Family History in Primary Care Pediatrics

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KEY WORDS
family history, primary care, pediatrics

ABBREVIATIONS
AHRQ—Agency for Healthcare Research and Quality
PCP—primary care provider

www.pediatrics.org/cgi/doi/10.1542/peds.2013-1032D

doi:10.1542/peds.2013-1032D

Accepted for publication Aug 28, 2013

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: This effort was supported by grant UC7MC21713 from the Health Resources and Services Administration's Maternal and Child Health Bureau. The Genetics in Primary Care Institute is a cooperative agreement between the American Academy of Pediatrics and the Maternal and Child Health Bureau. Dr Tarini is funded, in part, by a K23 Mentored Patient-Oriented Career Development Award from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (K23HD057994). Funded by the National Institutes of Health (NIH).

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

abstract

The family history has been called the first genetic test; it was a core element of primary care long before the current wave of genetics technologies and services became clinically relevant. Risk assessment based on family history allows providers to personalize and prioritize health messages, shifts the focus of health care from treatment to prevention, and can empower individuals and families to be stewards of their own health. In a world of rising health care costs, the family history is an important tool, with its primary cost being the clinician's time. However, a recent National Institutes of Health conference highlighted the lack of substantive evidence to support the clinical utility of family histories. Annual collection of a comprehensive 3-generation family history has been held up as the gold standard for practice. However, interval family histories targeted to symptoms and family histories tailored to a child's life stage (ie, age-based health) may be important and underappreciated methods of collecting family history that yield clinically actionable data and supplement existing family history information. In this article, we review the various applications, as well as capabilities and limitations, of the family history for primary care providers. *Pediatrics* 2013;132:S203–S210

Often used by genetic specialists as a case-finding tool for rare Mendelian (single-gene) disorders, a family history can also be a powerful screening and diagnostic tool for primary care providers (PCPs). A family history can be used for assessing risk for specific conditions; for preventing, detecting, and managing disease; for informing a diagnostic evaluation[1]; for providing preconception counseling[2]; and for fostering rapport with patients. The development of online family history tools and the increasing use of electronic health records offer opportunities for improving the ability of pediatric PCPs to record, standardize, and accurately assess family history information.

The challenge is to determine which type of family history information and method of collection is most useful and effective in the pediatric primary care setting. Although collection and interpretation of family histories are considered standard of care and are endorsed by many professional health care societies outside the field of genetics, evidence that family histories improve health outcomes is lacking. A systematic review prepared by the Agency for Healthcare Research and Quality (AHRQ) for the 2009 National Institutes of Health State-of-the-Science Conference on family history revealed a paucity of data to support the clinical utility of the family history.[3] The review attempted to identify which elements of a family history (eg, age, degree of relationship, number of affected relatives, ancestry) are most useful in primary care for common medical conditions (asthma and allergies [atopic disease], diabetes, major depression and other mood disorders, stroke, and cardiovascular disease) and 5 common cancers (breast, ovarian, colorectal, prostate, and lung). The majority of published studies analyzed in the review focused on collection of family histories in first-degree relatives only or for a single condition. The review found few data to guide recommendations on the key elements of an effective family history in primary care practice.

Although annual collection of the 3-generation family history has been touted as the gold standard, interval family histories targeted to symptoms and family histories tailored to a child's life stage (ie, age-based health) may be important and underappreciated methods of collecting family history that yield clinically actionable data and supplement existing family history information. Ultimately, the goal is to have an accurate and comprehensive assessment of each patient's family history. Achievement of this goal will require multiple and different discussions (eg, targeted and tailored) about family history in various clinical contexts (eg, health maintenance visits, acute care visits) both to help jog patients' memories about information they forgot to share, confirm the information already collected, and identify newly diagnosed health conditions among family members.

WHAT IS A FAMILY HISTORY?

A family history is a collection of information about the health history of an individual's biological relatives. Fundamentally, collecting a family history is an inexpensive, noninvasive screening procedure.[4] Although "screening procedure" may conjure images of blood samples sent to laboratories for specialized testing, a family history requires only a conversation between the clinician and the patient. The family history has broad clinical utility. Family history is a major risk factor for common chronic diseases, such as cardiovascular disease, diabetes, several cancers, osteoporosis, asthma, and psychiatric disorders.[1,5,6] It can also reveal the influence of environmental (social and natural) and cultural factors on an individual's health. For example, data from the Adverse Childhood Experiences study, 1 of the largest studies ever to examine the influence of childhood environment on adult health, has identified a number of links between a child's environment and disease in adulthood.[7] SCREEN is an easy-to-remember mnemonic that highlights important content included in a family history (Table 1).

