Leveraging Electronic Health Records to Increase Colorectal Cancer Screening

Purpose of this presentation:

• Part 1: To present the results of a large EHR leveraged randomized trial performed in an integrated health care system (Group Health): Systems of Support to Increase CRC Screening (SOS) National Cancer Institute Funded (R01CA121125, Green)

• Part 2: To discuss how this will be adapted and implemented as a pragmatic cluster randomized trial in 30 safety net clinics that care for underserved populations Strategies and Opportunities to STOP CRC in Priority Populations UH2AT007782 (Coronado, Devoe, Green) – NIH Collaboratory Award

• Part 2 to be continued in APRIL by Dr Gloria Coronado and beyond by Jen Devoe co-Principal Investigators
Part 1: Systems of Support to Increase Colorectal Cancer Screening (SOS)

National Cancer Institute Funded (R01CA121125)

Affiliations with the Cancer and Prevention and Control Network, the Cancer Research Network, and the HMORN Team:

Beverly Green MD, MPH
Ching-Yun Wang PhD
Melissa Anderson MS
Jessica Chubak PhD
Sally Vernon PhD
Rich Meenan PhD
Sharon Fuller
Jackie St. John
Mary Lyons
Kris Hansen

Also: Andy Bogart, Lynda Tyll, Kathryn Horner, Katie Rose Oliver, David Carrell, Julia Anderson, Dottie Oliver, Cheryl Wiese, Leslie Davis, Robert S. Thompson, Ed Wagner, Steve Taplin, Kim Riddell, Peggy Rogers, Shawn Auld, David Eide, Larson, Chris Tachibana, Rebecca Hughes, Jessica Ridpath, Susan Carol Bradford, David Grossman, Eric Larson
Decreasing the burden of Colorectal Cancer

Colorectal Cancer (CRC) is the leading cause of cancer deaths in non-smokers

Large randomized trials have demonstrated that CRC screening decreases CRC incidence and mortality

The US Preventive Services Task Force recommends
- colonoscopy every 10 years
- flexible sigmoidoscopy every 5 years (with an interval fecal occult blood test [FOBT])
- FOBT annually

Assuming 100% adherence, modeling showed these modalities to be equally effective and cost effective.
Can CRC screening adherence be increased?

The goal of the SOS study was to leverage automated data and stepped increases of support to increase CRC screening, and to assure screening adherence over 2 years.

The primary outcome were to determine the proportion with any type of CRC screening test over 2 years and the proportion that were current for both years of the study.
Eligibility

Inclusions

- Age 50 – 73
- At least 2 years of continuous enrollment
- Not current for CRC screening (no colonoscopy in 9 years, no flex sigmoidoscopy in 4 years, no FOBT in 10 months)

Exclusions

- Prior CRC, inflammatory bowel disease, 1st degree relative with CRC prior to age 60
- Life limiting or end stage disease (dementia, renal failure)
Patients were Randomized to either 1 of 3 Stepped Intensity Interventions or Usual Care

21 Primary Clinics in Western Washington

15,414 Patients aged 50-74 years
Not up to date for colorectal cancer screening
No colorectal cancer or life threatening conditions

4675 Patients consented by phone to participate and be randomized to 1 of 4 study groups

**Group #1 = Usual Care**
- EHR Alerts
- HEDIS reporting CRCs rates
- Patients received annual birthday letter preventive and chronic disease reminders
- Patient centered medical home “In-reach and out-reach”

N= 1167 Patients

**Group #2 = UC + Automated Care**
- Educational pamphlet about colorectal screening choices
- Number to call for colonoscopy or flex sig.
- If no request made, FOBT (SENSA 3 card sample sent)
- Reminder letter after 3 weeks if not done

N= 1173 Patients

**Group #3 = UC + Automated + Assisted Care**
Medical Assistant who:
- Called non-adherent patients
- Documented screening intention
- Reviewed educational materials already sent
- Sent flex sig or colonoscopy requests to the physician
- Assisted patients in making a telephone or in person appointment with their physician

N= 1161 Patients

**Group #4 = UC + Automated + Assisted Navigation**
Registered Nurse who:
- Called non-adherent patients.
- Assessed CRC and procedural risk
- Based on the Preventive Health Model and Theory of Planned Action provides counseling –
  - Preference clarification
  - Motivational interviewing
  - Action planning
- Assisted with completing action plan, including navigating the care system, and address barriers

N=1174 Patients
Our IRB required verbal consent, eligible patients (not current for CRC screening based on automated data and no other exclusions) were mailed an invitation letter, then called to confirm eligibility and provide verbal consent.

