

**Technology-Enabled Innovations in Children's Health  
Forecast Points  
May 2009**

*For the full booklet, with background and supporting information, go to  
[www.childrenspartnership.org/HITInnovationForChildren](http://www.childrenspartnership.org/HITInnovationForChildren)*

**POPULATION EXPERIENCE**

Forecasts in this category relate to changes in population experience that influence and are influenced by technology development, adoption, and dissemination.

- 1. Cell phone and mobile technology becomes ubiquitous and affordable in providing care support for children and families, enabling a greater amount of self-care.**
  - a. 0-2 years: Cell phones are a "given" for most families, regardless of socioeconomic status.
  - b. 2-5 years: An increasing number of services are primarily delivered via mobile platforms. Older children and adolescents are highly adept at using cell phones to support access to health information, health management, and treatment adherence.
    - i. Example: UNC text messaging study for management of obesity and healthy behavior
  - c. 5-10 years: Universal access to broadband and cell phones with more sophisticated functional capabilities (such as video, SMS, picture and Internet capabilities) enable more complex healthcare services and management applications to be delivered.
  
- 2. Portals for user entry into public services or benefits programs become simpler, more user-friendly, and electronically available through technology.**
  - a. 0-2 years: Families are able to apply online to determine eligibility for benefits programs in most states, though some states still require paper documentation.
    - i. Example: One-E-App (CA and other states)
  - b. 2-5 years: Outreach using case workers to connect families to services increasingly incorporates technology such as videoconferencing and data tracking.
    - i. Example: SingleStop USA
  - c. 2-5 years: Online programs allow more direct enrollment and less paper documentation due to electronic verification of information with other databases.
    - i. Example: Utah Clicks
    - ii. Example: Pennsylvania COMPASS
  - d. 5-10 years: Most benefit enrollment programs are entirely online, and automate enrollment by identifying eligible enrollees through other database systems.
    - i. Example: Express Lane Eligibility
  - e. 5-10 years: Integrated portals provide coordinated access to other support services such as transportation, nutrition services, and social services.
  
- 3. Technologies expand culturally competent services and outreach to underserved populations.**
  - a. 0-2 years: Providers offer language translation services to diverse patient groups through the use of multilingual websites and audio-visual translation technology.
  - b. 2-5 years: Continued demand for culturally competent services drives increased adoption of technology in order to support the delivery of these translation services.
    - i. Example: Kern County's use of Spanish-language media for outreach
  - c. 2-5 years: Audio-visual on-demand medical interpretation services are provided by healthcare providers, though funding limitations remain a barrier to broad deployment.

- d. 5-10 years: Video interpretation for health services evolves into both a linguistic and cultural interpretive service, facilitated via a state or national healthcare interpreting network ASP.
    - i. Example: Health Care Interpreter Network
- 4. Patients have improved access to specialists and services via telehealth, initially in rural and later in urban areas.**
- a. 0-2 years: Telehealth addresses shortage of specialists in rural regions, as well as provides connections for ED consultations and other acute care.
    - i. Example: University of California Davis Medical Center Telehealth Program
  - b. 2-5 years: Telehealth becomes an integral part of the normal workflow for many rural sites as reimbursement for such services expands, allowing for better management of chronic diseases.
    - i. Example: Open Door Community Health Centers
  - c. 5-10 years: Rural populations use telehealth to access preventive and other services, such as obesity treatment and management.
    - i. Example: University of California Davis Medical Center Telehealth Program
  - d. 5-10 years: Telehealth becomes integrated into service delivery for most settings, including urban settings, to leverage specialty and culturally appropriate services.
    - i. Example: Tele-interpreting and Tele-stroke
- 5. Economics and convenience drive more families to access services at alternate sites of care.**
- a. 2-5 years: School-based clinics providing physical and mental health services expand in number for both children and adolescents. Funding limitations remain a barrier to broad deployment.
    - i. Examples: Alameda County (CA), The Children's Trust HealthConnect (Miami Dade County, FLA)
  - b. 2-5 years: Retail clinics expand in number and the range of services offered due to increasing consumer demand for after-hours care.
  - c. 5-10 years: Reimbursement rates and billing opportunities for providing care services at alternate sites increase, driving further expansion of retail clinics. School-based health centers continue to expand but at a slower rate.
  - d. 5-10 years: Dependence on ED for primary care slowly lessens as alternate sites of care serve a broader population.
  - e. 8-10 years: Retail clinics and school-based clinics supplement community clinics as important sources of care for children in poverty.
- 6. Obesity is recognized as a public health issue, leading to increased collaboration between non-health providers.**
- a. 0-2 years: Schools increasingly modify the nutritional component of school lunches in an attempt to drive healthier behaviors and outcomes.
  - b. 2-5 years: More states begin to legislate the tracking and reporting of BMI in schools.
    - i. Example: Arkansas BMI Initiative
  - c. 5-10 years: State or local governments mandate the inclusion of structured physical activity and specific diets in schools to combat obesity.
    - i. Example: Eat, Exercise, Excel from Leavenworth, Kansas
    - ii. Example: Healthy For Life/PE4ME from Orange County, California
- 7. Social media and gaming platforms develop targeted applications for special needs children, behavioral health care, and public health.**
- a. 0-2 years: Social networks offer patients with chronic conditions moderated peer-to-peer discussion forums to support care management and reduce social isolation.
    - i. Example: Starlight/Starbright Foundation (Starlight World)
  - b. 0-5 years: Social networks expand information-sharing and advocacy applications for children in foster care and with special needs.
    - i. Example: Trilogy Integrated Resources

