Embedding Guidance in the Kaiser Permanente EHR

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Statement of Disclosure
Wiley Chan, MD

• I have no commercial or academic conflicts of interest
  • Employment: Northwest Permanente Medical Group, which works exclusively with the Kaiser Foundation Health Plan in the US
  • Member: US National Heart, Lung and Blood Institute (NHLBI) Expert Panel on Integrated Cardiovascular Risk Reduction
    • Co-Chair: NHLBI Implementation Science Work Group
  • Member: State of Oregon Health Evidence Review Commission (HERC)
    • Chair: HERC Evidence-Based Guidelines Subcommittee
About Kaiser Permanente

- One of the USA’s largest nonprofit health plans
- Integrated health care delivery system
- Serving 9 states and the District of Columbia
- 9.1 million members
  - 17,000+ physicians
  - 49,000+ nurses
  - 175,000+ employees
  - 37 hospitals
- 618 medical offices and outpatient facilities
- $50.6 billion operating revenue*

- Scope includes ambulatory care, inpatient care, primary care, specialty care, behavioral health, Ambulatory Surgery Centers, Skilled Nursing Facilities, home health, hospice, pharmacy, imaging, laboratory, optical, dental, and insurance

*Source: 2012 Kaiser Permanente Annual Report
Overview

- Guidelines must be implemented to impact health outcomes
  - Guidelines must be rigorously, transparently evidence-based and contain actionable recommendations to be implementable

- Robust tools exist to embed guidance in Electronic Health Records (EHRs)
  - High-quality evidence of effectiveness in improving health care process measures (Lobach. AHRQ April 2012)
  - Tools aimed at patients are rapidly proliferating

- Effective use of EHR tools requires thoughtful planning, management and full integration into health care delivery system workflows and operational infrastructure
EHR Content & Decision Support That Get Used

- Based on reliable guidance
  - Evidence based
  - Accurately targeted

- Modal alerts (force user to interact with alerts)

- Pieces of content that do one thing quickly & well
  - All-encompassing content not generally well accepted

- More efficient than alternative methods
  - Easy to navigate
  - Streamlines workflow (eg, ordering multiple disparate items)
  - Embedded guidance for Clinician, Staff, Member
    - Do it right the first time
EHR Content & Decision Support That Get Used

- **Fully integrated into standard workflows**
  - Developed in collaboration with end-users
  - Right place & right time
  - Targeted toward lowest permissible and desirable scope of practice
  - Fully supported by implementation tools and training

- **Actively promoted**
  - High-level Leadership support
  - Aligned with organization’s priorities
  - Aligned with and supports improvement in performance metrics
  - User training

- **Centralized, coordinated governance**
  - Aligned clinical guidance
  - Judicious use of decision support
KP National HTN Algorithm

ACE-Inhibitor² / Thiazide Diuretic
- Lisinopril / HCTZ
  (Advance as needed)
  20 / 25 mg X ½ daily
  20 / 25 mg X 1 daily
  20 / 25 mg X 2 daily
- Pregnancy Potential: Avoid ACE-Inhibitors²
  If ACEI intolerant or pregnancy potential
  → Thiazide Diuretic
  Chlorthalidone 12.5 mg → 25 mg
  OR
  HCTZ 25 mg → 50 mg

If not in control

Calcium Channel Blocker
- Add amlodipine 5 mg X ½ daily → 5 mg X 1 daily → 10 mg daily
  If not in control

Beta-Blocker OR Spironolactone
- Add atenolol 25 mg daily → 50 mg daily (Keep heart rate > 55)
  OR
  IF on thiazide AND eGFR ≥ 60 mL/min/1.73m² AND K < 4.5
  Add spironolactone 12.5 mg daily → 25 mg daily
  If not in control