Of those contacted about 11% self-reported being current for CRC testing.

After excluding these people and those excluded for other self-reported reasons, participation rate was 38%. (4675/12241)

Accounting for those with unconfirmed eligibility the corrected participation rate (Reach) was 44%.

Compared to participants, non participants were significantly more likely to:

- Be less educated
- Have Medicaid insurance
- Be current smokers
- Have lower levels of expected clinical need (RUBS)
- Not participate in other types of cancer screening (cervical, breast, prostate)
- Not think CRC screening was important
Conceptual model for the interventions

The Preventive Health and Chronic Care Models

Figure 1. Systems Approach to Colorectal Cancer Screening
Chronic Care and Preventive Care Model and Organizational Strategies to Improve Quality of Care
(Wagner, Myers, Vernon)
Group #1 = Usual Care

- Electronic Health Alerts
- HEDIS reporting of CRCS rates
- Annual birthday letter with preventive and chronic disease reminders
- Patient centered medical home “In-reach and out-reach”
**Screening, prevention, and wellness recommendations for**

- Keep your blood pressure below 140/90 to prevent heart disease and stroke.
- Have your cholesterol checked every 5 years.
- Get a flu shot every year in the fall.
- Get a tetanus-diptheria (Td or Tdap) vaccine (every 10 years for Td or once in a lifetime for Tdap).
- If you smoke or someone you live with smokes, contact Free & Clear® Quit for Life™ Program Call 1-800-462-2527 or visit www.freeclear.com/quit.
- Track your most recent screening tests and vaccines online by registering for enhanced services at www.mygrid.org.
- If you haven’t completed an Advance Directive, contact me or Group Health Resource Line at 1-800-972-2370 or e-mail to resources@login.org.

Send a secure message through MyGroupHealth or call my office at 360-394-1900, to get help scheduling these tests. (please do not call or go to the lab before you have contacted me)

<table>
<thead>
<tr>
<th>Tests recommended for you</th>
<th>Please have these tests during these time periods</th>
<th>Date of last known test within the recommended time period</th>
<th>Unless you are on a more frequent schedule, have your next test before</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pap test for Cervical cancer screening. *</td>
<td>Pap test every 2-3 years.</td>
<td>03MAY2010</td>
<td>03MAY2010</td>
</tr>
<tr>
<td>Mammogram for Breast cancer screening. *</td>
<td>Mammogram every 1 or 2 years based on breast cancer risk factors.</td>
<td>17JUL2009</td>
<td>17JUL2010 or 17JUL2011 See next page.</td>
</tr>
<tr>
<td>Talk to me about colorectal cancer screening.</td>
<td>Colonoscopy every 10 years unless you are on a more frequent schedule.</td>
<td>03AUG2005</td>
<td>Depends on your situation. Please contact me unless you are current on screening.</td>
</tr>
</tbody>
</table>
Electronic health record generated mailings:

- Mailing #1: Educational pamphlet about colorectal screening choices. Number to call for colonoscopy or flex sigmoidoscopy.
- Mailing #2: If no request made, FOBT (SENSA 3 card sample)
- Mailing #3: Reminder letter after 3 weeks if not done

Repeated in year 2: when due for screening if a FOBT was completed or 1 year after randomization if no CRC testing done.
This pamphlet includes information about colon cancer and what you can do to keep your colon healthy.