- c. 2-5 years: Serious gaming expands with applications for specific behavioral and developmental conditions.
    - i. Example: Second Life for autism using avatars
  - d. 5-10 years: Social media becomes a standard platform used by public health agencies at the local, state, or federal levels to push public health messages.
    - i. Example: Centers for Disease Control and Prevention (CDC) projects – flu shots outreach via Whyville for children, PPSA project to encourage HIV testing in adolescents
    - ii. Example: Internet Sexuality Information Services (ISIS) – STDtest.org text messages in San Francisco
- 8. Adolescents and children become more selective about sharing personal health information as applications involving open data sharing and user-generated content increase.**
- a. 2-5 years: Experiences on Facebook and MySpace transform the norms for information sharing among adolescents and children.
  - b. 2-5 years: Teens increase their use of 'control' technologies that allow more granular and selective information sharing with parents and clinicians.
    - i. Example: Sharing partial personal health record rather than entire record
  - c. 5-10 years: Adolescents continue to become more sophisticated and judicious about data sharing, leading to progress on establishing more data sharing norms.

## SERVICE

Forecasts in this category relate to how changes in the way services are offered, delivered & coordinated influence and are influenced by technology development, adoption, and dissemination.

### **9. Self-management and services delivered at alternate sites increase in response to chronic health problems such as obesity, asthma, and developmental and behavioral issues.**

- a. 0-2 years: An increase in the availability of provider-based online patient portals allows some families greater access to their health information, as well as the ability to receive results and monitoring information in the home.
- b. 2-5 years: Home-based (including Internet and mobile) gaming, and self-management technologies become more widespread to help parents and children manage chronic conditions.
  - i. Example: Text-based messaging reminders for medication management
  - ii. Example: Starlight/Starbright Foundation – Get Fit Get Right
  - iii. Example: DPS Health
- c. 2-5 years: The usage of cell phones to remind, monitor, and provide feedback for chronic disease management becomes widespread for school-age children, adolescents, and parents.
- d. 5-10 years: Retail clinics\* and other alternate sites of care, including schools, move increasingly into providing chronic disease management services.

### **10. Mandated screening targets an increasing number of conditions and shifts from diagnosis to risk assessment with the use of family history and genetic markers.**

- a. 0-2 years: Use of both paper-based and computer-based survey instruments to screen patients varies depending on the site of care.
- b. 2-5 years: New mandates for screening specific conditions drive the expansion of screening tools and questionnaires.
  - i. Example: Modified Checklist for Autism for toddlers (M-CHAT)
- c. 2-5 years: Screening is primarily computer-based and is administered through pre-visit questionnaires to allow for more targeted and customized visits. Screening questionnaires are increasingly linked to EMRs and patient portals.
  - i. Example: Child Health & Development Interactive System (CHADIS) (not currently linked to EMR)
  - ii. Example: The Child and Adolescent Health Measurement Initiative (CAHMI)
- d. 5-10 years: Advances in genetic research drive the use of biomarkers in newborn screening panels, which test for developmental conditions and assess individual risk for less specific conditions.

### **11. 211 and online models for universal information access (utility-style programs) evolve to refer and connect families to appropriate services.**

- a. 0-2 years: Utility-style programs increase in number of sites and states, including CA, to provide referral information for at-risk families.
  - i. Example: Connecticut Children's Trust Fund – Help Me Grow
- b. 2-5 years: Utility-style programs continue to spread and are increasingly integrated into 211 systems at the local or state level. These programs help facilitate connections between different community resources, in addition to referring families.
- c. 5-10 years: Utility-style programs increase their reach, capabilities, and connections to community resources.
- d. 5-10 years: Web-based registration and scheduling become part of the utility platform to connect families to government resources.
  - i. Example: One-e-App

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\* CA slower for retail clinics due to strict regulatory requirements

**12. Health services for children are increasingly delivered electronically via mobile, gaming, and telehealth platforms:**

**12a. Mobile platforms are increasingly used to enhance care delivery, provide disease management services, and access patient information.**

- a. 0-2 years: Many small-scale pilots demonstrate the value of text-based messaging applications using cell phones in the delivery of disease management services, but evidence of benefits is lacking.
  - i. Example: UNC text messaging study for management of obesity and healthy behavior
  - ii. Example: BeWell Mobile
  - iii. Example: University of California Irvine Neonatal Intensive Care Unit program
- b. 2-5 years: Cell phones become widespread in disease management for chronic conditions through the use of adherence and reminder mechanisms. Vendors push cell phone health management technologies direct to consumers for chronic illness, health promotion, and education efforts.
  - i. Example: Vanderbilt study on PHR-linked mobile reminder systems
- c. 2-5 years: Cell phones are increasingly used to access patient portals for appointments, lab results, and pharmacy. Cell phones are also increasingly integrated with online and other media formats, and are used to augment in-person services.
  - i. Example: Texting from web browser
  - ii. Example: Internet Sexuality Information Services (ISIS) marketing through radio, online and other formats
- d. 5-10 years: Cell phones are widely incorporated into other health platforms such as EMRs, PHRs, and gaming.