- Consider medication non-adherence
- Consider interfering agents (e.g., NSAIDs, excess alcohol)
- Consider white coat effect. Consider BP checks by medical assistant (e.g., two checks with 2 readings each, 1 week apart).
- Consider discontinuing lisinopril/HCTZ and changing to chlorthalidone 25 mg plus lisinopril 40 mg daily.
- Consider additional agents (hydralazine, terazosin, reserpine, minoxidil).
- Consider stopping atenolol and adding diltiazem to amlodipine, keeping heart rate > 55.
- Avoid using clonidine, verapamil, or diltiazem together with a beta blocker. These heart-rate slowing drug combinations may cause symptomatic bradycardia over time.
- Consider secondary etiologies.
- Consider consultation with a hypertension specialist.
Hypertension SmartSet

Triggered by Encounter or Problem List Diagnosis
Triggered by Reason for Visit

Search for SmartSets
Hypertension SmartSet

Orders Can be Defaulted

Hyperlink to Web Portal

Expandable Sections with Embedded Guidance

Contains All the Tools Required for Point-of-Care

Hypertension treatment algorithm

ACE Inhibitor/Thiazide diuretic - first line therapy. **ACE INHIBITORS CONTRAINDICATED IN PREGNANCY AND IN WOMEN OF CHILDBEARING POTENTIAL WHO ARE NOT PRACTICING HIGHLY EFFECTIVE CONTRACEPTIVE MEASURES**

- Lisinopril-Hydrochlorothiazide 20-25 mg SELF-TITRATION 0.5 to 2 tabs max, #180, RF PRN
- Lisinopril-Hydrochlorothiazide 20-25 mg Tab, 0.5 TAB PO ONCE DAILY, #45, RF PRN
- Lisinopril-Hydrochlorothiazide 20-25 mg Tab, 1 TAB PO DAILY, #90, RF PRN
- Lisinopril-Hydrochlorothiazide 20-25 mg Tab, 2 TABS PO ONCE DAILY, #180, RF PRN

Thiazide Diuretics - first line therapy if ACEI intolerance (and GFR greater than 30mL/min)

- ACE Inhibitors - first line for CKD, or diuretic intolerance
- ARB - if ACEI intolerant and CKD or LVSD, or DM with microalbuminuria,
- Aspirin - recommended for patients at increased cardiovascular risk with controlled HTN

MEDICATIONS - ADD-ON THERAPY.
ORDERS
LEVEL OF SERVICE & FOLLOW-UP
PATIENT INSTRUCTIONS

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**Hypertension SmartRx**

- Combination ACE Inhibitor-thiazide diuretic (e.g. lisinopril-HCTZ) should be used as initial therapy for most patients with uncomplicated hypertension.
- ACE Inhibitors are contraindicated in pregnancy and in women of childbearing potential who are not practicing highly effective contraceptive measures.
- Certain other high-risk conditions are compelling indications for the use of other antihypertensives.

**Embedded Guidance**

- Set Web Link to Hypertension Guideline
- Set Web Link to Hypertension Treatment Algorithm

**Link to SmartSet**

- Hypertension Adult IM FP - NW Smart Set (#16616)

**Alternatives in Preferred Order**

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<th>Alternative</th>
<th>Sig</th>
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<th>End Date</th>
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<td>S+365</td>
<td>3</td>
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Best Practice Advisory

Programmable Triggering Logic

Highly Utilized, Single-Purpose Best Practice Advisory

Defaulted Link to SmartSet
Best Practice Advisories

Aspirin SmartSet
Defaulted Medication Order & Patient Instructions

Medication Order Placed

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Low-Dose Aspirin: After Your Visit

Your Kaiser Permanente Care Instructions

Low-dose aspirin acts as a "blood thinner" to prevent blood clots from forming. It can reduce your risk of a stroke and can protect against heart attacks. When taken during and after a heart attack, aspirin can reduce your chances of dying. Aspirin also can help if you have had a heart attack or have a high risk of a stroke caused by a clot.

Daily aspirin can cause bleeding, so it may not be safe if you have stomach ulcers or uncontrolled high blood pressure. Do not take daily aspirin tablets that have other ingredients such as caffeine or sodium.

Before starting aspirin therapy, tell your doctor about all the drugs, herbal medicines, and other treatments you take.