A traditional family history contains a wide range of health information on at least 3 generations of maternal and paternal family members: first-degree relatives (children, siblings, and parents), second-degree relatives (aunts, uncles, and grandparents), and third-degree relatives (first cousins) (Table 2). A family history is commonly organized and displayed in the form of a pedigree because it facilitates identification of inheritance patterns. Standard pedigree nomenclature has been in use since 1995[8,9] and is probably most helpful when looking for classic Mendelian patterns of inheritance.[1] Although

TABLE 1 The SCREEN Mnemonic for Family History Collection

SC	Some Concerns	"Do you have any (some) concerns about diseases or conditions that run in the family?"
R	Reproduction	"Have there been any problems with pregnancy, infertility, or birth defects in your family?"
E	Early disease, death, or disability	"Have any members of your family died or become sick at an early age?"
E	Ethnicity	"How would you describe your ethnicity?" or "Where were your parents born?"
N	Nongenetic	"Are there any other risk factors or nonmedical conditions that run in your family?"

Content taken from Trotter TL, Martin HM. Family history in pediatric primary care. *Pediatrics*. 2007;120(suppl 2):S62.

TABLE 2 Important Components of a Family History (For Each Relative)*

Relationship of relative (e.g., full or half siblings, adopted)
Sex of relative
Age or year of birth
Ancestral background/ethnicity
Consanguinity (blood relationship between parents)
Medical conditions and age at diagnosis
Pregnancies and any complications (e.g., infertility, miscarriages, stillbirths, ectopic pregnancies, pregnancy terminations, preterm birth, preeclampsia)

*Courtesy of National Coalition for Health Professional Education in Genetics.

PCPs are unlikely to construct a pedigree as part of their standard practice, a passing familiarity with pedigree nomenclature and patterns will help them communicate patient information to genetics specialists (Figs 1 and 2).

Although PCPs have been encouraged to collect a comprehensive 3-generation family history or construct a pedigree for each patient,[10] there is little evidence to support the clinical utility of this practice and little time to collect the necessary information during short primary care visits. Therefore, we suggest that PCPs consider a multimodal approach to collecting family histories over a child's lifetime that includes histories targeted to a child's symptoms during an acute visit (targeted family histories) as well as histories tailored to the child's life stage (tailored family histories) (Table 3). If the PCP finds a red flag in these family histories (Table 4), then he or she can take a more extensive history and consider additional evaluation or referral to a specialist.

Alternatively, a targeted family history may provide considerable value when a patient presents with symptoms that suggest an underlying genetic condition in the family. For example, a preteen who presents to a pediatric PCP with recurrent syncope with exertion should raise concern about the possibility of an inherited cardiac condition, such as an arrhythmia or hypertrophic cardiomyopathy, and should prompt the clinician to take a multigenerational family history targeted to these conditions. Information from such targeted histories can then be incorporated into the comprehensive record of the patient's family history. Targeted family histories are not new to the pediatric PCP. They are an integral part of current clinical screening guidelines. For example, preparticipation physicals for competitive athletes should include targeted questions about sudden death among relatives,[11] and a family history of dyslipidemia and early atherosclerotic heart disease is considered an indication for lipid screening in children.[12]

In addition, a tailored family history that focuses on health conditions relevant to the child's life stage may maximize clinical utility and offer an achievable goal within the time constraints of a health maintenance visit. A broadly focused family history may seem irrelevant to the child's life stage. For example, familial disease patterns that are clinically relevant for a newborn are likely to differ from those for an adolescent. PCPs take such differences into account when tailoring discussions about safety to the child's age (eg, sudden infant death syndrome versus bike helmet use).[13] As the child grows, the family history is built stage by stage. Given their long-term relationship with families, pediatric PCPs are in an ideal position to construct such progressive family histories.

