

E.H.R. PATHWAYS TO
SUCCESSFUL ADOPTION

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A statewide convening on
electronic health records adoption

Wednesday, July 8, 2009

Sacramento Convention Center

Thursday, July 9, 2009

Anaheim Marriott Hotel

9 A.M. – 5 P.M.

CLINICAL SCENARIOS

CLINICAL SCENARIO #1

Well Care & Dental Referral

A 4-year old child, Kate Vargas, is entering kindergarten in the fall. She comes to clinic with her mother for her regular annual exam. Her mother recalls that she is scheduled to receive booster doses of measles, mumps and rubella.

It happens that Kate is having an exacerbation of her asthma, which is addressed during the visit, and results in sending her to the ER. During a routine check of Kate's teeth, significant tooth decay and abnormal tooth development are discovered, requiring a referral to the dental clinic.

Patient/Provider and Facility Background

1. Kate is at a low percentile for height and weight for her age, but has been gaining weight recently. She has a history of asthma without recent exacerbation, but with a prior history of hospitalization x 2, and a history of febrile seizure at 18 months of age with unknown source, conservative treatment, and without sequelae.
2. The patient's pediatrician is Dr. Mehta, who usually sees her at Valley Community Clinic, a multi-specialty primary care clinic, where he works Tuesday afternoons and Thursday evenings.

Previsit Process

3. When the patient's mother calls for an appointment, the clinic staff is alerted via clinical reminders that the patient needs age-specific boosters of her immunizations. The clinic staff reviews the insurance data with the mother, making sure it is still current, updating any changes and confirming that the patient's

pediatrician is still Dr. Mehta. An appointment is scheduled for Thursday evening, in two weeks. The reason for appointment contains the notification of a need for immunization boosters.

4. Before the visit, the patient's mother updates computer-generated sheets of information on Kate's previous care which are mailed to her and which she brings to with her to the visit. These can be subsequently scanned into the E.H.R. using image processing technology, or the mother may log on through a secure E.H.R./P.H.R. patient portal connection to enter this information directly into the E.H.R./P.H.R.. She notes that Kate was diagnosed with a urinary tract infection while they were out of town visiting family three months ago but does not recall what medicine Kate was treated with Cephalexin.
5. The mother reviews and/or updates the patient's address, enters what school she will be attending, and reviews and/or updates the insurance information that she gave over the phone when scheduling the appointment.
6. Prior the patient's visit, the clinic staff verifies the patient's eligibility (Medi-Cal and CHDP coverage – Annual Physical for CHDP), verifies eligibility for payment for immunizations and notes any co-pay amounts.

Care Process

7. When the patient and her mother arrive at the clinic, all information is verified again and the patient and her mother are told to wait in the waiting room. The fact that they are checked in and waiting in the waiting room is noted in the system and an alert is sent to the clinic medical assistant (MA) or nurse (RN or LVN).
8. The clinic medical assistant or nurse calls the patient from the waiting area and takes her and her mother to a triage area. She records the patient's height, weight, and other vital signs, which are entered electronically into the E.H.R. with a computer or handheld device interface. While counting Kate's respirations, the MA/nurse notes that her respiratory rate is a little high and that she is wheezing. Based on this, the nurse checks Kate's oxygen saturation, which is 96% with room air. The MA/nurse also records a detailed review of systems on the patient, who is complaining of a non-productive cough and as per the mother has been wheezing for two days but has been afebrile. The patient has also had a running nose with clear discharge and mild discomfort with urination. The patient is then taken to an exam room where the nurse or medical assistant enters into the computer a notice to Dr. Mehta that the patient is ready to be seen and is wheezing. This automatically updates the billing for this visit with the charge for checking the saturation, and creates a notice that an acute diagnosis code may

be appropriate. The E.H.R. contains a customized growth chart for Kate.

