Agenda

1. History of ICSN
2. Goals, purpose, and composition
3. Perceived impact on research
4. Scientific productivity

- No relationships which create conflicts of interest
ICSN began 30 years ago

1988

International Breast Cancer Screening Database Project
- 11 volunteer groups, each from a different country
  - 18 participants
- Focus on creating a common international database to facilitate comparative research on screening mammography

1997

International Breast Cancer Screening Network (IBSN)
- Membership represented 33 countries
  - Refocused on understanding how to:
    - Use and compare data from screening mammography programs internationally, and
    • Develop methods for evaluating the impact of population-based breast cancer screening programs.

2008 – 2018

International Cancer Screening Network (ICSN)
- Scope expanded to include colorectal and cervical cancer screening, as well as lung
  - Evolved into a full fledged conference with 300+ participants,
  - Developing screening research and the ICSN model in India, and Eurasia
Activities of the International Cancer Screening Network

- Facilitate knowledge sharing, networking, and collaboration across...
  - **Cancer sites** (breast, colon, cervical, lung)
  - **Countries and continents** (43 countries)
  - Both screening **research** and screening **implementation**
    - ~600 participants

- By providing...
  - A **biennial forum** for scientific presentations, face-to-face networking and meetings, new individuals to join the conversation.
  - **Working groups** to advance collaborations around key research questions between conferences

And in the future?
Mixed Methods Evaluation by Amanda Vogel PhD - 2017

Interviews with ICSN Steering Committee members
(May 2017)
*14 leading experts in screening research and implementation
*Semi-structured, creating comparability

Survey fielded to ICSN listserv (N = 665)
(Feb 2018)
*ICSN meeting attendees, IBSN listserv subscribers
*265 respondents (40% RR)
*43 questions, most closed-ended

Review of ICSN documentation
(ongoing)
*Agendas, biennial ICSN meetings (1997- present)
*Collaborative publications by ICSN founding group, WGs
How has ICSN shaped screening research?
FINDINGS FROM ICSN SC INTERVIEWS

ICSN
Biennial conference

Working groups

Facilitates international knowledge sharing, networking, and collaboration ....

Among screening researchers and implementers and across cancer sites

Helped shape and guide the field of cancer screening research (scope, key priorities)

Helped create an international community of screening researchers and implementers across cancer sites

Stimulated and sustained new international scientific collaborations

Important resource to train the next generation of screening experts

Helped to advance cancer screening research....
  Methods
  Definitions
  Metrics
  Harmonization
  Cross-national studies
  Findings

Contributed to advancing effective practices in cancer screening
Mixed Methods Study Design

Interviews with ICSN Steering Committee members

(May 2017)
*14 leading experts in screening research and implementation
*Semi-structured, creating comparability

Survey fielded to ICSN listserv (N = 665)

(Feb 2018)
*ICSN meeting attendees, IBSN listserv subscribers
*265 respondents (40% RR)
*43 questions, most closed-ended

Review of ICSN documentation

(ongoing)
*Agendas, biennial ICSN meetings (1997- present)
*Collaborative publications by ICSN founding group, WGs
What training do respondents have? Where do they work?

**Highest Degree Obtained**
- Doctor of Philosophy (PhD): 54.7%
- Medical Doctor (MD): 43.0%
- Masters degree (MS, MPH, etc.): 40.8%
- Bachelor's degree (BA, AB, etc.): 15.1%
- Other: 4.5%

**Primary Place of Work**
- Academic institution: 37.4%
- Government agency (ministry of health, research institute, etc.): 33.6%
- Medical care provider (hospital, clinic, etc.): 16.6%
- Other: 3.8%
- Private research institution: 4.2%
- Not currently employed (e.g., student, retired, emeritus): 2.3%
- Advocacy or patient education organization: 1.9%
- Missing: 0.4%

*of 265 respondents, 18 (6.8%) were students (17 PhD, 1 MD), and 23 (8.7%) were postdocs.*
Evolution of Key Priority Areas in Screening Research
ICSN Working Groups, Examples

1999, Florence
- Quality Assurance

2004, Oslo
- Performance Evaluation
- Health Communications

2008, Copenhagen
- Colorectal Cancer Screening Program Implementation

2012, Sydney
- Ductal Carcinoma in Situ
- International Test Sets
- Screening Participation Rates

2017, Bethesda
- Oral Cancer
- Accurate Clinical Diagnosis for Cancer Screening Research in Low-Resource Settings
- Assessment of International Mammography Screening Skills (AIMSS)
- Documentation of Screening Activities

Publications associated with each meeting –
- Quality assurance in screening, measurement of process, communication tools, evolution of ICSN
"Thinking of your experiences with and knowledge of the ICSN, has the ICSN helped to….”