**12b. Health games expand beyond online applications targeting chronic illness, to include wellness and prevention for phones and gaming consoles.**

- a. 0-2 years: Online games help improve self-efficacy and adherence for children with chronic illness and developmental issues, while reducing stigma associated with such conditions through engaging and stimulating game formats.
  - i. Example: Hope Lab games for cancer
  - ii. Example: Starlight/Starbright Foundation games for asthma and obesity
- b. 0-2 years: General wellness and fitness games for gaming consoles are widespread. These games are increasingly used in health promotion programs but not as a part of routine healthcare delivery.
  - i. Example: Wii Fit and other Wii fitness games
  - ii. Example: Dance Dance Revolution
- c. 2-5 years: Games for chronic illness are available on cell phones, in addition to online, where they reach a wider audience.
- d. 5-10 years: Online and phone games are developed for general wellness and health promotion.
  - i. Example: Centers for Disease Control and Prevention (CDC) flu shot and HIV prevention games
- e. 5-10 years: Specialized games for chronic illness develop for gaming consoles, allowing these games to reach a wider audience of children.

**12c. Telehealth applications expand, particularly for rural communities and special needs children.**

- a. 0-2 years: Telehealth is used to connect providers serving children in rural communities. Connections directly to the home for children are rare.
  - i. Example: Texas Tech F. Marie Hall Institute for Rural and Community Health
  - ii. Example: Open Door Community Health Centers
- b. 2-5 years: Telehealth becomes increasingly integrated into rural healthcare delivery

- workflows due to increased reimbursement and better communications networks.
- c. 5-10 years: Telehealth is increasingly established in school districts and child-care settings.
  - i. Example (child care): University of Rochester Medical Center (Health-e-Access)
- d. 5-10 years: Telehealth becomes a routine part of care/service delivery for rural providers, specialty consultations, training applications, and expands into prevention. Reimbursement continues to improve as telehealth demonstrates strong patient outcomes and user satisfaction at reduced costs.
  - i. Example: UC Davis Medical Center, Telehealth Program
- e. 5 to 10 years: Telehealth delivers services in the home for chronically ill and special needs children.

**13. Technology is used to leverage home visiting programs targeted at children of at-risk families and children with special health-care needs.**

- a. 0-2 years: Home visiting programs for vulnerable families prove their value with evidence-based results, but are difficult to scale due to high nursing resource utilization.
  - i. Example: Medically Vulnerable Infant Program
  - ii. Example: Nurse Family Partnership
- b. 2-5 years: Mobile technology is used to bolster programs, using functionality such as still photos, video clips, and text messaging.
  - i. Example: University of California Irvine Neonatal Intensive Care Unit program
- c. 5-10 years: Programs increasingly use interactive video and remote services to further achieve scale. Training for these programs is increasingly virtual.

## SETTINGS & FACILITIES

Forecasts in this category relate to how changes in settings & facilities influence and are influenced by technology in development, adoption, and dissemination.

### **14. Poverty and consumer demand for access drive the delivery of healthcare services at alternate sites of care, rather than traditional pediatricians' offices.**

#### **14a. Community clinics play a growing and essential role in providing safety net services.**

- a. 0-2 years: Increased funding due to the federal stimulus leads to significant expansion of community clinics, which increasingly include consolidated dental and behavioral health services.
- b. 0-2 years: Community clinics continue to consolidate, creating larger networks and reducing the number of standalone clinics.
- c. 0-2 years: Community clinics move towards adoption of EMR/EHR systems that integrate records for patients.
  - i. Example: Clinica Sierra Vista EMR adoption
- d. 2-5 years: Community clinics are essential at providing services for rural areas, where school-based and retail clinics are more difficult to find.
  - i. Example: Open Door Community Health Centers
  - ii. Example: Northern Sierra Rural Health Network
- e. 2-5 years: Many school-based clinics are sponsored by community clinics, facilitating better use of technology and coordinated care.
- f. 5-10 years: An increasing number of community clinics provide services through expanded service hours and access at other community locations, such as WIC sites and churches.