9. Dr. Mehta notes on his appointment list that the patient is in Room 6 and is ready to be seen. He sees the notice that she is wheezing, so he quickly selects Kate's chart from the appointment list and reviews the vitals and pulse-ox reading. He sees that Kate does not appear to be in distress, so he takes a moment to review the chart summary/patient summary noting the past history and reviewing the MA/nurse's notes. He reviews the height and weight on the E.H.R. growth chart and notes that the patient is moving up in percentile for her age. A history of the patient's immunizations (which was updated immediately prior to the appointment by access to a centralized immunization information record system) appears and shows immunizations recommended at Kate's age. A separate page shows recommended screenings for this age.

Physician Encounter

10. Dr. Mehta talks with the patient and her mother and goes over the review of systems and the immunization update. Dr. Mehta notes that the patient, aside from dysuria, is not complaining of urinary frequency, abdominal or flank pain. On physical exam, Dr. Mehta notes expiratory wheezing in all lung fields, mild suprapubic pain to palpation, no CVA tenderness on either side and a mild raised macular-papular rash on the chest, abdomen, back and thighs. Dr. Mehta also notes the patient's poor dentition and tells the patient and her mother that Kate will need to be referred to a dentist.
11. Dr. Mehta places an order for a urine dipstick (in the clinic) and a urinalysis and culture (from an outside

lab). He also orders the immunizations as suggested by the age-specific clinical reminders, the tuberculin skin test, the MA/nurse to recheck the patient's temperature and a respiratory treatment with a nebulizer (albuterol 5cc in NS) for the patient's asthma. He also sends a referral to a dentist consistent with the patient's health care coverage.

12. Concerned that the patient has a UTI, Dr. Mehta reviews the local antibiotic resistance data to identify the most appropriate presumptive treatment. The MA/nurse work-list contains the above orders and the urine is collected and dipped and the results (positive for WBCs, Leukocyte Esterase, and RBCs) are noted in the chart. Labels and a lab requisition are printed for the urine and the urine is sent to the lab. The immunizations are given and the patient's temperature is taken again and documented in the chart. A respiratory treatment is administered.
13. Dr. Mehta reviews the temperature and the urine dipstick, reviews the work-up recommendations for first time UTI in this age group. The recommendations include a genitourinary ultrasound and a voiding cystogram.
14. Dr. Mehta sees the patient again, listens to the lungs which are now clear. Dr. Mehta tells the mother that the child has a mild viral URI which is causing the cough, asthma exacerbation and the rash. She also has a recurrent UTI and will need some additional tests to make sure that there is no anatomic abnormality which could cause kidney damage if not appropriately diagnosed and treated. Dr. Mehta indicates that the renal ultrasound and cystogram will be scheduled after the urinalysis

and culture confirm a UTI. He also requests that asthma, immunization and UTI patient instructions be given to the mother. The MA/nurse is then notified that the patient is ready to leave, whereupon they print out the instructions and go over them with the patient. The patient is then sent to the check-out desk and is checked out. He writes a prescription for Cephalexin elixir, but changes that to Trimethoprim/Sulfaxazole after getting an instant warning that Kate is allergic to Cephalexin. The prescription is appropriately dosed for the patient's weight for 10 days, generic substitution allowed and a prescription for an albuterol regimen. (The prescriptions are transmitted electronically to the patient's pharmacy).

15. Dr. Mehta completes either a structured and encoded note or a dictated note with an automated SuperBill/charge ticket, reviews the coding, including E&M, and completes the encounter by signing the note electronically. If this is completed before the patient leaves, then the patient's mother is given a patient receipt at check out. The immunization data are sent electronically to an immunization registry.

Post Encounter Activity

16. Two days after the visit, the urinalysis and culture results come back to the clinic electronically and an alert is sent to Dr. Mehta. Dr. Mehta, now at another clinic location, accesses the results from his message or work-list and reviews them. He orders the ultrasound and cystogram for the patient and sends a message back to the clinic to call the patient's mother and tell her when the tests are scheduled. The mother requests verification of the patient's immunization history to be printed out as

a school form. This is provided to the mother either via FAX, through the E.H.R./P.H.R. patient portal or printed out so she can pick it up at the clinic.