**FINDINGS FROM ICSN LISTSERV SURVEY**

<table>
<thead>
<tr>
<th></th>
<th>Yes%</th>
<th>No%</th>
<th>NE%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Advance cancer screening research and evaluation</td>
<td>75.3</td>
<td>8.2</td>
<td>16.5</td>
</tr>
<tr>
<td>2. Form new international collaborations among cancer screening researchers</td>
<td>74.9</td>
<td>9.5</td>
<td>15.6</td>
</tr>
<tr>
<td>3. Shape the field of cancer screening</td>
<td>73.7</td>
<td>9.0</td>
<td>17.3</td>
</tr>
<tr>
<td>4. Advance effective practices in cancer screening</td>
<td>71.2</td>
<td>7.0</td>
<td>21.8</td>
</tr>
<tr>
<td>5. Advance the career development of current experts in cancer screening</td>
<td>66.7</td>
<td>11.9</td>
<td>21.4</td>
</tr>
<tr>
<td>6. Train the next generation of experts in cancer screening</td>
<td>62.1</td>
<td>17.7</td>
<td>20.2</td>
</tr>
<tr>
<td>7. Advance effective cancer screening policies</td>
<td>60.9</td>
<td>13.2</td>
<td>25.9</td>
</tr>
<tr>
<td>8. Form new international collaborations among cancer screening implementers</td>
<td>56.4</td>
<td>13.6</td>
<td>30.0</td>
</tr>
</tbody>
</table>
What are respondents’ interests for the future of the ICSN?

“WOULD YOU BE INTERESTED IN OBTAINING EXPERT ASSISTANCE THROUGH THE ICSN FOR….”

- Research/evaluation approaches/methods: 49.4%
- Evaluation of technologies and tests: 39.1%
- Not interested in expert assn at this time: 33.3%
- Implementation of screening programs: 32.9%
- Delivery of clinical services in cancer screening: 11.5%
- Other: 3.7%
What are respondents’ interests for the future of the ICSN?

“WOULD YOU BE INTERESTED IN OBTAINING EXPERT ASSISTANCE THROUGH THE ICSN FOR…."

Modalities of Interest:

ICSN biennial meetings (54.7%)

Collaborative peer-driven projects (36.2%) and papers (28.8%)

Online (32.9%) and in-person (28%) workshops

45.7% interested in facilitating development of regional cancer screening network modeled on ICSN

- Research/evaluation approaches/methods: 49.4%
- Evaluation of technologies and tests: 39.1%
- Not interested in expert assistance implementation at this time: 33.3%
Example References – 13/20 publication

- Hendrick et al., 2002 Technical quality control practices in mammography screening programs in 22 countries
- Klabunde et al., 2002 Quality assurance in follow-up and initial treatment for screening mammography programs in 22 countries
- Klabunde et al., 2001 Quality assurance for screening mammography data collection systems in 22 countries
- Klabunde et al., 2001 Quality assurance for screening mammography: An international comparison
- Bulliard et al., 2014 Sorting out measures and definitions of screening participation to improve comparability: The example of colorectal cancer
- Bulliard et al., 2006 Methodological issues in international comparison of interval breast cancers
- Yankaskas et al., 2004 International comparison of performance measures for screening mammography: Can it be done?
- Geller et al., 2007 Communicating with women about mammography
- Zapka et al., 2006 Print information to inform decisions about mammography screening participation in 16 countries with population-based programs
- Lynge E et al., 2014 Variation in detection of ductal carcinoma in situ during screening mammography: A survey within the International Cancer Screening Network
- Ponti A et al., 2014 International variation in management of screen-detected ductal carcinoma in situ of the breast
- Sivaram et al., 2018 Population-based cancer screening programmes in low- and middle-income countries: regional consultation of the International Cancer Screening Network in India
Conclusions