#### **14b. School-based clinics continue to expand and start to serve as hubs in communities to provide access to health resources for other members of the family.**

- a. 0-2 years: School-based clinics continue to expand (with funding and operating models depending on location) to provide wellness and episodic care services for children, particularly adolescents.
- b. 0-2 years: Increased federal funding and the ability to bill for services drive the expansion of school-based clinics in low-income areas.
- c. 2-5 years: School-based clinics expand to act as a community service hub for other members of the family, including preschool children and mothers.
  - i. Example: Newport Mesa school district Mommy and Me classes
  - ii. Example: Daycare services for preschool children
- d. 5-10 years: School-based clinics increasingly incorporate technologies such as telehealth and mobile platforms to deliver care, with an increasing emphasis on self-management and care of chronic illness.
- e. 5-10 years: Standalone school-based clinics become rare, as many are tied to community clinics. Some also form partnerships with retail clinics.
  - i. Example: Miami Dade County HealthConnect clinics/Walgreens partnership
- f. 5-10 years: School-based clinics that have EHRs and share information with health systems, clinics, or HIEs become more widespread, leading to better coordination of care for children across community settings.

#### **14c. Retail clinics expand in some areas to fill the gap for episodic care and eventually well-child visits for some families, though growth depends on regional economic and regulatory restrictions.**

- a. 0-2 years: Retail clinics provide a convenient option for episodic care but see mixed success. Licensure and other restrictions limit growth in California.
  - i. Example: Walgreens does not operate retail clinics in California
- b. 2-5 years: Retail clinics continue to be slow to develop for rural areas due to provider competition, cultural issues, and small market volume.

- c. 2-5 years: Retail clinics deliver additional well-child services such as well-child check-ups, immunizations, and physicals.
  - i. Example: Retail clinics working with California Dept. of Health to think about how to distribute children's immunizations
- d. 5-10 years: Retail clinics further expand offerings by adding services for chronic disease management.
- e. 5-10 years: Retail clinics integrate more technology into workflow, including kiosks, web portals/records, and telehealth for some sites. Retail clinics increasingly share data with patients' primary care physicians and HIEs.

**15. Children's hospitals become more highly sub-specialized by almost exclusively providing tertiary care and care of special needs children, and are much less focused on ambulatory and routine care.**

- a. 0-2 years: Increased acuity as well as shifting of complex pediatric care to children's hospitals strains their capacity.
- b. 0-2 years: Children's hospitals continue to provide some specialty services to community hospitals, who find it difficult to maintain pediatric expertise.
  - i. Example: Telehealth specialty consultations and ICU support
- c. 2-5 years: Primary care ambulatory clinics associated with children's hospitals begin to be phased out, due to an increasing focus on specialized tertiary care.
- d. 5-10 years: Difficulty continues to exist for transitioning children with serious chronic diseases to adult providers. Children's hospital-based pediatricians and specialists maintain these patients for life.
- e. 5-10 years: Children's hospitals monopolize specialty pediatric care.

**16. Traditional community pediatrician practices contract and consolidate.**

- a. 0-2 years: Economic conditions drive more visits to community clinics, as many community pediatricians do not accept public insurance.
- b. 2-5 years: Community pediatricians lag in implementing EMRs and other HIT solutions due to cost concerns. Small practices have difficulty surviving, particularly in rural areas.
- c. 5-10 years: A subset of community pediatricians succeed through the implementation of EMRs, joining professional associations for purchasing and support, offering care managers for referral and other HIT solutions, and moving into more specialized care.
  - i. Example: Use of Healthy Steps programs for referrals

**17. Downshifting of care and increased self-efficacy creates an ever more medicalized home, for children with chronic diseases and with special needs.**

- a. 0-2 years: Care previously provided in a hospital is increasingly done at home.
  - i. Examples: Ventilators, tube feedings, home dialysis, IV antibiotics
- b. 2-5 years: Mobile technology and telehealth platforms support earlier discharge.
  - i. Example: Video cell phones for neonates.
- c. 5-10 years: Remote services connecting the home to provider or care manager expand, allowing home care for more acute episodes.

## REGULATIONS & STANDARDS

Forecasts in this category relate to how changes in regulations & standards influence and are influenced by technology development, adoption, and dissemination.

### **18. Payment reform necessitates increased use and adoption of HIT by all practices.**

- a. 0-2 years: The federal stimulus drives EMR and other HIT adoption and rewards use for practices that accept public insurance, which excludes many community pediatrician practices.
- b. 2-5 years: Pay-for-performance requirements make EMR data tracking and evidence of associated outcomes necessary.
- c. 2-5 years: Payments for participation in HIEs (which necessitates an EHR) become more common.
- d. 5-10 years: Payors penalize providers that do not have certified EMRs that connect to pharmacies and other organizations like HIEs.

### **19. Economic and regulatory pressures to downshift care meet with strong pushback from professional organizations and providers, but advance despite resistance.**

- a. 0-5 years: Shortages of pediatric providers at every level increase pressure for downshifting, necessitating licensure and scope of practice modifications. This is particularly difficult in California, given current regulations.
  - i. Example: School insulin injections requiring RNs
- b. 2-5 years: Professional organizations and unions strongly counter efforts to downshift care.
- c. 5-10 years: The practical reality of clinician shortages in providing care services leads to continued downshifting regardless of organized pushback.
  - i. Example: Prescriptive Authority to Psychologists Act (New Mexico)

### **20. Proprietary and business interests trump and undermine the desire for data interoperability. (**

- a. 0-2 years: Vendors develop proprietary HIT solutions with little regard for general interoperability standards.
- b. 2-5 years: A few successful attempts to legislate interoperability and standards for data systems are implemented.
- c. 5-10 years: Vendors are forced to adopt interoperability requirements for larger applications, leaving smaller applications for children's health largely not interoperable.