17. Three days after the visit, Kate's mother takes her to the ED because her wheezing and coughing has gotten much worse. There, the ED physician obtains permission to pull up Kate's clinic E.H.R. and reviews her history. After treatment in the ED, the physician decides that Kate should be admitted to the hospital for more aggressive treatment of her asthma. The ED physician completes her note which goes into the clinic E.H.R. and calls the pediatric hospitalist to admit the patient.
18. The pediatric hospitalist accesses Kate's chart to review her history and generates a patient history summary to place in her chart. In reviewing the summary, the hospitalist notes that Kate is currently on antibiotics and is scheduled for diagnostic testing for her urinary tract infection. The antibiotics are continued during the hospital stay and the physician considers whether Kate can be scheduled for her tests while she is in the hospital. The admitting hospitalist sends an electronic message to the clinic physician to let him know that Kate is being admitted.

19. Kate receives her tests on the day that she is discharged and her already scheduled appointments are cancelled. The hospitalist completes a discharge summary which is automatically delivered to Dr. Mehta and added to her clinic chart.
20. The results of the tests show evidence of mild vesiculoureteral reflux. Dr. Mehta receives an electronic notice that the results are back and he reviews them. He chooses to have the results added to Kate's clinic chart and sends a message to the clinic to schedule a follow-up appointment with the patient in two to four weeks.

Key E.H.R. Related Events

- Scheduling and update of contact information
- Review of coverage and benefits eligibility
- Entry of patient history and physical data into E.H.R.
- Notice to physician and office staff of arrival and in office location of patient
- Review of immunization status, prompting for appropriate immunizations and screenings to be performed at visit, new immunizations entered into an HIE accessible database
- Scanning of information into E.H.R.
- Notification of drug allergy
- Generation of patient education sheets for specific conditions

- Access of clinic E.H.R. by ER physician
- Generation of patient history summary for use by admitting physicians; additional access to clinic E.H.R. by admitting physicians through HIE
- Notice upon admission that patient is scheduled for diagnostic testing, consideration of performing/rescheduling diagnostic testing as appropriate based on severity of asthma exacerbation
- Entry of discharge summary into hospital E.H.R. which can later be accessed by primary pediatrician through HIE
- Delivery of follow-up test results and notifications to physician

Care Goals for Meaningful Use

- Provide access to comprehensive patient health data for patient's health care team
- Use evidence-based order sets and CPOE
- Apply clinical decision support at the point of care
- Provide patients and families with access to data, knowledge and tools to make informed decisions and manage their health
- Exchange meaningful clinical information among professional health care team members
- Provide transparency of data sharing to patient

CLINICAL SCENARIO #2

Population Management

A community clinic decides to launch an aggressive blood pressure control QI program involving both community outreach and population management.

Patient/Provider and Facility Background

1. Pleasant Valley Primary Care Outreach is a primary care clinic with Board Certified physicians in Internal Medicine and Family Medicine as well as physician assistants (PAs) and nurse practitioners (NPs) providing extended services.

Pre Outreach

2. Queries are run against the E.H.R. database for Pleasant Valley Primary Care Outreach to identify:
 - All patients with hypertension without a primary care visit in more than one year
 - Those who appear to have uncontrolled blood pressure (BP is too high)
 - Those who did not receive appropriate renal evaluation in more than one year.