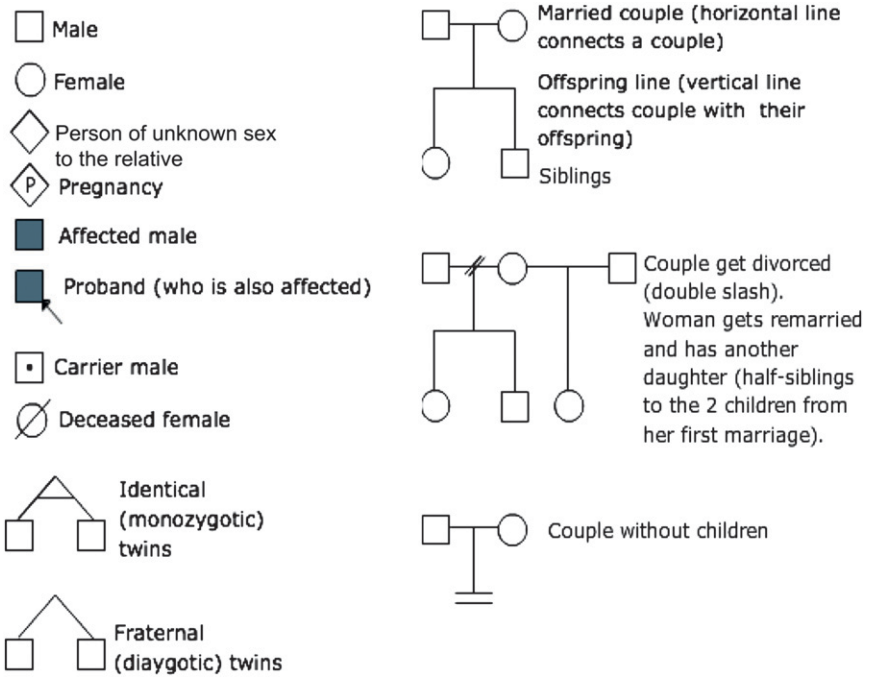

FIGURE 1
Pedigree symbols. Courtesy of the National Coalition for Health Professional Education in Genetics.

CHALLENGES TO COLLECTING FAMILY HISTORIES

Although the decision about when to collect a comprehensive 3-generation family history is left to the physician's discretion, annual health maintenance visits tend to be a popular time to collect (or update) such information from both new and established patients.[14] As noted earlier, a family history is not a static document collected 1 time. Although a family history does contain information about past events, family

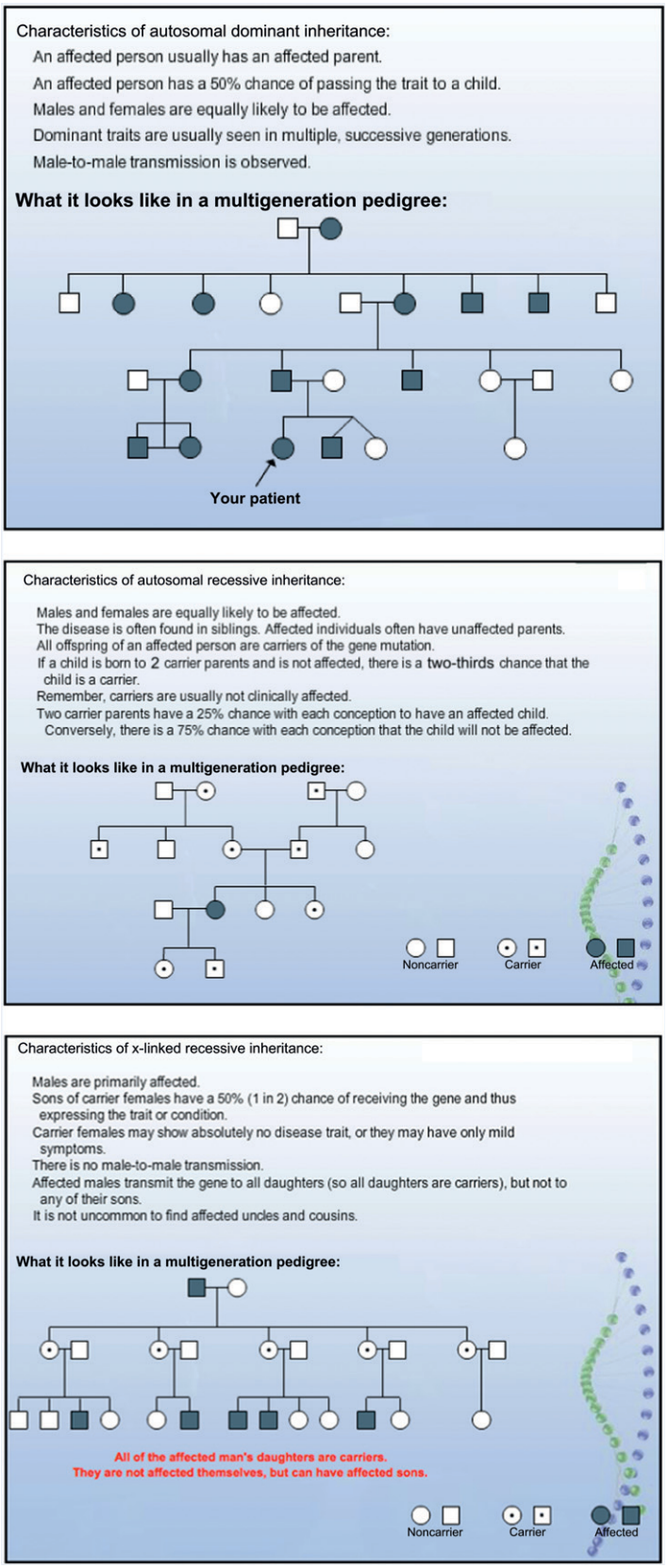

FIGURE 2
Examples of inheritance patterns displayed in pedigrees. Courtesy of the National Coalition for Health Professional Education in Genetics.