Follow-up care is a key part of your treatment and safety. Be sure to make and go to all appointments, and call your doctor if you are having problems. It's also a good idea to know your test results and keep a list of the medicines you take.

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**Patient Support Tool: Panel View**

- **Search Panel for Specific Care Gaps**
- **Sort Panel by Various Criteria**
- "Gap Score" Constructed to Reflect Clinical Importance of Care Gaps
- "Y" Denotes Membership in Registry Color Reflects Clinical Importance of Registry-Specific Care Gaps

### Complete Panel View

<table>
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<th>PCP(s):</th>
<th>Total Patients: 1977 - displaying results 1 to 200 of 1977</th>
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<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 All</td>
</tr>
</tbody>
</table>

| NAME | Age | Sex | Dx | Prev | Gap | DM | CVD | CHF | HTN | CKD | Asth | Remarks | Last Seen | Rev'd | PCP |
|------|-----|-----|----|------|-----|----|-----|-----|-----|-----|-------|----------|--------|-----|
|      | 54  | M   |    |      | 20  |    |     |     |     |     |       |          | 11/10   |       |
|      | 56  | M   |    |      | 19  |    |     |     |     |     |       |          | 03/11   | 8/27/07|
|      | 64  | M   |    |      | 19  |    |     |     |     |     |       |          |         |       |
|      | 59  | M   |    |      | 19  |    |     |     |     |     |       |          |         |       |
|      | 77  | F   | R  |      | 18  |    |     |     |     |     |       |          |         |       |

"Gap Score" Constructed to Reflect Clinical Importance of Care Gaps

"Y" Denotes Membership in Registry Color Reflects Clinical Importance of Registry-Specific Care Gaps
### Patient Support Tool: Detail View

#### Registry Membership
- Care Gap Acuity (Color)
- & Gap Score

#### Care Recommendations
- **Visits, Immunizations, Vitals, & CAD Risk**

#### Pertinent Labs
- **Active Prescriptions**

### Therapeutic Care Gaps:
- Aspirin use - Use "CAD" order to document, if daily ASA use
- ACE/ARB - START? for CVD risk
- Statin - START at min. Simva 40, LDL OVERDUE Possible interaction

### Chronic Condition Monitoring Care Gaps:
- HBA1C OVERDUE Last: 8.4 08-FEB-11
- Lipid Panel OVERDUE
- CKD confirmed - MicroAlbumin Screen Urine DUE

### Preventive Care Gaps:
- Flu Shot due - Last done: 10/23/08
- Tdap DUE (not Td), then boost with Td every 10 yrs - Last done: 11/12/09
- Consider Colorectal Cancer Screening if never before screened or greater than 10 years.

---

**Last Flu Date:** 10/23/08
**Last Pneumo:** 10/2/02
**Last Td:** 11/12/09

**Patient Vitals**
- **Last BP:** 132/65 on 10/7/11
- Pulse: 62 on 10/7/11
- Weight: 218.0 on 5/3/11
- Height: 73.0 on 2/8/11
- **BMI:** 28.8 5/3/11
- Ten Year Cardiac Risk: %