### What is colon cancer?
Colon cancer is a type of the colorectal cancer. The term colorectal cancer includes cancers of the colon, rectum, and rectoanal junction. Colon cancer is uncommon until you are about 50 years old. About 1 in 20 people will develop colorectal cancer in their lifetime, with a slightly higher chance in men than in women. The risk increases after the age of 50.

### What can I do to prevent colon cancer?
Colon cancer cannot be prevented. However, you can lower your risk of developing colorectal cancer by:
- **Maintaining a healthy weight.**
- **Being physically active.**
- **Eating a healthy diet.**
- **Not smoking.**
- **Limiting alcohol consumption.**

### What screening tests are there for colon cancer? Which one is best for me?

<table>
<thead>
<tr>
<th>Screening Test</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flexible Sigmoidoscopy</strong></td>
<td>A procedure in which a flexible scope is inserted into the rectum to examine the colon and rectum.</td>
<td>Can find polyps, can remove them if needed, can be done in office.</td>
<td>Does not examine the entire colon, may not find polyps in the rectum.</td>
</tr>
<tr>
<td><strong>Colonoscopy</strong></td>
<td>A procedure in which a flexible scope is inserted into the rectum to examine the entire colon. It can find and remove polyps.</td>
<td>Can see the entire colon, can remove polyps, can detect cancer.</td>
<td>More invasive, more expensive, requires sedation.</td>
</tr>
</tbody>
</table>

### How to prepare for and take the test
- **Colonoscopy:**
  - You will need to follow a special diet before the test. You will also need to take a bowel preparation the day before the test. You will need to be able to sit on a toilet.
  - The test is performed in a hospital or clinic. It usually takes about 30 minutes. Afterward, you will need to rest for a few hours before you can drive.

### Fecal Blood Test (FOBT)
- **How to prepare for and take the test:**
  - You will need to follow a special diet before the test. You will also need to take a bowel preparation the day before the test. You will need to be able to sit on a toilet.
  - The test is performed in a hospital or clinic. It usually takes about 30 minutes. Afterward, you will need to rest for a few hours before you can drive.

###灵活结肠镜 (Flexible Sigmoidoscopy)
- **How to prepare for and take the test:**
  - You will need to follow a special diet before the test. You will also need to take a bowel preparation the day before the test. You will need to be able to sit on a toilet.
  - The test is performed in a hospital or clinic. It usually takes about 30 minutes. Afterward, you will need to rest for a few hours before you can drive.

### Colonoscopy
- **How to prepare for and take the test:**
  - You will need to follow a special diet before the test. You will also need to take a bowel preparation the day before the test. You will need to be able to sit on a toilet.
  - The test is performed in a hospital or clinic. It usually takes about 30 minutes. Afterward, you will need to rest for a few hours before you can drive.
Instructions for the Fecal Occult Blood Test (FOBT): Use the enclosed test kit to collect stool samples from 3 bowel movements in a row. Follow the steps described below.

Stay away from certain foods, vitamins, and medicines

For 3 days before and on the days you do the test:
- Don't eat red meat, including beef, lamb, and liver. It's OK to eat chicken and pork.
- Don't take more than 250 mg of vitamin C each day.
- If possible, don't take more than one baby aspirin or regular aspirin per day.
- If possible, don't take the medicines listed here:
  Generic name  |  Brand name  
  Ibuprofen     |  Advil, Motrin  
  Naproxen      |  Aleve, Naprosyn  
  Celecoxib     |  Celebrex

Avoid using some household cleaners while testing
- If you have toilet bowl cleaners in your toilet tank, take them out. Flush twice before you collect your first sample. Don't use any toilet bowl cleaners until after you've collected all 3 samples.
- Keep the test kit away from heat, light, and chemicals.

Don't test during your menstrual period
- Don't do the test during your menstrual period. It's OK to start the test 3 days after the bleeding stops.

1. Get the test card ready
- Take the card out of the envelope. Open the front of section 1 by lifting the flap.

2. Collect your first sample
- Flush the toilet and let it refill.
- Unfold the tissue paper from your kit and lay it on the surface of the toilet water. Let the edges of the paper stick to the sides of the bowl. Your stool will fall on the tissue. It's OK if some water collects on the tissue.