### **21. Implementation of certifications and standards drive an increase in customized HIT solutions for children.**

- a. 0-2 years: Standards groups focused on children promote pediatric certification standards for HIT products, such as growth chart functionality, integration with immunization registries, and privacy standards.
  - i. Examples: CCHIT, HL7
- b. 2-5 years: Recommendations on basic functions from certification workgroups are adopted by most major EHR systems in large inpatient health systems, as vendors and child health standards groups work together.
- c. 2-5 years: CCHIT develops standards for pediatric specialties, though these standards are not required for certification (specialty examples: asthma, obesity, ADD, autism).
- d. 5-10 years: An increasing number of HIT vendors create functional options that are pediatric-specific in both primary and specialty pediatric care.

### **22. Privacy regulations remain an excuse for failure to share data and work on interoperability.**

- a. 0-2 years: Policy implementation and perception, rather than actual privacy laws, continue to be a large barrier to data sharing.
  - i. Example: Differences between HIPAA, FERPA, CMIA
- b. 2-5 years: The scope of health privacy laws continues to expand to protect health information in more forms and settings, but technology and behavior continue to outpace regulatory

responses and legal ambiguities remain.

- i. Example: Health data in PHRs or other applications
- ii. Example: Emerging case law on privacy of health information provided in social networks (*Beye v. Horizon* in NJ)
- c. 2-5 years: Continued ambiguity and complexity of health privacy law regarding information about adolescents impedes EMR and HIE adoption in adolescent care.
  - i. Example: Statewide Health Information Network for New York
- d. 2-5 years: Innovative counties and private organizations implement solutions that permit information sharing to improve health without unnecessarily disclosing personal information. Most other settings lag in this process.
- e. 5-10 years: Legislation, regulation, and practice align with enabling technology to support clear intra-operation of EMRs and PHRs, and the sharing of population-level data. Other forms of information sharing continue to be impeded by perceptions of privacy law.

**23. Community health worker roles are subject to certification to support reimbursement.**

- a. 0-2 years: Experiential criteria are used to define the community health worker role; as a result community health workers vary in background among different organizations.
  - i. Example: CHRISTUS in Texas using community health workers
- b. 2-5 years: The criteria become formalized for the community health worker role, leading to formal training programs. Certification programs begin to develop.
- c. 5-10 years: A broader certification process is in place for community health workers, resulting in consistency across different organizations. Selected states begin reimbursement pilots.

**24. Reimbursement changes recognize the medical home model, increasing the size of family medicine practices and pushing traditional pediatrics into a more specialized role.**

- a. 0-2 years: Family medicine practices, having the appeal of being able to care for the entire family, obtain a greater share of pediatric patients.
- b. 2-5 years: Significantly higher rate of EMR adoption for family practices and clinics provides an advantage over pediatric practices in tracking and providing patient information.
  - i. Example: Current ~50% EMR adoption by AAFP members
- c. 5-10 years: Pediatrics increasingly becomes more specialized, taking on more complex cases and less general well-child care. Some pediatricians become absorbed into family medicine practices.

## INFORMATION & COMMUNICATIONS TECHNOLOGY

Forecasts in this category relate to innovations in information and communication technology that influence and are influenced by technology development, adoption and dissemination.

### **25. An emphasis on wired connectivity results in lower cost, higher bandwidth services reaching all interested care sites.**

- a. 0-2 years: Broadband Internet access is increasingly common at home across all socioeconomic groups, though some rural areas still depend on public sites such as libraries for broadband access.
- b. 2-5 years: Telehealth expands rapidly as a result of HIT infrastructure investments from the federal stimulus, improved reimbursement, and the adoption of browser-based, internet-protocol (IP), DSL-capable services.
  - i. Example: InteractiveCare.com
- c. 5-10 years: The "last mile barrier" disappears as affordable broadband is universally accessible as a result of increased infrastructure investment.
  - i. Example: CA Telehealth Network

### **26. Mobile connectivity and devices are ubiquitous with increasing device functionality and affordability.**

- a. 0-2 years: Most school-age children and all adolescents have basic cell phones with text messaging.
- b. 2-5 years: "Smart phones" with multi-media capabilities become the device of choice for chronic disease management for children and families of special needs children.
  - i. Example: Whitney Young mobile demonstration pilot
- c. 2-5 years: "Smart phones" are the principal Internet-access device for most adolescents.
- d. 5-10 years: Specialized capabilities begin to appear for chronic disease management on "smart phones."
  - ii. Example: Smart phone with built-in glucometer

### **27. EMR adoption proliferates in children's hospitals and ambulatory clinics, while adoption lags in community pediatric practice settings.**