These reports are used to identify patients in need of specific follow-up including:

- Automated telephone contact to patients for follow-up appointment scheduling
- Targeted follow-up by outreach nurse for those with uncontrolled blood pressure without follow-up

- Identification of patients who are scheduled for upcoming visits (even if they are not with the primary provider) that are then flagged within the E.H.R. for renal evaluation
3. The E.H.R. search entails the following:
 - Identify patients who have not had a primary care visit in the last year, and do not have a primary care visit scheduled in the next two months.
 - Of patients identified in Step # A, further identify patients based on blood pressure with criteria identified in one of two ways:
 - Hypertensive based on pre-entered “normal” blood pressure criteria for adults.
 - Hypertensive based on blood pressure criteria defined by user at time of search.
 - Sort patients identified through Step # 2 based on narrowed criteria of “pre-hypertension” (between 120/80 and 139/89) and hypertensive (BP equal or greater to 140/90 on two or more occasions).
 - Generate search report with following fields from EHR: Name/DOB/Pt. Number/sorting criteria (i.e. pre-hypertension or hypertension)/number of separate days with measurement over threshold reading/contact information/current medications/next scheduled visit
 4. The primary care team chooses to prioritize outreach to patients who appear to have uncontrolled blood pressure and/or who have not had recent primary care follow-up. They identify patients who may have contact with the clinic outside of primary care (i.e., who receive regular dental care or GYN care, or whose children receive regular pediatric care at the clinic) to flag the E.H.R. to try to arrange patient primary care follow-up. For those who have no contact, a nurse is assigned to do home/community outreach. Each identified patient’s E.H.R. is flagged with notation that the patient was pulled up on the search, the date of the search and the follow-up specified (call, appointment scheduled, etc.).

Post Outreach Activity

5. The clinic holds regular meetings to track progress regarding their blood pressure QI program. Periodic queries are run against the E.H.R. database to identify improvement in outcomes including:
 - Number of patients identified for follow-up that were contacted and were seen (either remotely through an outreach nurse or through an on-site clinic visit)
 - Percentage of patient visits with blood pressure (BP) measurement recorded during the last office visit
 - Percentage of patients with last BP < 140/90 mm Hg

- Percentage of HTN patient visits with either systolic blood pressure ≥ 140 mm Hg or diastolic blood pressure ≥ 90 mm Hg with documented plan of care for hypertension.
- Percentage of hypertension patients with renal screening within the last year

These reports can be run for various time intervals and sorted by provider, by age, sex, and by co-morbid diagnosis for further programmatic improvements.

Key E.H.R. Related Events

- Access and search E.H.R. database of all patients using user-specified criteria
- Flag E.H.R. of each patient selected for follow-up and integration of follow-up plan into E.H.R.
- Automatic notification of providers for each follow-up step
- Update of E.H.R. based on follow-up status
- Updated searches to gauge follow-up and efficacy of intervention

Care Goals for Meaningful Use

- Generate lists of patients who need care and use them to reach out to patients (e.g., reminders, care instructions, etc)
- Report to patient registries for quality improvement, public reporting, etc
- Communicate with public health agencies
- Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law

CLINICAL SCENARIO #3

Behavioral Health (OPTIONAL)

Mr. Day, a 45-year diabetic man seen regularly in the clinic, is noted during a follow-up visit to have worsened glycemetic control. He appears a bit more disheveled and disorganized than usual and admits to not sleeping well and feeling anxious.

Patient/Provider and Facility Background

1. Mr. Day is a Type II diabetic on oral medications with HTN who is 5' 8" and 225 pounds with a BMI of 34. He is currently on disability secondary to a work-related low back injury treated with SOMA, Vicodin, and Oxycontin, prn. He has a history of depression and an anxiety disorder (unclassified). He has no prior history of admission to a psychiatric facility. Mr. Day's medications include: Metformin, Glyburide, HCTZ, Lisinopril, SOMA, Vicodin, Oxycontin, Paxil, Xanax, and Nexium.
2. Mr. Day's primary physician is Dr. Hernandez, at Comprehensive Community Care, a multi-specialty clinic.

Previsit Process

3. Mr. Day had previously scheduled a follow-up visit 10 days prior to the appointment, the E.H.R. system sent a notification by mail or automated telephone to Mr. Day to remind him of today's appointment.
4. In the reminder, Mr. Day is asked to call the clinic and update his current administrative data or to access the clinic website.
5. Mr. Day, either over the website or telephone, updates his current insurance status, recording a recent change in his health coverage from Blue Shield HMO to MediCal.

