Alice and Bob are recovering from a particularly virulent flu that kept them both out of work for the past week. They awaken one snowy February night to hear their 6-year-old daughter, Charlotte, coughing, wheezing, and crying. She seems warm and will not be comforted. Alice and Bob are worried, but they have recently joined a plan that offers them the option of an in-home consultation. Because packing up their daughter and driving to the emergency room of the nearest hospital would take at least half an hour, they telephone the on-call pediatrician. After hearing the symptoms, the pediatrician decides to ask for basic measurements and have a quick look at Charlotte right away to decide whether she needs to be brought to the emergency room.

Alice turns on their Internet access device (a set-top box) and their television, while Bob sets up the home health assessment pack, including a digital thermometer, heart rate monitor, stethoscope, and video camera. Alice uses the keyboard to navigate to the health plan's Web site and inserts a smart card into the box that authenticates them to the health plan server. While they wait a few moments, their access device exchanges digital certificates authenticating both the server and their device and establishes an encrypted session with the server. Because videoconferencing will be used, the device also reserves a suitable level of bandwidth from Bob and Alice's Internet service provider to carry the quality of video needed for the consultation (a few hundred kilobits per second).

Once connected to the health plan Web site, a menu of options appears, and the couple make a video call to the pediatrician. A live image of the pediatrician appears in a video window. Alice transmits an authorization code to the pediatrician enabling her to access Charlotte's medical record from the online repository in which Alice and Bob maintain all their family medical records. The pediatrician asks them to take Charlotte's temperature and pulse and to position the microphone so that she can hear the child's breathing. Alice first uses the thermometer and heart rate monitor, which transmit results to the set-top box over wireless links. Guided by the pediatrician, Alice then places the stethoscope around various landmarks on Charlotte's chest and back to listen to the child's respirations. The pediatrician can see an image of Charlotte beamed to the set-top box from Bob's video camera. Alice and Bob can see a split-screen image on their television showing the pediatrician on one side and the image from their video camera on the other.

The pediatrician determines that Charlotte's condition does not require her to come in to the emergency room. From her remote observations, she concludes that the most likely diagnosis is acute asthma. Charlotte has had two previous episodes of asthma during the past year, and in both cases she responded well to inhalants. The

pediatrician asks the parents to administer a dose of the inhalant. Because it is possible to determine within 10 minutes whether the inhalant will work, the pediatrician opts to keep the video call running. Bob makes Charlotte comfortable, seating her within range of the video camera. During the ensuing 10 minutes, the pediatrician engages the parents in a brief review of the events leading up to the evening, exploring such things as exposure to dust and toxins as well as stress events in the family. Recalling that Charlotte's school has some major renovations under way, Alice asks the pediatrician about a possible connection between dust from the renovation and Charlotte's asthma flare-up.

The pediatrician guides Alice to the American Lung Association's Web site, and together they review the information about asthma in children. A checklist of environmental risk factors appears simultaneously on the screen, and the pediatrician and Alice review these together. Next they listen to an audio clip of various breath sounds, with the pediatrician coaching Alice on how to identify the distinctive sound of wheezing.

The pediatrician notes that Charlotte's breathing is easing, and the little girl is no longer crying. The pediatrician asks to speak to Charlotte and asks a few questions about how she feels. Charlotte points to her chest and says it feels tight. Noting that she is able to pronounce common words and that the audible wheezing has stopped, the pediatrician judges the situation to be under control and advises the family that Charlotte should be helped back to sleep.

The on-call pediatrician also recommends that an appointment be made for Charlotte to be seen by her own pediatrician the following afternoon. Bob navigates to the health plan's scheduling program and sets up the appointment. The site provides a map to the clinic that can be printed. The next day, as soon as she arrives at the clinic, Charlotte is welcomed and escorted into the examination room. While her doctor is finishing up another appointment, the nurse takes Charlotte's vital signs and adds the information to her electronic medical record, which is accessed from the computer in the examination room. Shortly thereafter, the doctor enters the room, reviews Charlotte's vital signs, examines her, and provides a diagnosis. Once the diagnosis and a prescription for a new inhaler are entered into the electronic record, a claim for payment is automatically filed with Charlotte's health plan and an electronic prescription is sent to the pharmacy near her house. The medication will be waiting when Bob and Charlotte stop by on their way home.