members' health issues are dynamic and evolving. Newly discovered information about family members, living or deceased, and new information about the clinical significance of previously identified genetic variants in the family may require the clinician to refine the family history. Moreover, as with most clinical histories that rely on patient recall, repeated questioning on different occasions may help patients to remember forgotten, but important, information.

Admittedly, there is room for improvement in the collection and documentation of family histories by PCPs. By self-report, the vast majority of PCPs (eg, 95% in 1 study) say that they take a family history as part of routine care.[15] However, direct-observation studies suggest otherwise. In 1 such study of family physicians, family history was discussed during only 24% of visits on average, and there was significant variation between providers, ranging from 0% to 81% of a given provider's visits.[14] Frezzo et al[16] reported that 20% of patients in an internal medicine clinic were at increased risk for disorders with known genetic contribution, but this risk was not noted in their medical charts.

A common complaint from PCPs is that they do not have enough time to collect a family history during the brief time allowed for patient visits. In a direct-observation study of family physicians, the average time spent collecting a family history was 3 minutes for established patients and slightly >5 minutes for new patients.[14] In addition, exactly what constitutes a family history is frequently interpreted through the eye of the beholder, and this study did not assess the scope and content of the information collected. For some clinicians, "family history" may mean a comprehensive 3-generation family history, whereas for others, taking a family history may mean asking the

TABLE 3 Types of Family History

Family History	Health Conditions	No. of Generations
Targeted	Specific disorders relevant to presenting symptoms	Multigenerational, not necessarily 3 generations
Tailored	Range of disorders relevant to child's age-based health	Multigenerational, not necessarily 3 generations
Comprehensive	Range of disorders, including disorders not immediately relevant to child's age-based health	3 generations

single question "What diseases run in your family?" These differences in practice make assessing the clinical utility of the family history challenging.

Web-based family history tools and the emergence of electronic health records offer a potential panacea for standardizing collection of family histories and maximizing their clinical utility. Another advantage of electronic health records is that some patient-oriented tools (eg, online patient portals or electronic tablets in providers' offices) decrease the collection time during the actual clinic visit, thus allowing family histories to be taken in relatively short primary care visits. Several organizations have aggregated freely available Web- and paper-based tools for the collection and assessment of family history information in an attempt to bring some consistency to the collection, documentation, and interpretation of that information (Appendix). Unfortunately, few of these tools, including those developed for use in the primary care setting, have been validated.[17] Frezzo et al[16] have developed 1 of the few family history tools for primary care adult medicine that has been validated against a gold standard (eg, an interview by a genetic counselor). No validated pediatric family history tools exist.

TABLE 4 Red Flags in a Family History*

- Multiple relatives affected with the same disorder or related disorders
- Earlier-than-expected age at onset of disease
- Intellectual disability (formerly referred to as developmental delay or mental retardation)
- Diagnosis of a disease in the less-often-affected sex (e.g., breast cancer in a male)
- Multifocal or bilateral occurrence in paired organs
- At least one major malformation, with or without minor manifestations
- Disease in the absence of risk factors or after preventive measures
- Abnormalities in growth (growth retardation, asymmetric or excessive growth)
- Recurrent pregnancy losses
- Consanguinity (blood relationship between parents)

*Adapted from Core Principles in Family History: Interpretation. National Coalition for Health Professional Education in Genetics. http://www.nchpeg.org/index.php?option=com_content&view=article&id=199&Itemid=126. Accessed February 22, 2013.

TRANSLATING THE FAMILY HISTORY INTO IMPROVED HEALTH OUTCOMES

For family histories to improve health outcomes, the information collected must be accurate, the risk to the patient identified and effectively communicated, and appropriate action taken by provider and patient. Each of these steps presents significant challenges.