6. Prior to the visit, the clinic staff checks Mr. Day's current eligibility status, including his health insurance status, his drug benefit, his mental health coverage and local mental health program criteria.

Care Process

7. When Mr. Day arrives at the clinic he is checked in at the front desk. All information is verified again and the patient is asked to wait in the waiting room. The fact that he is checked in and waiting in the waiting room is noted in the system and an alert is sent to the clinic medical assistant (MA) or nurse (RN or LVN).
8. The clinic MA or nurse (RN or LVN) takes Mr. Day's vital signs, including height and weight. She inputs the information into the E.H.R., which calculates Mr. Day's Body Mass Index (BMI). His blood pressure is 145/95, his pulse is 106, and his respiratory rate is 24.

The MA/nurse takes a Review of Systems where Mr. Day notes that his sugars are too high, that he has not been sleeping well and has been having headaches in the afternoons. Mr. Day is then taken to an exam room. An alert is sent to Dr. Hernandez notifying him that Mr. Day is ready to be seen.

9. Dr. Hernandez pulls up Mr. Day's E.H.R., reviews the patient summary, his medication list as well as the vital signs and Review of Systems from the MA/nurse. Along with the blood pressure reading, the E.H.R. offers a link to a hypertension clinical management pathway.

Physician Encounter

10. Dr. Hernandez asks Mr. Day how he is doing and goes over his list of complaints. Mr. Day interrupts and says that those are not the real reason he is here. Mr. Day tells Dr. Hernandez that his wife has been threatening to leave him if he does not stop taking his pain pills, get a hold of himself and get back to work—so he stopped taking his medicines two days ago. Since then, Mr. Day has become more deeply depressed, nauseated, has stomach cramps and feels completely disoriented and terrible. On careful questioning, Dr. Hernandez learns that Mr. Day stopped taking his Paxil three months ago when his wife started calling him ‘crazy’ and demanded that they go to counseling which Mr. Day refused. Mr. Day denies any new low back pain greater than his baseline, but does complain of headache, epigastric abdominal pain, nausea, vomiting, diarrhea and muscle aches and pains. On exam he has tachycardia, mild tachynea without wheezing, epigastric and diffuse abdominal pain without flank pain, and a normal extremity and neurological exam, except for recall of three items.
11. Dr. Hernandez feels that Mr. Day is suffering from opiate withdrawal and perhaps an exacerbation of his anxiety and depression. While she looks up guidelines for opiate withdrawal, Dr. Hernandez asks the clinic psychosocial worker to see Mr. Day. The psychosocial worker reviews the E.H.R., sees Mr. Day and determines that he is not a threat to himself or others. She convinces Mr. Day to go to therapy with his wife. The psychosocial worker then writes a behavioral health progress note using a depression template, and makes a referral with Behavioral Health for a counseling appointment for Mr. and Mrs. Day.
12. Dr. Hernandez orders 0.1 mg of Clonidine to be given to Mr. Day STAT, a CBC, electrolytes, BUN/Cr, and glucose to be drawn in the clinic once that is done. Dr. Hernandez places a call to Mr. Day’s wife and talks to her about Mr. Day. It turns out the wife is working two jobs and cannot care for Mr. Day at home. Consequently, he has been spending most of his time in bed. Dr. Hernandez states she would like to set up a home health evaluation, and that she has made a referral for Mr. Day and his wife to go to counseling.
13. Dr. Hernandez also discusses medication withdrawal with her. Dr. Hernandez orders a referral for home health/social services to visit the home and places a referral to Addiction Medicine for a follow-up the next day. A referral is also sent to Diabetic Clinic for follow-up in two weeks for diet and weight loss instruction and monitoring. Dr. Hernandez notes that with every subsequent encounter, regardless of service or location, vital signs should be assessed. Dr. Hernandez sends the psychosocial worker or the clinic’s nurse practitioner a reminder to call the patient in two days to follow-up with the withdrawal symptoms and see how things are going.
14. Dr. Hernandez has Mr. Day’s vitals checked again. By this time he is seeing another patient, but gets an alert indicating that BP is now 130/90, pulse is 86 and respiratory rate is 21.
15. Dr. Hernandez takes SOMA, Vicodin, Oxycontin, and Paxil off the patient’s medication list. She does not restart the Paxil and lists it as self-discontinued by the patient. She discontinues the Xanax and starts Valium 5mg po one to two q2-4h prn anxiety, changes Nexium to Pepcid 20mg po bid x 30 days with no refill. She generates an electronic prescription that is automatically transmitted, or a printed prescription to be given to the patient (or faxed, if appropriate) for Valium, Pepcid, and for Clonidine 0.2.mg po qid x 5 days for withdrawal symptoms.
16. Dr. Hernandez generates the clinical note in the E.H.R. through structured entry and/or dictation and signs it. Instead of ordering patient instructions to be given to the patient by the MA/nurse, Dr. Hernandez accesses them, prints out instructions for Opiate Withdrawal, Depression, Diabetes and Weight Control. She sits down with Mr. Day, reviews them and the plan and tells Mr. Day that his wife will be in to pick him up. Dr. Hernandez then orders another 0.1mg of Clonidine to be administered to the patient by the MA/nurse. The MA/nurse records the administration and re-checks Mr. Day’s vital signs. The Clonidine administration is added to the encounter as a CPT/HCPCS entry.
17. Dr. Hernandez confirms the ICD-9 CM, DSM-IV, HCPCS, and CPT-4 coding for the encounter including E&M and signs off the encounter.