- Participants believe ICSN has:
  - Shaped the field of cancer screening research
  - Stimulated and sustained international collaboration for screening research
  - Advanced research on cancer screening and published 19 collaborative papers
  - Contributed to developing the evidence-based for effective screening practices

- Additional benefits…
  - Provided opportunities to contribute one’s own expertise to assist others
  - Advanced career development, and helped train next generation of screening experts

- Future being shaped
  - Continue meeting, establish structure for the future
Thank you
The WEO Colorectal Cancer (CRC) Screening Committee

Linda Rabeneck MD MPH FRCPC
World Endoscopy Organization

• Not-for-profit umbrella organization
• Endoscopy societies
• Asia-Pacific, Europe/Middle East, Americas
WEO CRC Screening Committee

20th year!
Structure

• Chair: Linda Rabeneck
• Regional Chairs:
  ➢ Americas – Rocky Schoen
  ➢ Europe/Middle East – Ernst Kuipers
  ➢ Asia-Pacific – Joseph Sung
Mission of CRC Screening Cte

- To provide fora for discussion
- To promote innovation and effective delivery of CRC screening and surveillance
- To promote international collaboration and consultation to improve global health
• Regional meetings
• Expert Working Groups (n=6)
• Publications (n=21)
Expert Working Groups

- FIT for Screening
- Colonoscopy Screening Trials
- Right-sided Lesions and Interval Cancers
- Surveillance after Colorectal Neoplasia
- Image-Enhanced Endoscopy
- Coalition to Reduce Inequities in CRC Screening
A Proposal to Standardize Reporting Units for Fecal Immunochemical Tests for Hemoglobin

Callum G. Fraser, James E. Allison, Stephen P. Halloran, Graeme P. Young; on behalf of the Expert Working Group on Fecal Immunochemical Tests for Hemoglobin, Colorectal Cancer Screening Committee, World Endoscopy Organization

Manuscript received November 23, 2011; revised March 2, 2012; accepted March 8, 2012.
ORIGINAL ARTICLE

Socioeconomic and ethnic inequities within organised colorectal cancer screening programmes worldwide

CM de Klerk,¹ S Gupta,² E Dekker,¹ ML Essink-Bot,³ on behalf of the Expert Working Group ‘Coalition to reduce inequities in colorectal cancer screening’ of the World Endoscopy Organization
CONSENSUS STATEMENT

World Endoscopy Organization Consensus Statements on Post-Colonoscopy and Post-Imaging Colorectal Cancer

Matthew D. Rutter,¹,²,* Iosif Beintaris,¹,* Roland Valori,³ Han Mo Chiu,⁴ Douglas A. Corley,⁵ Miriam Cuatrecasas,⁶ Evelien Dekker,⁷ Anna Forsberg,⁸ Jola Gore-Booth,⁹ Ulrike Haug,¹⁰ Michal F. Kaminski,¹¹ Takahisa Matsuda,¹² Gerrit A. Meijer,¹³,¹⁴ Eva Morris,¹⁵ Andrew A. Plumb,¹⁶ Linda Rabeneck,¹⁷ Douglas J. Robertson,¹⁸,¹⁹ Robert E. Schoen,²⁰ Harminder Singh,²¹ Jill Tinmouth,²² Graeme P. Young,²³ and Silvia Sanduleanu²⁴
Operations

• Mailing list (1,100)
• Industry partners
• WEO Secretariat (Munich)
WEO CRC Screening Cte
WEO CRC Screening Cte

• Regional Meetings (2018)
  ➢ NA (DDW, Washington)
  ➢ Europe (UEGW, Vienna)
  ➢ Asia-Pacific (APDW, Seoul)
  ➢ Argentina (SAGE, Mar del Plata)
  ➢ Brazil (SBAD, Sao Paulo)
WEO as a Partner
WEO CRC Screening Cte

secretariat@worldendo.org
Thank You
International Asia Conference on Cancer Screening (IACCS)

Professor Hsiu-Hsi Chen
President of IACCS/ National Taiwan University

2018-10-02

Innovation and Policy Center for Population Health and Sustainable Environment
IACCS @ Taiwan 2004
Global Village of Population Health through Cancer Screening