3. Place your sample on the card
- Use one of the sticks in the kit to take a small sample of stool from the tissue paper. Place a small amount on the area of the card marked A.
- Use the same stick to take another sample from a different part of the stool. Place a small amount on the area of the card marked B.
- Throw the stick away and flush the stool and tissue paper.

4. Close & store the card
- Close the cover of section 1 by placing the front flap under the tab.
- Store the card in the paper envelope until your next bowel movement. Don't put the test card in the refrigerator.

5. Collect the other 3 samples
- Take samples after your next 2 bowel movements. Follow steps 1-4 using the other 2 sections of the test card.

6. Mail the test card to the lab
- Put the test card in the mailing envelope that came with your kit. The mailing envelope is already labeled with your Group Health consumer number and the lab's address. Make sure the envelope is sealed tightly. No extra postage is needed.
Medical Assistant who:

- Called non-adherent patients
- Documented screening intention
- Could review educational materials already sent
- Sent flexible sigmoid or colonoscopy requests to the patient’s physician
- Assisted with appointments with their physician if needed

Repeated year 2
Registered Nurse who”
  • Called non-adherent patients
  • Assessed CRC and procedural risk
  • Based on the Preventive Health Model and Theory of Planned Action provides counseling –
    - Preference clarification
    - Motivational interviewing
    - Action planning
  • Assisted with completing action plan, including navigating the care system, and address barriers

Repeated in year 2
<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age - 50-64</td>
<td>85%</td>
</tr>
<tr>
<td>Sex – female</td>
<td>54%</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
</tr>
<tr>
<td>White – non Hispanic</td>
<td>80%</td>
</tr>
<tr>
<td>Black</td>
<td>5%</td>
</tr>
<tr>
<td>Asian</td>
<td>5%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
<tr>
<td>High school education or less</td>
<td>15%</td>
</tr>
<tr>
<td>Fair or poor health</td>
<td>7%</td>
</tr>
<tr>
<td>Never had CRC testing/screening</td>
<td>46%</td>
</tr>
</tbody>
</table>
Primary Outcomes\textsuperscript{a}  Current years 1 and 2

<table>
<thead>
<tr>
<th></th>
<th>Proportion Current both Years 1 and 2</th>
<th>Adjusted Differences between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Usual Care N=1166</td>
<td>Automated minus Usual Care</td>
</tr>
<tr>
<td></td>
<td>Automated N=1169</td>
<td>Assisted minus Automated</td>
</tr>
<tr>
<td></td>
<td>Assisted N=1159</td>
<td>Navigated minus Assisted</td>
</tr>
<tr>
<td></td>
<td>Navigated N=1170</td>
<td>Navigated minus Automated</td>
</tr>
</tbody>
</table>

| Adjusted percent | 26.3% | 50.8% | 57.5% | 64.7% | 24.5% | 6.7% | 7.2% | 13.9% |

| P value          |       |       |       |       | <0.001 | 0.001 | <0.001 | <0.001 |

\textsuperscript{*} Models are adjusted for age, sex, race, education, and account for clustering by clinic.
\textsuperscript{†} Applying a strict Bonferroni cut-off would provide a threshold of 0.0083 (i.e., 0.05/6). Significant P-values are bolded.
\textsuperscript{‡} Current defined as receiving flexible sigmoidoscopy or colonoscopy in year 1, or FOBT in year 1 plus FOBT, colonoscopy, or sigmoidoscopy in year 2.