**Most recent KP pharmacy dispense of each drug within certain drug classes in last 12 months. Bolded = dispensed in last 3 months**

```
<table>
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<tr>
<th>Drug</th>
<th>Date</th>
<th>Dose</th>
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<tr>
<td>LANTUS INJ 100/ML</td>
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<tr>
<td>METFORMIN HCL TAB 850MG</td>
<td>10/5/11</td>
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<tr>
<td>GLIPIZIDE TAB 10MG</td>
<td>10/5/11</td>
<td>40.0000</td>
</tr>
<tr>
<td>ATENOLOL TAB 50MG</td>
<td>10/5/11</td>
<td>75.0000</td>
</tr>
<tr>
<td>NITROSTAT SUB 0.4MG</td>
<td>9/12/11</td>
<td></td>
</tr>
<tr>
<td>CEPHALEXIN CAP 500MG</td>
<td>2/25/11</td>
<td>2000.0000</td>
</tr>
<tr>
<td>HYDROCODONE/ACETAMINOPHEN TAB 5-500MG</td>
<td>9/12/11</td>
<td>650.0000</td>
</tr>
<tr>
<td>DOXYCYCLINE HYCLATE CAP 100MG</td>
<td>1/2/11</td>
<td>200.0000</td>
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Clinical Knowledge Management
KPNW

- Knowledge Synthesis & Maintenance
- Knowledge Representation
- Knowledge Integration & Alignment
- EHR Clinical Content
- Guidelines/EBM

- Governance
- Metrics Usage Statistics Outcomes
- KPHC** Content Maintenance

^ Includes Knowledge Discovery, Acquisition and Creation
*Primary Focus Areas for KPNW Knowledge Management Team
** Kaiser Permanente HealthConnect and Related Applications
Lifecycle of EHR Content Implementation

1. Requirements Definition
2. Design
3. Develop/Build
4. Deploy/Champion
5. Measure/Evaluate
6. Maintain/Revise

Diagram showing the cyclical process of implementing EHR content.
Lifecycle of EHR Content Implementation

Requirements Definition

- What problem are you trying to solve and what are the explicit objectives?
- Who are the stakeholders?
- Who needs to be involved in the design? How? When?
- What workflow processes are involved?
Determining When/Where/How to Embed Guidance: Clinical Pathway Analysis

- **Member identified:** Lipid screen needed
- **Leverage Point Identified:** Lipid test ordered
- **Member advised to go to lab for lipid test:** 2 min
- **Leverage Point Identified:** Member goes to lab for lipid test
- **Area of concern:** Lipid test results in Provider in-basket
- **Provider reviews lab results:** 10 min
- **Member notified of lipid results:** 10 min
- **Member sees lipid test result in KP.org:** 10 min

**Green box= touch time**
**Red box= wait time**

- Immediate or Not at all
- 0-7 days
- 6-24 hours
- Hours-days
- 0-7 days
Lifecycle of EHR Content Implementation

Measure & Evaluate

- Does the content reflect explicit goals & metrics?
- How will you measure its effects?
- How will you evaluate your results?
- When and how will you iterate based on data?
Effect of Best Practice Advisory
Chlamydia Screening Rates (HEDIS)

Chlamydia Screening
Commercial Members
Age 16-24

2010 Stretch Target 73.6%

2011 Target 72.9%

Commercial only Age range decreased to 16-24 2009

BPA released 12/4/08

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<td>48.6%</td>
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<td>Score (21-24)</td>
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<td>73.0%</td>
<td>73.4%</td>
<td>74.2%</td>
<td>74.3%</td>
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The percentage women 16-24 years of age, continuously enrolled for 1 year who were identified as sexually active, who had at least one test for chlamydia during the measurement year. Overall score is average for two age groups.
Unblinded Internal Reporting of Performance Metrics

Northwest Permanente, PC

High Priority Measures - Filter by Clinician Name

Regional | Building or Department | Name | Module | PCSA

Clinician Name: (export clinician data to Excel)

Cervical Cancer Screening

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<th>Percent</th>
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<td>Jan. 2008</td>
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<td>Feb. 2008</td>
<td>83.1%</td>
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<td>Mar. 2008</td>
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<td>Apr. 2008</td>
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<tr>
<td>May 2008</td>
<td>90.7%</td>
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<td>Dec. 2008</td>
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Colorectal Cancer Screening

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Kaiser Permanente
Lifecycle of EHR Content Implementation

- Requirements Definition
- Design
- Develop/Build
- Deploy/Champion
- Measure/Evaluate
- Maintain/Revise
KP.org: My Health Manager

Welcome, Catherine | Sign off

My health manager | Health & wellness | Health plans & services | Locate our services

- My doctor
- My medical record
- Pharmacy center