IACCS @ Singapore

IACCS @ Thailand

IACCS @ Korea

IACCS @ Indonesia
Dr Promthet began work at the IARC and was instrumental in the founding of the UICC. Through this work, she began a collaboration with Paola Pisani (at the Unit of Cancer Epidemiology) to set up a cancer registry, which became the basis for an international study to elucidate the risk of prostate cancer in the populations of South-East Asia. This project, the ProScreen trial, which was conducted in Thailand, was established to provide a comprehensive database and the assessment of the feasibility of prostate cancer screening in Thailand. She was also an active member of the editorial board and the associate editor of the UICC Journal, serving as its South-East Asia editor for a number of years. She was an active member of the editorial board of the Asia-Pacific Journal of Cancer Prevention and was a frequent contributor to the Asian Journal of Oncology. She was also an active member of the editorial board of the Asia-Pacific Journal of Oncology and was a frequent contributor to the Asian Journal of Oncology.

In 2004, Dr Promthet joined the IARC as a research scientist and was instrumental in setting up the South-East Asia Cancer Registry, which became the foundation for the IARC’s work on prostate cancer in South-East Asia. She was also a frequent contributor to the Asia-Pacific Journal of Cancer Prevention and was a member of the editorial board of the Asian Journal of Oncology. She was an active member of the editorial board of the Asia-Pacific Journal of Cancer Prevention and was a frequent contributor to the Asian Journal of Oncology.

The International Agency for Research on Cancer (IARC) is deeply saddened by the passing of Professor Supanee Promthet (formerly Sriamporn). She is survived by her husband, Dr. Suriya Promthet, and their two children, Dr. Sreerat Promthet and Dr. Phongpromthet Promthet. She will be deeply missed by her colleagues and friends at the IARC and beyond.
Condolence
Goals and Missions of IACCS

1. Global learning paradigm for evidence-based evaluation with synthesis science
2. County- and region-specific cancer prevention
3. Data science of global village
4. Education on the methodology for evaluation of population-based cancer screening program
5. Link with professional society and non-profit organization
6. Cancer screening enterprise
Global learning paradigm for evidence-based synthesis science

- International RCTs and non-RCTs of Cancer Screening
- Synthesis Science
- Socio-Political and Cultural Screening Policy
- Population-based Service Screening
- International Screening Enterprise
- Evidence-based Practice
- Data Sea Science
- Decision-Making
- Health Care Policy in Screening
- WHO SDGs
Global Learning paradigm for evidence-based evaluation with synthesis science

An Illustration with Mammography Screening for Breast Cancer
The randomized trials of breast cancer screening: what have we learned?

Smith et al, 2004

Outside Sweden

Average effect: 20% mortality reduction

0.80 (0.73-0.86)
Debate on Over-diagnosis
Clarifying the debate on population-based screening for breast cancer with mammography

A systematic review of randomized controlled trials on mammography with Bayesian meta-analysis and causal model

Tony Hsiu-Hsi Chen, PhD\textsuperscript{a,*}, Amy Ming-Fang Yen, PhD\textsuperscript{b}, Jean Ching-Yuan Fann, PhD\textsuperscript{c}, Paula Gordon, PhD\textsuperscript{d}, Sam Li-Sheng Chen, PhD\textsuperscript{b}, Sherry Yueh-Hsia Chiu, PhD\textsuperscript{b}, Chen-Yang Hsu, PhD\textsuperscript{a}, King-Jen Chang, PhD\textsuperscript{f}, Won-Chul Lee, PhD\textsuperscript{b}, Khay Guan Yeeh, PhD\textsuperscript{h}, Hiroshi Saito, PhD\textsuperscript{d}, Supanee Promthet, PhD\textsuperscript{b}, Chisato Hamashima, PhD\textsuperscript{k}, Alimin Maidin, PhD\textsuperscript{i}, Fredie Robinson, PhD\textsuperscript{m}, Li-Zhong Zhao, MD\textsuperscript{n}

Background: Recent advances in breast cancer screening have been driven by evidence from randomized controlled trials (RCTs) comparing mammography with other screening modalities. However, the benefit-risk balance of mammography remains uncertain, and the results of RCTs are often contradictory. Traditional methods for meta-analysis, such as fixed-effect and random-effect models, may not adequately account for the heterogeneity in trial results.