\textsuperscript{a} Published in Annals of Internal Medicine March 5, 2013
Type of Test Completed to Stay “Current” for CRC Testing over 2 Years

Randomization Group

- UC
- Auto
- Assist
- Navigate

- Not Current
- FOBT Y1, ineligible Y2
- FOBT Y1, Y2
- FOBT Y1, CSFS Y2
- FS Y1
- CS Y1
# Effectiveness of stepped interventions in selected subgroups

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Usual Care</th>
<th>Automated</th>
<th>Assisted</th>
<th>Automated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>26%</td>
<td>51%</td>
<td>58%</td>
<td>65%</td>
</tr>
<tr>
<td>Age 50-64</td>
<td>25%</td>
<td>47%</td>
<td>55%</td>
<td>63%</td>
</tr>
<tr>
<td>Age 65+</td>
<td>33%</td>
<td>70%</td>
<td>71%</td>
<td>77%</td>
</tr>
<tr>
<td>Men</td>
<td>21%</td>
<td>47%</td>
<td>59%</td>
<td>66%</td>
</tr>
<tr>
<td>Women</td>
<td>28%</td>
<td>54%</td>
<td>56%</td>
<td>64%</td>
</tr>
<tr>
<td>Lower levels of education</td>
<td>25%</td>
<td>47%</td>
<td>48%</td>
<td>65%</td>
</tr>
<tr>
<td>Higher levels of education</td>
<td>28%</td>
<td>54%</td>
<td>62%</td>
<td>65%</td>
</tr>
<tr>
<td>No prior screening</td>
<td>19%</td>
<td>38%</td>
<td>44%</td>
<td>54%</td>
</tr>
<tr>
<td>Prior screening</td>
<td>32%</td>
<td>64%</td>
<td>70%</td>
<td>74%</td>
</tr>
<tr>
<td>White</td>
<td>29%</td>
<td>51%</td>
<td>58%</td>
<td>67%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5%</td>
<td>40%</td>
<td>47%</td>
<td>54%</td>
</tr>
<tr>
<td>Black</td>
<td>16%</td>
<td>48%</td>
<td>52%</td>
<td>45%</td>
</tr>
<tr>
<td>Asian</td>
<td>24%</td>
<td>61%</td>
<td>72%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Green = Incremental increase in screening significant at a threshold of 0.0083 (i.e.0.05/6).
Yellow = magnitude of effect greater than overall, but not significant.
### Costs

<table>
<thead>
<tr>
<th></th>
<th>Program Cost per person</th>
<th>Cost per additional CRC test (when the cost of the test is included)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usual Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Automated</strong></td>
<td>$94</td>
<td>- $89</td>
</tr>
<tr>
<td><strong>Assisted</strong></td>
<td>$98</td>
<td>$371</td>
</tr>
<tr>
<td><strong>Navigated</strong></td>
<td>$103</td>
<td>$557</td>
</tr>
</tbody>
</table>
Limitations

**Generalizability**

- Verbal consent required
- 80% white, educated
- All had health insurance
- Organizations are moving away from 3 day collection guaiac SENSA® to 1 or 2 sample fecal immunochemical tests that don’t require a special diet

**Long-term outcomes on clinical and cost outcomes unknown**

- FOBT requires annual adherence (delayed colonoscopies also may be suboptimal)
- At 2 years automated was less expensive, but long term?
- Benefits of program on detection and removal of high risk pre-cancer lesions and prevention of late stage CRC unknown
Conclusions

EHRs can be leveraged to efficiently and repeatedly deliver mailed interventions to increase CRC testing.

Stepped approaches were applied only to those needing these, and lead to incremental but smaller increases in CRC testing. (A little is a lot and more is a little more)

The rapid growth of EHRs provides opportunities for spreading this model more broadly and testing whether they can be used to maintain long-term adherence to screening.
Part 2: Translating a EHR leveraged intervention into safety net clinics

Strategies and Opportunities to STOP CRC in Priority Populations (STOP) UH2AT007782 (Coronado, Devoe, Green)
NIH Collaboratory Award

• CRC screening rates are very low in Safety Net Clinics (10 -30% of adults age 50-75 are current for screening)

• We hypothesize that implementation of EHR leveraged automated interventions and additional tailored interventions can be implemented safety net clinics and will result in increased uptake of CRC screening and maintained over time for the eligible population in these clinics.
To test this hypothesis we will conduct a 2 phased study

- Phase 1: We will define codes for identifying the sample, phenotype characteristics, and tracking outcomes. We will test the feasibility, effectiveness, and costs of implementing the adapted intervention in 2 Latino-serving safety net clinics. Our pilot findings will inform the design and evaluation of the cluster trial.