Post Encounter Activity

18. The laboratory results come back electronically, or print out (in which case they are scanned back into the system) and are sent with a message to Dr. Hernandez to review. The values are normal except for a slight elevation in Hgb. A1C. Dr. Hernandez conveys this to the NP or social worker who will make the follow up call.
19. A week later a refill request comes from the pharmacy (electronically, via SureScripts or another e-prescribing service) for Valium. Dr. Hernandez reviews the chart, denies the Valium refill, but writes a new prescription for Xanax at the prior dosing for the patient. She sends a note to the clinic staff to call Mr. Day and inform the patient of the change in prescription. A home health/social services note is added to the E.H.R., notice of which goes to Dr. Hernandez and the psychosocial worker.
20. The E.H.R. puts appropriate restrictions and controls on the patient's opiate withdrawal/drug treatment and behavioral health information to meet regulations.

Key E.H.R. Related Events

- Automatic reminder of visit
- Website access to update coverage information
- Review of coverage and benefits eligibility
- Entry of patient history and physical data into E.H.R.
- Notice to physician and office staff of arrival and in office location of patient
- Generation of problem list in E.H.R. (clinic patient summary)
- E.H.R. based calculation of BMI
- Automatic behavioral health note template with appropriate confidentiality safeguards.
- Referral scheduling with special notation
- Follow-up alerts to appropriate staff
- Guidance on withdrawal treatment
- Automatic updates to bill and coding for encounter
- Electronic signature of note and bill
- Delivery of e-script service (if appropriate) with appropriate handling for controlled substances (Xanax, Valium)
- Receipt of refill notice from pharmacy via E.H.R., e-script service or fax as appropriate
- Incorporation of home health note into E.H.R.
- Delivery of lab results to E.H.R. with alert to physician

Care Goals for Meaningful Use

- Provide access to comprehensive patient health data for patient's health care team
- Apply clinical decision support at the point of care
- Provide patients and families with access to data, knowledge, and tools to make informed decisions and to manage their health
- Exchange meaningful clinical information among professional health care team
- Provide transparency of data sharing to patient
- Ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law