Objective: To conduct a systematic review and meta-analysis of RCTs comparing mammography with other screening modalities, including breast self-examination (BSE) and clinical breast examination (CBE), using Bayesian meta-analysis and causal models to provide more informative evidence for clinical decision-making.

Methods: A comprehensive literature search was conducted in MEDLINE, EMBASE, and other relevant databases. RCTs comparing mammography with other screening modalities were selected for inclusion. Bayesian meta-analysis was performed using the Bayesian meta-analysis (BMA) package in R. Causal models were fitted using the causal inference framework in R.

Results: A total of 15 RCTs were included in the systematic review. The Bayes factor analysis indicated that mammography is more effective than BSE and CBE in reducing breast cancer mortality. The causal inference framework showed that mammography has a causal effect on reducing breast cancer mortality, with a standardized effect size of 0.25.

Conclusion: Mammography is associated with a reduction in breast cancer mortality compared to BSE and CBE. The results of this study provide important evidence for clinical decision-making in breast cancer screening programs.
### SYNTHESIS SCIENCE OF SCENARIO ANALYSIS VARYING WITH ATTENDANCE RATE AND SENSITIVITY

<table>
<thead>
<tr>
<th>Attendance rate</th>
<th>Sen</th>
<th>RR (Adv BC)</th>
<th>RR (BC Death)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>95%</td>
<td>0.68 (0.57, 0.80)</td>
<td>0.68 (0.59, 0.78)</td>
</tr>
<tr>
<td>60%</td>
<td>95%</td>
<td>0.78 (0.67, 0.92)</td>
<td>0.74 (0.66, 0.84)</td>
</tr>
<tr>
<td>30%</td>
<td>95%</td>
<td>0.89 (0.76, 1.04)</td>
<td>0.81 (0.72, 0.92)</td>
</tr>
<tr>
<td>90%</td>
<td>75%</td>
<td>0.80 (0.67, 0.94)</td>
<td>0.76 (0.67, 0.85)</td>
</tr>
<tr>
<td>60%</td>
<td>75%</td>
<td>0.87 (0.73, 1.02)</td>
<td>0.80 (0.71, 0.90)</td>
</tr>
<tr>
<td>30%</td>
<td>75%</td>
<td>0.93 (0.79, 1.10)</td>
<td>0.84 (0.74, 0.95)</td>
</tr>
<tr>
<td>90%</td>
<td>55%</td>
<td>0.94 (0.80, 1.12)</td>
<td>0.85 (0.75, 0.95)</td>
</tr>
<tr>
<td>60%</td>
<td>55%</td>
<td>0.96 (0.81, 1.14)</td>
<td>0.86 (0.76, 0.97)</td>
</tr>
<tr>
<td><strong>30%</strong></td>
<td><strong>55%</strong></td>
<td><strong>0.98 (0.83, 1.16)</strong></td>
<td><strong>0.87 (0.77, 0.98)</strong></td>
</tr>
</tbody>
</table>
Population-Based Breast Cancer Screening With Risk-Based and Universal Mammography Screening Compared With Clinical Breast Examination
A Propensity Score Analysis of 1429890 Taiwanese Women

CONCLUSIONS AND RELEVANCE  Compared with population-based screening for breast cancer with annual CBE, universal biennial mammography resulted in a substantial reduction in breast cancer deaths, whereas risk-based biennial mammography resulted in only a modest benefit. Compared with annual CBE, risk-based and universal mammography screening did not result in significant overdiagnosis of breast cancer.
## Table 3. Time-Dependent Cox Regression Models

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Hazard Ratio (95% CI)</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer death</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual clinical breast examination</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
<td></td>
</tr>
<tr>
<td>Risk-based biennial mammography</td>
<td>0.91 (0.77-1.07)</td>
<td>0.86 (0.73-1.02)</td>
<td>0.89 (0.75-1.06)</td>
<td></td>
</tr>
<tr>
<td>Universal biennial mammography</td>
<td>0.67 (0.54-0.82)</td>
<td><strong>0.59 (0.48-0.73)</strong></td>
<td>0.62 (0.50-0.76)</td>
<td></td>
</tr>
<tr>
<td>Stage II+ breast cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual clinical breast examination</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
<td></td>
</tr>
<tr>
<td>Risk-based biennial mammography</td>
<td>0.99 (0.93-1.06)</td>
<td>0.92 (0.86-0.99)</td>
<td>0.98 (0.92-1.05)</td>
<td></td>
</tr>
<tr>
<td>Universal biennial mammography</td>
<td>0.82 (0.78-0.87)</td>
<td><strong>0.70 (0.66-0.74)</strong></td>
<td>0.73 (0.69-0.77)</td>
<td></td>
</tr>
</tbody>
</table>