- a. 0-2 yrs: Children's hospitals are at Stage 4 on HIMSS EMR adoption.
- b. 0-5 years: EMRs are adopted at most large community clinic systems and hospital-associated clinics.
  - i. Example: Clinica Sierra Vista
- c. 2-5 years: EMR adoption still lags at small pediatric practices, with funding and technology support a major barrier.
- d. 5-10 years: The majority of children's hospitals, specialty practices, and community clinics are at Stage 6 or 7 of EMR adoption.
- e. 5-10 years: EMR adoption at small community pediatric practices becomes more widespread due to increasing number of lower-cost and pediatrics-focused options available.
  - i. Example: eClinical Works EMR system offered by Wal-Mart
- f. 5-10 years: Private payor-reporting requirements rewarding EMR adoption drive community pediatricians into loose associations to consolidate purchasing power and provide economies of scale in the implementation and maintenance of EMRs.
  - i. Example: Children's National Medical Center – Children's IQ Network

### **28. EMR functionality for pediatrics evolves rapidly and advanced clinical decision support becomes more common.**

- a. 0-2 years: EMRs are primarily "computerized charts" with some pediatric-specific functions and basic decision support, such as weight-based dosing.
- b. 2-5 years: Pediatric-specific functions are common. Core clinical data is structured with standard terminologies (i.e. family history) and EMR data is increasingly used to identify population health trends leading to appropriate interventions.

- i. Example (population health): Metro Health System's BMI study
- c. 5-10 years: Clinician notes are partially structured with standard terminologies. Advanced clinical decision support is common, and reduces therapeutic variation while beginning to improve diagnostic accuracy.
- d. 5-10 years: The continuity-of-care-document (CCD) standard results in sharing of essential information among medical, behavioral health, and dental practitioners. Sharing of data beyond this essential information continues to be a struggle.

**29. PHRs enhance self-efficacy and eventually become ubiquitous patient portals.**

- a. 0-2 years: Tethered PHRs sponsored by large healthcare systems prove very successful.
- b. 0-2 years: Untethered PHRs are limited in adoption as patients and their families struggle to find their user value. Certain models find success for niche populations such as special needs children, foster children, and migrant families.
  - i. Example: MiVIA, mainly for migrant farmworkers and their families
- c. 2-5 years: Untethered PHRs increasingly demonstrate efficacy in coordinating care for special needs and chronically ill children, while linking to additional resources relevant to serving the needs of children and their families.
- d. 5-10 years: Consumer demand and proliferation of EMRs drives tethered PHRs to become a standard part of provision of care. Untethered PHRs become a smaller niche market.
- e. 5-10 years: Most care delivery systems have fully maximized patient portals, some of which offer the capability to integrate information from untethered PHRs.
  - i. Example: Kaiser Health Connect
  - ii. Example: Parents will expect pre-visit questionnaires in the PHR

**30. Health Information Exchanges (HIEs) and other data sharing initiatives proliferate to support continuity of care.**

- a. 0-5 years: HIEs link with both public and private data sources, including healthcare providers, schools, and state-run immunization registries.
  - i. Example: CORHIO linking to four large Denver health providers
- b. 5-10 years: Data-sharing models expand to incorporate some PHR models in addition to EHRs and EMRs. Smaller practices increase participation in data-sharing initiatives.
- c. 5-10 years: Data in HIEs is increasingly used for community-based health research, population surveillance, and community planning. HIEs move into the role of a public utility to connect government, private organizations, and individuals, though legacy government systems, limited stakeholder engagement, and privacy restrictions pose difficult barriers to overcome.
  - i. Example: Virginia HIE connecting to government disability benefits

**31. Geographic Information Systems (GIS) become an essential component of community planning and assisting families in accessing personalized services.**

- a. 0-2 years: GIS tracking initiatives use open-source data collection to support data-driven planning and help low-income families find services.
  - i. Example: HealthyCity.org for Los Angeles, which will go statewide for CA in 2010
  - ii. Example: Online Advocate
- b. 2-5 years: GIS applications are increasingly used in personal health and safety applications, particularly via mobile platforms.
  - i. Example: GIS-enabled cell phones for way-finding or environmental information
- c. 2-5 years: GIS tracking information becomes directly available to people without an intermediary, providing families with direct access to information about services.
- d. 5-10 years: GIS tracking integrates more effectively with many data sources such as schools, RHIOS, state and county data, immunization registries, EMRs and PHRs, in order to provide a geographical view of population health. GIS tracking is used routinely in community planning.

## BUSINESS MODELS

Forecasts in this category relate to how business models influence and are influenced by technology development, adoption, and dissemination.

