectly improve children's health, safety, and well-being. Safe, stable, and supportive relationships are critical for children's health, development, and well-being. Family-level interventions can help keep children safe and healthy." Office of Disease Prevention and Health Promotion (2022). Healthy People 2030 Website. https://health.gov/healthypeople/objectives-and-data/browse-objectives/children

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[13] The Affordable Care Act established *Bright Futures* as the standard for primary and preventive health care, and *Bright Futures* provided detailed guidelines for the content of well-child visits and their periodicity schedule. The 4th edition of *Bright Futures* added substantially to the responsibility to identify and respond to social determinants of health, but from the outset *Bright Futures* has taken a very broad view of healthy development and the child health primary care practice responding to social as well as biomedical issues that impact child health. Hagan, J, Shaw, J, Duncan, P (2018). *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*, 4th Edition. Elk Grove, IL: American Academy of Pediatrics.

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Academy of Pediatrics (2003). Family pediatrics: Report of the Task Force on the Family. *Pediatrics.* Vol. 111, No. 6. Retrieved at: file:///C:/Users/brune/Downloads/TaskForceontheFamilyReport.pdf. While at the Commonwealth Fund, Dr. Schor led work on the decade-long Assuring Better Child Development (ABCD) Initiative (2000 to 2010), furthering the concept of pediatric practice to respond early to children around their healthy development. A recent overview of Schor's continuing work and thinking can be found at: Schor E, and Bergman D (2021). Pediatric preventive care: Population health and individualized care. *Pediatrics.* Vol. 148, Issue 3.

[17] See, in particular: National Advisory Team (2020). *Young Child Health Transformation: What Practice Tells Us.* InCK Marks Working Paper. Retrievable at: https://www.inckmarks.org/webinars/InCKMarksPracticeTransformationComponentfinalpdf.pdfhttps://www.inckmarks.org/webinars/InCKMarksPracticeTransformationComponentfinalpdf.pdf This paper summarizes different syntheses of effective and evidenced-based programs in early childhood relating specifically to pediatric practice by NICHQ, CSSP, NASEM, RAND, HERWJ, and HE&YC and the practice principles noted in these summaries that undergird them. The National Academy of Science and Medicine has issued several detailed reports that speak to early childhood and the importance of strengthening families to support healthy development. While not singling out as a category specific pediatric program interventions, many, including Reach Out and Read and HealthySteps, are referenced as exemplary and evidenced-based programs. See: National Academies of Sciences, Engineering, and Medicine. (2015). *Strategies for Scaling Tested and Effective Family-Focused Preventive Interventions to Promote Children's Cognitive, Affective, and Behavioral Health*. Washington, DC: The National Academies Press. See also: National Academies of Sciences, Engineering, and Medicine. (2019). *Fostering Healthy Mental, Emotional, and Behavioral Development in Children and Youth: A National Agenda*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25201. See also: National Academies of Sciences, Engineering, and Medicine. (2016). *Parenting Matters: Supporting Parents of Children Ages 0-8*. Washington, DC: The National Academies Press. doi: 10.17226/21868.

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[21] At the federal level, the Early Childhood Comprehensive Services (ECCS) Initiative, created in 2001, presented an initial framework and support to states to explore more integrated responses to children and families. A consortium of foundations supported the BUILD Initiative to accelerate innovation and learning, which has continued to this day to be a focal point for early childhood systems building. A 2005 Working Group of those in the early childhood field provided a framework that included health care, but the major focus and attention has been on early care and education. For a description of this work and how it could integrate an expanded role for child health care, see: Bruner C (2012). A Systems Approach to Young Children's Healthy Development and Readiness for School, in Kagan S and Kauertz K (eds.). *Early Childhood Systems: Transforming Early Learning.* Teachers College Press. P. 35-41. Retrievable at: https://books.google.com/books?hl=en&lr=&id=CZgbAgAAQBAJ&oi=fnd&pg=PA35&dq=bruner+early+childhood+health&ots=lH-LMTbpdJ&sig=AURQxLez97kQhruzJAMY2BegX90#v=onepage&q=bruner%20early%20childhood%20health&f=false

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