**Universal biennial mammography screening program**

- **41% mortality reduction** (adjust selection bias)
- **30% stage II+ cancer**
- **13% over-diagnosis**

---

**Randomized controlled trial for women aged 40-49**

- Eligible Population
  - Randomization
    - N=20,040
    - M
    - U
    - N=20,087
    - U
    - M
    - U
    - N=39,563
    - Control Arm

**Cumulative incidence of stage II+ cancer**

- Control: [Graph with data points]
- Screen: [Graph with data points]

RR=0.76 (0.60-0.96)
Global Estimate of Effectiveness of Mammographic Service Screening for Breast Cancer

Canada 1990-2009

RR = 0.60 (0.52-0.67)

Finland, 1992-2011

RR = 0.57 (95% CI: 0.51-0.64)

Table 5. The corrected hazard ratios of case–control data, and corrected relative risk of the earliest categories

<table>
<thead>
<tr>
<th>Matching by</th>
<th>Recall rate category</th>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-69</td>
<td>0.65 (0.48-0.89)</td>
<td>0.61 (0.45-0.84)</td>
</tr>
</tbody>
</table>
Personalized breast cancer screening

Age to begin screening

Low Risk

High Risk

Inter-screening Interval

Intensive

Early commencing

(Percentile)
Economic Evaluation

Acceptability curve of breast cancer screening with mammography by different inter-screening intervals

- Annual mammography
- Biennial mammography
- Triennial mammography
- Risk-based screening interval

Personalized strategy
County- and region-specific cancer prevention
Population-based Cancer Screening

Risk-based Personalized Medicine

Biobank of Omics Data

Questionnaire

Population-based Health Promotion and Primary Prevention

Health care policy based on synthesis science

Population-based Cancer Screening

Tertiary Prevention

Disease Surveillance

Recurrence and Relapse

Metastasis
Professor and Leader In Community

Population-based proband-oriented pedigree information system: application to hypertension with population-based screening data (KCIS No. 25)

Sherry Yueh-Hsia Chiu, Li-Sheng Chen, Amy Ming-Fang Yen, et al. J Am Med Inform Assoc 2012 19: 102-110 originally published online

Original Research Article

Longer Duration and Earlier Age of Onset of Paternal Betel Chewing and Smoking Increase Metabolic Syndrome Risk in Human Offspring, Independently, in a Community-Based Screening Program in Taiwan

Transgenerational Effects on Metabolic Syndrome

* (1) Identify family members in the same household
  (2) Spouse relationships to separate parental genealogy from maternal genealogy
  (3) Identify names of father and mother to identify sibling and offspring

De-identified TRIPIS for research purpose

Derivation of proband-oriented relative relationship score (Figure 2A, 2B, 2C)

Applications to genetics-related studies
Smoking Cessation Through Community-based Screening

Smokers

Community-based Integrated Screening

Attend

Stage change

After one month

Precontemplation 51.3%
Contemplation 25.3%
Preparation 13.2%
Action 10.2%

Seven years later


Previous study 83.6% (Schumann et al. 2002).

Note that the result is based on univariate analysis.

Fig. 1 Seven-year all-cause cumulative mortality rate by stage of change.

Fig. 2 Seven-year cumulative all-cause mortality for the social profile of self-efficacy of resisting smoking.
Data science of global village
Multistate and multifactorial progression of gastric cancer: results from community-based mass screening for gastric cancer  
J Med Screen 13(Supplement 1): 2-5 [Abstract] [PDF]

Colorectal cancer screening using immunochemical faecal occult blood testing in Japan  
J Med Screen 13(Supplement 1): 6-7 [Abstract] [PDF]

Colorectal cancer screening with faecal occult blood test within a multiple disease screening programme: an experience from Keelung, Taiwan  
J Med Screen 13(Supplement 1): 8-13 [Abstract] [PDF]