### **32. Technology is used to scale promising innovations and demonstrate sustainability.**

- a. 0-2 years: Small pilots continue to demonstrate success in improving outcomes for children. Most do not incorporate technology due to funding or other constraints, making these pilots difficult to scale.
  - i. Example: Children and Families Commission of Orange County (CA) – First 5 pilots around early childhood
  - ii. Example: Alameda County (CA), Every Child Counts – home visiting programs
- b. 2-5 years: Funding for children's health programs and pilots increasingly demand a stronger evaluation component to demonstrate outcomes and scalability.
- c. 2-5 years: Technology use in pilots expands, particularly for remote monitoring and data sharing technologies.
- d. 5-10 years: Funders mandate pilots to include a plan for sustainable implementation, including strategic stakeholder partnerships and viable business models.
  - i. Example: California HealthCare Foundation requirements

### **33. Children adopt consumer technologies more readily than other populations, while provider technologies lag.**

- a. 0-2 years: Greater funding for adult and older adult populations leads to a dramatic increase in remote patient monitoring and EMR use in the adult setting, leaving children's services behind.
  - i. Example: Health Hero Health Buddy by VA
- b. 2-5 years: Children's care increasingly uses personal consumer technologies such as mobile platforms, social networking and the Internet, and gaming.
  - i. Example: BeWell Mobile
- c. 5-10 years: Having proven their efficacy for adults and older populations, remote monitoring technologies and EMRs "diffuse down" as vendors adapt technologies geared to children.
  - i. Examples: Glucose monitoring and control, asthma management, Q&A functionality

### **34. Vendor business models and consumer demand pushes mobile and other technologies direct to the consumer, bypassing healthcare providers and other traditional distribution channels.**

- a. 0-2 years: Consumers look for convenient technological solutions to manage health and navigate care decision support processes, beyond what is available from their healthcare provider.
- b. 2-5 years: Vendors increasingly market online and mobile health management services and other products directly to the consumer.
  - i. Example: Google Health
  - ii. Example: Medication reminder technologies
- c. 5-10 years: Payors increasingly use financial incentives to push consumers to maintain healthier lifestyles, further driving consumer demand for personal solutions to manage health.
  - i. Example: West Virginia Medicaid Redesign
  - ii. Example: Use of social networking as motivation and tracking of weight loss
- d. 5-10 years: Vendors increasingly push over the counter self-paid options, leading to an increase in "e-patients" who rely on consumer technologies rather than providers to manage personal health.
  - i. Example: Internet Sexuality Information Services (ISIS) – STDtest.org via cell phone, allowing adolescents write own prescription
  - ii. Example: Strep self test
- e. 5-10 years: Open-source software for consumer-facing health applications becomes more widespread.
  - i. Example: Patients Like Me

**35. Emergence of a service-based business model for smaller entities accelerates the adoption of EMR and other technologies.**

- a. 0-2 years: Community pediatricians in small practices have difficulty implementing EMRs and other HITs, due to the high costs and workflow disruptions involved.
- b. 0-2 years: More HIT vendors move to a service-based business model, charging monthly fees for an ongoing service contract rather than high up-front investment costs.
- c. 2-5 years: Consumers increasingly demand electronic access to personal health information and services, pushing community pediatricians to find affordable solutions.
- d. 2-5 years: Service-based models are increasingly common in the areas of EMR and remote patient monitoring.
  - i. Example: eClinical Works EMR offered by Wal-Mart
  - ii. Example: Pharos IVR remote based patient management
- e. 5-10 years: Service-based models predominate as loose associations between community pediatricians form to purchase, implement, and maintain EMRs.
  - i. Example: Children's National Medical Center – Children's IQ Network

**36. Economies of scale drive consolidation of EMR vendors, leading to the largest players being the most successful.**

- a. 0-2 years: While the EMR/PHR space is very fragmented, large players begin to establish themselves as the EMRs of choice at large hospital systems.
- b. 2-5 years: Existing market advantage as well as economies of scale in a variety of areas (include providing ongoing service and technical support) leads to further EMR consolidation.
- c. 5-10 years: Group purchasing by community pediatricians looking for service-based EMRs further supports consolidation in the EMR space.

**37. Health Trusts for wellness and prevention emerge at the local and later the federal level.**

- a. 0-2 years: A few successful local models emerge to fund wellness and prevention services through a single trust.
  - i. Example: The Children's Trust (Miami-Dade County, FLA)
- b. 2-5 years: Many counties and some states mandate funding for health trusts to ensure wellness and prevention services for all children.
- c. 5-10 years: A federal wellness trust develops to support all wellness and prevention care.
- d. Wildcard: Single-payor system for all children's care emerges.

**38. Alternate sites of care improve their ability to bill for services.**

- a. 0-2 years: School-based clinics still rely on a mix of state funding, grants, and public insurance. Billing is highly variable for different sites and is not the major funding source for most school-based clinics.
- b. 2-5 years: Retail clinics expand insurance acceptance to reach a wider audience, as well as add services such as wellness care.
  - i. Example: Retail clinics offering disease management services for conditions such as diabetes
- c. 5-10 years: School-based clinics become more financially sustainable due to their ability to bill public and private insurance sources (particularly in areas with lower socioeconomic status), and through realizing economies of scale by serving as hubs in communities.
  - i. Example: Alameda County, CA – school-based clinics

## WORKFORCE

Forecasts in this category relate to how changes in workforce influence and are influenced by technology development, adoption, and dissemination.