Physicians frequently raise concerns about the reliability and accuracy of the family history information that patients provide. As with any other kind of medical history collected from a patient, a family history will only be as good as the reporter who provides it. Patients are human and therefore may misinterpret, fail to disclose, or simply be unaware of information. Nevertheless, the utility of the family history should not be dismissed outright. Providers should instead be mindful of these shortcomings and their potential to bias the family history. Although much of the data analyzed in the AHRQ systematic review were collected from patients in specialty practices, not primary care clinics, the review revealed that patients reported the absence of disease more accurately than the presence of disease.[3] Not surprisingly, the closer the degree of relation, the more accurate the report.

Using the family history to quantify risks for common complex disorders presents another challenge. The AHRQ review revealed that even when risks for such disorders are known, the sensitivities and positive predictive values are low for most common conditions (<25% and <10%, respectively). Atopic diseases, as well as major depression and other mood disorders, were notable exceptions, with sensitivities ~50% and positive predictive values of 25% to 50%. However, the review acknowledged that because the data were based on research conducted outside the primary care setting, sample bias limits the applicability of the results to primary care.[3]

Even when the risk of disease can be determined from a family history, PCPs face the challenge of accurately communicating that risk in a way that patients can understand. Risk communication research has shown that formats for communicating risk vary according to the clinical context and needs of the patient.[18] Moreover, patients' family history–based perceptions of their own risk vary with personal experiences and might conflict with the risk estimates of the health care providers.[19] To motivate patients to change their behavior on the basis of a family history, we require a better understanding of their perceptions of their personal risks of disease, which may differ depending on the disease and individual experiences.[20]

Data on how family histories affect health outcomes are sparse and show only modest effects on behavior. Studies have found that knowledge of a family

history of breast cancer leads to increased adherence to routines for breast self-examination but not to increased use of mammography.[3] A randomized trial involving >40 primary care practices showed that participants who used a Web-based tool to assess their familial risk for various diseases found small increases in preventive behaviors such as physical activity and healthy eating habits but decreases in cholesterol monitoring.[21] An intervention study to increase folic acid intake in Irish families with a history of neural tube defects increased participants' knowledge about the benefits of folic acid but did not increase their use of folic acid.[22]

NAVIGATING ETHICAL DILEMMAS OF THE FAMILY HISTORY

In considering the technical- and evidence-based challenges to using the family history in primary care, we must not overlook ethical issues, such as privacy, confidentiality, and potential discrimination, that might arise from its use.[23,24] Potential ethical challenges to improving health outcomes by means of the family history include tensions between the right to privacy and the duty to inform. For example, some PCPs treat multiple members of the same family, and genetic information about 1 family member may be highly relevant to the care of his or her relatives. Is it ethical to use information learned in treating 1 family member in the care of another without the consent of the first family member? In pediatrics, a child's genetic information may have implications for the parents, for example, by indicating their carrier status or revealing misattribution of the child's paternity. In these situations, the physician must clearly understand the potential consequences of the genetic information for other family members, especially if collection of a family history leads to genetic testing.

Unfortunately, it is not clear how physicians should proceed when collection of a patient's family history reveals family members to be at increased risk of disease. Although physicians have been sued for failure to notify an at-risk relative, mandatory institution of a duty-to-inform requirement for physicians conflicts with the Health Insurance Portability and Accountability Act and some state laws.[25] To assist physicians, professional organizations such as the American Medical Association have recommended that, before initiating testing, physicians explicitly inform patients of the situations in which they would feel compelled to breach confidentiality.[26]

CONCLUSIONS

Even when it becomes technically and financially feasible to generate a complete genetic sequence for each patient, targeted and tailored family histories will still provide important context about diseases that may run in the family, enabling providers to implement appropriate screening procedures, interventions, and management plans. Although pediatric PCPs are in a position to use family histories to improve health outcomes for their patients, several technical, evidential, and ethical barriers exist. Failure to address these barriers will leave pediatric PCPs without guidance on which data elements are most effective, on how best to collect those elements efficiently, and on how to use the family history to improve health care behavior and outcomes.

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APPENDIX Online Family Health History Tools

Family History Tool (Organization)	Web Site
My Family Health Portrait (US Surgeon General's Family History Initiative)	https://familyhistory.hhs.gov
Family Health History (Centers for Disease Control and Prevention)	www.cdc.gov/genomics/famhistory/
Family Medical History (American Medical Association)	www.ama-assn.org/ama/pub/category/2380.html
Draw Your Family Tree (National Society of Genetic Counselors)	http://www.nsgc.org/About/FamilyHistoryTool/DrawYourFamilyTree/tabid/227/Default.asp
Family Healthware (Centers for Disease Control and Prevention)	http://www.cdc.gov/genomics/famhistory/famhx.htm
Family History for Prenatal Providers (National Coalition for Health Professional Education in Genetics)	http://www.nchpeg.org/index.php?option=com_content&view=article&id=53