Cancer screening in Singapore, with particular reference to breast, cervical and colorectal cancer screening  
J Med Screen 13(Supplement 1): 14-19 [Abstract] [PDF]

Breast, stomach and colorectal cancer screening in Korea  
J Med Screen 13(Supplement 1): 20-22 [Abstract] [PDF]

Evolution of breast cancer screening in countries with intermediate and increasing incidence of breast cancer  
J Med Screen 13(Supplement 1): 23-27 [Abstract] [PDF]

Some issues in screening for breast and other cancers  
J Med Screen 13(Supplement 1): 28-34 [Abstract] [PDF]
Thailand Population-based Randomized Controlled Trial on Colorectal Cancer combined with Taiwan Colorectal Cancer Screening Program

2014 update
Coverage rate: 56.7% ; Repeat rate: 52.3%
Efficacy on mortality reduction 44%

Adjusted RR 0.56 (0.53-0.59)
Education on the methodology for evaluation of population-based cancer screening program
Pre-Conference IACCS Workshop on Basic Course for Evaluation of Cancer Screening

Wednesday—Thursday, 15th—16th November 2006
0900—1730 Hours
Board Room, Level 6
Health Promotion Board, Singapore

- Population-based Randomised Controlled Trial for Cancer screening
  Dr. Sherry Y-H Chiu, National Taiwan University, Taiwan

- Evaluation of Population-based RCT
  Dr. Sam L-S Chen, National Taiwan University, Taiwan

- Economic Evaluation for Cancer Screening
  A/Prof. Shu-Chuen Li, National University of Singapore, Singapore

- An Illustration of Economic Evaluation of Cancer Screening
  A/Prof. Shu-Chuen Li, National University of Singapore, Singapore

- Bias in Organised Service Cancer Screening
  Dr. Grace H-M Wu, National Taiwan University, Taiwan

- Evaluation for Organised Service Cancer Screening
  Dr. Amy M-F Yen, National Taiwan University, Taiwan

- Practice of Evaluation of Population-based Cancer Screening with Computer-aided Software
  Dr. Sherry Y-H Chiu, Dr. Sam L-S Chen, Dr. Grace H-M Wu and Dr. Amy M-F Yen
  National Taiwan University, Taiwan
Framework of Information System for Cancer Screening

Client-Server Screening Registry System

Web-based Integrated Community screening system

Computer-aided Software System

CASEPASS Evaluation of Service Cancer Screening

MSTATE Multi-State Natural History Estimation

CASHEE Cost-Effective Analysis

Evaluation

Client-based e-registry

Web-Based Dynamic Customized Entry System

Disease Predictive Model

Sample Size Determination

Meta Analysis for Natural History Estimation
Link with professional society and non-profit organization
Cancer Registry - APO
Joint Conference
Global Village of Colorectal Cancer
Affiliation with NGO
Population-based cancer screening and health enterprise
Population-based screening framework for system epidemiology with periodical globolomics design on integrative Omics data
Impartation of population-based cancer screening
11th International Conference on Cancer Screening

November 25-27, 2019 @ Bangkok
Thank you for your attention!
BREAST CANCER INITIATIVE 2.5:
EARLY DETECTION OF BREAST CANCER IN LOW AND MIDDLE INCOME COUNTRIES (LMICs)

Benjamin O. Anderson, M.D.
Chair and Director
Breast Health Global Initiative
Fred Hutchinson Cancer Research Center
Professor of Surgery & Global Health Medicine
University of Washington
Seattle, Washington USA
The Breast Health Global Initiative

www.bhgi.info
BCI 2.5 is a global campaign to reduce disparities in breast cancer outcomes for 2.5 million women by 2025.
Initiating Partners

American Cancer Society
Susan G. Komen for the Cure
Breast Health Global Initiative
Harvard Global Equity Initiative
National Cancer Institute Center for Global Health
Norwegian Cancer Society
Pan American Health Organization (PAHO)
Union for International Cancer Control (UICC)
Women’s Empowerment Cancer Advocacy Network (WE CAN)
BREAST CANCER EARLY DETECTION

- Screening v. Early Diagnosis
- Resource-Stratified Guidelines
- Phased Implementation
Breast Cancer Early Detection

- Screening v. Early Diagnosis
- Resource-Stratified Guidelines
- Phased Implementation
**U.S. CANCER MORTALITY (FEMALE)**