### **39. Pediatric workforce shortages drive downshifting of care at all levels, with increasing levels of responsibility given to the individual and family.**

#### **39a. Shortages of pediatric physicians and sub-specialists drive downshifting of care for chronic disease.**

- a. 0-2 years: Primary care pediatricians, nurse practitioners, and physician assistants have increasing roles in managing and coordinating care in chronic conditions such as asthma, diabetes, and obesity.
- b. 0-2 years: Telehealth helps alleviate some specialty shortage gaps, particularly in rural areas.
  - i. Example: Northern Sierra Rural Health Network
  - ii. Example: Open Door Community Health Centers
- c. 2-5 years: Increased use of remote monitoring technologies helps mid-level practitioners have an expanded and more autonomous role in treating chronic diseases.
- d. 5-10 years: Retail clinics<sup>\*</sup> staffed by nurse practitioners and school-based clinics begin to move more into the chronic care space.
  - i. Example: Walgreens model for adult chronic care
- e. 5-10 years: Telehealth continues to be the main method for rural areas to provide access to specialists.

#### **39b. Wellness care downshifts away from community pediatricians to both licensed and unlicensed professionals.**

- a. 0-2 years: Nurse practitioners and physician assistants have increasing roles in well-child care, rather than families relying exclusively on community pediatricians for well-child visits.
  - i. Example: Usage of nurse practitioners for well-child visits at community clinics
- b. 2-5 years: Health aides and other staff at school-based clinics are increasingly involved in providing well-child care.
- c. 5-10 years: Supervision technologies and remote monitoring support an increasing amount of downshifted well-child care, at both rural and urban locations.

#### **39c. Technology enables downshifting of care to individuals and families, as evidence demonstrates it is an effective way to manage health.**

- a. 0-2 years: Families, particularly those with high health literacy, demonstrate desire to have greater access to and control over their health information.
- b. 2-5 years: Patient portals become common in allowing families greater access to health records, test results, and other health management tools.
  - i. Example: Kaiser Health Connect
- c. 2-5 years: Mobile technology becomes a leading platform to manage personal health, leading to an increasing number of vendors developing direct-to-consumer services.
- d. 5-10 years: Care for obesity and asthma becomes largely based on management by the family or individual, enabled by personal technologies that provide reminders, adherence cues, and decision support.
  - i. Example: Cell phone reminder technologies
- e. 5-10 years: Shift to greater accountability overwhelms some families, leading them to access care at school and community-based systems.

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<sup>\*</sup> Retail clinics in states with less strict licensure requirements will move faster into chronic care space

**40. The traditional small community general pediatric practice is increasingly challenged by economics, lifestyle, and service demands.**

- a. 0-2 years: Community pediatricians attempt to hold on to well-child visits as a source of income, even as economic pressures drive more families to access care at community clinics and other alternate sites of care.
- b. 2-5 years: Demand for a more balanced lifestyle and greater familiarity with technology gained in residency training programs drive new pediatricians to larger practices and clinic-based settings.
  - i. Example: All CA residency programs have telehealth and EMR component
- c. 5-10 years: Community clinics take on a much bigger role in the provision of pediatric care and see an increasing number of complex cases, taking some pediatric visits away from private practices.
- d. 5-10 years: Small general pediatric practices are increasingly endangered and forced to either consolidate, join with community clinics, provide more specialty services, or go out of business.

**41. Community health workers' role expands to provide support as part of the care team for chronic disease management and special needs care, reducing the need for clinic visits.**

- a. 0-2 years: Successful asthma care programs relying on community health workers expand to other chronic diseases.
  - i. Example: Long Beach Asthma Coalition (part of Allies Against Asthma)
- b. 2-5 years: Training and certification of community health workers increase their use by community clinics.
  - i. Example: New Mexico Maternal and Child Health LEND program (Interdisciplinary Leadership Training Program)
- c. 5-10 years: The community health worker becomes the adjunct care coordinator for children with chronic care needs.

**42. Ad-hoc peer-to-peer support networks develop (including networks for parents of children with chronic diseases), eventually leading to formal peer health worker roles.**

- a. 0-2 years: Peer specialist roles in behavioral health care are judged to be successful.
  - i. Example: New Mexico Certified Peer Specialist Program
- b. 2-5 years: Based on success in behavioral health, peer specialist roles evolve for disease-specific chronic care management.
  - i. Examples: Type 1 diabetes, cystic fibrosis
- c. 5-10 years: Certification and reimbursement for peer specialist roles begin to emerge.

*To access additional background, forecast, and policy materials, please go to  
[www.childrenspartnership.org/HITInnovationForChildren](http://www.childrenspartnership.org/HITInnovationForChildren)*

*Health Technology Center and The Children's Partnership would like to acknowledge  
The California Endowment for its support of this project.*

**Health Technology Center**

The Health Technology Center (HealthTech) is a nonprofit research organization and expert network whose mission is to advance the adoption of beneficial technologies in healthcare.

**The Children's Partnership**

The Children's Partnership (TCP) is a national, nonprofit organization working to ensure that all children—especially those at risk of being left behind—have the resources and the opportunities they need to grow up healthy and lead productive lives.

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