- Phase 2: We will conduct a cluster randomized trial in about 30 safety net clinics, randomizing them to usual care or automated plus interventions.

- The primary outcome will be clinic CRC testing rates over 2 years.
### SOS was an Explanatory Trial vs STOP is a Pragmatic Trial

<table>
<thead>
<tr>
<th>Category</th>
<th>SOS Description</th>
<th>STOP Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility</td>
<td>Specific criteria for inclusion and exclusion</td>
<td>Broad inclusion criteria, minimal exclusions</td>
</tr>
<tr>
<td>Consent</td>
<td>Patient verbal consent was required</td>
<td>Patient level consent is not required</td>
</tr>
<tr>
<td>Blinding</td>
<td>Patients &amp; investigators were blinded</td>
<td>Patients, providers, and investigators are un-blinded. Reports are generated and shared, interventions are modified and improved</td>
</tr>
<tr>
<td>Protocols</td>
<td>Protocols were fixed and monitored closely</td>
<td>Flexible – using principles of Community Based Participatory research principles</td>
</tr>
<tr>
<td>Assessments</td>
<td>Includes administrative data and patient self-reported outcomes</td>
<td>Data is from administrative databases and qualitative assessments</td>
</tr>
</tbody>
</table>
Setting – The OCHIN Primary Care Research Collaborative

Oregon Health Information Network (OCHIN) and Primary Care Research Collaborative with 50 Networks, 250 clinics, >1,000,000 unique patients

Phase 1: Two OCHIN affiliated Safety Net Clinics that serve Latino populations (Virginia Garcia Memorial Health Centers Cornelius and Hillsboro Oregon)

Phase 2: About 30 OCHIN Safety Net Clinics in Oregon, Washington, and California
OCHIN has a single centralized EHR (EPIC)

OCHIN’s mission is to provide safety net clinics with Health IT tools, for the purpose of improving patient experience and quality of care and optimizing population management while reducing costs.

**Strengths:**
- Comprehensive “horizontal data” - a single EHR is deployed centrally, and links all clinics and patient information with a similar data structure
- OCHIN collects “phenotypic” data available not typically collected for insurance plans (income, homeless status, preferred language)

**Challenges:** Integration of “vertical data” from hospitals and external providers that are not part of OCHIN

**Opportunities:**
- The State of Oregon’s Affordable Care Act (ACA) health exchange will be managed as a single Coordinated Care Organization (CCO’s)
- Oregon’s CCO will manage, 80% of Medicaid claims and 40% of all claims across the state with links to claims data
- We also be able collect utilization data from Project Access who provides colonoscopy services for the uninsured
STOP Pilot Phase is being implemented in 2 Latino-serving Federally Qualified Health Centers

<table>
<thead>
<tr>
<th>Subset of patients age 50-74, not current CRCS</th>
<th>N = 213</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 50-64</td>
<td>79%</td>
</tr>
<tr>
<td>Female</td>
<td>63%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>59%</td>
</tr>
<tr>
<td>Spanish speaking</td>
<td>58%</td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>18%</td>
</tr>
<tr>
<td>Medicare</td>
<td>23%</td>
</tr>
<tr>
<td>Self-pay (none)</td>
<td>50%</td>
</tr>
<tr>
<td>Commercial</td>
<td>6%</td>
</tr>
<tr>
<td>Other or Unknown</td>
<td>3%</td>
</tr>
<tr>
<td>&lt;= 100% Poverty Level</td>
<td>80%</td>
</tr>
</tbody>
</table>
Preliminary Results

213 STOP letters were mailed January 18, 2013 –
  • 16 letters were returned (bad addresses)
  • 1 patient called in to refuse

206 FIT Kits were mailed February 8, 2013

As of March 15th 64 patients (31.6%) completed FITS,
9 were positive (9.2% of those completed)

Plus interventions (calls with motivational interviewing) are just beginning

More to come soon