- Appointment center
- My plan and coverage
- My message center

Schedule appointments

Schedule your appointments online.

My message center

Exchange secure e-mail with your doctor's office in my message center. You also can go there to contact our Member Services and Web manager.

Appointment center

Wondering if you should book a visit? Consult our interactive symptom checker, or go straight to scheduling in the appointment center.

My medical record

See test results, immunizations, and more health information in my medical record.
KP.org
Personal Action Plan

Demographics section

Welcome Message

Cancer Screening
Breast Cancer Screening (Mammogram)
Cervical Cancer Screening (Pap Test)
Colorectal Cancer Screening

Heart Health
LDL Cholesterol
Blood Pressure

Chronic Health Conditions
Diabetes (A1c Lab Test)
Asthma

Preventive Care
Body Mass Index (BMI)
Tobacco Use

General Clinical Guidelines
Preventive Care Guidelines
Cancer Screening Guidelines
Additional Screening Guidelines
Recommended Immunizations Schedule

Medications
Adherent
Non Adherent
### Personal Action Plan: Medications

**Medications**

<table>
<thead>
<tr>
<th>Name of medication</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLIPIZIDE</strong></td>
<td>73% of time with medication on hand</td>
</tr>
</tbody>
</table>

Our records indicate that you might **not** be picking up these medication refills as often as prescribed:

---

Our records indicate that you are taking the following medications. Good job! Click on the name to see your medication dispensing history and to setup refill reminders:

<table>
<thead>
<tr>
<th>ATORVASTATIN CALCIUM</th>
<th>100% of time with medication on hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATENOLOL</td>
<td>100% of time with medication on hand</td>
</tr>
<tr>
<td>LISINOPRIL &amp; HYDROCHLOROTHIAZIDE</td>
<td>100% of time with medication on hand</td>
</tr>
<tr>
<td>METFORMIN HCL</td>
<td>100% of time with medication on hand</td>
</tr>
</tbody>
</table>
GLIPIZIDE

Our records indicate that you may not be refilling your medication as often as it is prescribed.

Are you taking your medication(s) regularly as prescribed? If not, ask yourself:

- Do I forget to take my medications?
- Is it because it costs too much?
- Does the medication make me feel bad?
- Is it because I am taking too many medications?

Tips to help improve taking your medications:

1. Use a pill box to keep track of a week's worth of medications.
2. Schedule taking your medication(s) at the same time everyday (e.g., when your brush your teeth in the morning.)
3. Keep a list of all prescriptions and over the counter medications in your wallet.
4. Talk to your doctor at your next visit if you are not taking your medication as often it is prescribed.

(Our records do not include any medication received outside of Kaiser Permanente pharmacies and only reflect the amount and frequency indicated in our pharmacy records.)
Among KP Southern California members with diabetes &/or hypertension, use of KP.org was associated with statistically significant improvement in 9 HEDIS measures evaluated, by 2.0-6.5%.

Selected Measures/Pre-Post Matched-Control Study
Summary: Embedding Guidance

- Robust tools exist to embed guidance at the point of care.
- Guidance aimed directly at patients can greatly expand the point of care:
  - Convenient access to medical record and resources
  - Communication and transactions
  - Enhance patient engagement
- Tools are necessary, but insufficient to affect health outcomes:
  - Every stage of EHR content implementation lifecycle is important
  - Full integration into health care delivery system workflows and operational infrastructure is critical
Summary: Embedding Guidance

- EHR Content & Decision Support That Get Used
  - More efficient than alternative methods
    - Convenience for patients
  - Integrated into standard workflows
    - Offload clinicians
    - Supported by training & implementation tools
  - Developed in collaboration with end-users
    - Improved workflow integration
    - Enhanced acceptance by end-users
  - Associated with reported performance metrics
    - Simple and explicit metrics
    - Focused on performance gaps & potential benefit
Summary: Embedding Guidance

- **EHR Content & Decision Support That Get Used**
  - Aligned with organizations’ priorities
    - Actively promoted and supported
  - Centralized, coordinated governance
    - Aligned with other content and with guidelines
    - Carefully deployed, accurate, and rigorously maintained
  - Patient tools that enhance engagement
  - Based on reliable guidance
    - Accurately targeted
    - Evidence-based

- **Guideline Developer’s Role**
  - Write Evidence-Based, Implementable Recommendations
Embedding Guidance in the Kaiser Permanente EHR

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