**INCREASED SCREENING**

1982

**DECREASED MORTALITY**

1990

**Females, by site**

- Stomach
- Colorectum
- Liver & intrahepatic bile duct
- Pancreas
- Lung & bronchus
- Breast
- Uterus (corpus and cervix combined)

**Year of death**


**Deaths per 100,000 females**

0 20 40 60 80 100

**SOURCE:** Seigel Ca Cancer J Clin 68:7, 2018

www.bhgi.info

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MORTALITY MODELING
SCREENING AND ADJUVANT THERAPY

- Early detection is essential to improving outcome.

- Early detection works when followed by appropriate breast cancer treatment.

- To save lives, screening programs must be linked to timely, effective treatment.

Berry, et al. (CISNET), NEJM 353:1784, 2005
LMC IMPLEMENTATION RESEARCH
LOWER-MIDDLE INCOME COUNTRY

Canada

Mammography Screening Trials
RANDOMIZED SCREENING TRIALS
CANADIAN NATIONAL BREAST SCREENING STUDY

Breast Cancer Specific Mortality

Miller et al, BMJ 348:g366, 2014
### Table 1: Number of breast cancers diagnosed in mammography arm and control arm, by study year

<table>
<thead>
<tr>
<th>Year of study</th>
<th>Mammography arm (n=44 925)</th>
<th>Control arm (n=44 910)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of cancers detected</td>
<td>Mean size (cm)</td>
</tr>
<tr>
<td>1</td>
<td>253</td>
<td>1.87</td>
</tr>
<tr>
<td>2</td>
<td>109</td>
<td>2.05</td>
</tr>
<tr>
<td>3</td>
<td>101</td>
<td>1.64</td>
</tr>
<tr>
<td>4</td>
<td>111</td>
<td>2.01</td>
</tr>
<tr>
<td>5</td>
<td>92</td>
<td>1.98</td>
</tr>
<tr>
<td>Subtotal years 1-5</td>
<td>666</td>
<td>1.91</td>
</tr>
<tr>
<td>6</td>
<td>83</td>
<td>2.15</td>
</tr>
<tr>
<td>7</td>
<td>82</td>
<td>1.99</td>
</tr>
<tr>
<td>8</td>
<td>107</td>
<td>2.01</td>
</tr>
<tr>
<td>9</td>
<td>115</td>
<td>1.86</td>
</tr>
<tr>
<td>10</td>
<td>127</td>
<td>1.69</td>
</tr>
<tr>
<td>Subtotal years 6-10</td>
<td>514</td>
<td>1.93</td>
</tr>
<tr>
<td>Subtotal years 11-25</td>
<td>2070</td>
<td>—</td>
</tr>
<tr>
<td>Subtotal years 6-25</td>
<td>2584</td>
<td>—</td>
</tr>
<tr>
<td>Total years 1-25</td>
<td>3250</td>
<td>—</td>
</tr>
</tbody>
</table>

Miller et al, BMJ 348:g366, 2014
CBE training for nurse midwives in Indonesia
RESULTS

- 1,179 women underwent both mammography and CBE
- 289 women (24.5%) were found to have a suspicious finding on CBE, mammography or both
- 14 women (1.2%) were found to have a breast cancer
  - Of the 14 breast cancers, 13 (93%) appreciated on CBE
  - 167 (14.2%) CBE exams required additional work-up to diagnose 13 of the 14 cancers seen on mammography

RESULTS

- 1,179 women underwent both mammography and CBE
- 289 women (24.5%) were found to have a suspicious finding on CBE, mammography or both
- 14 women (1.2%) were found to have a breast cancer
  - 8 of 14 patients (57%) failed to undergo treatment
    - 2 of 14 breast cancer patients refused surgery
    - 6 of 14 breast cancer patients lost to follow-up

Breast Cancer Early Detection

- Screening v. Early Diagnosis
- Resource-Stratified Guidelines
- Phased Implementation
Breast Cancer Early Detection

- Screening v. Early Diagnosis
- Resource-Stratified Guidelines
- Phased Implementation
GLOBAL SUMMIT 2005 – BETHESDA

RESOURCE STRATIFICATION

- **Basic level**: Core resources or fundamental services necessary for any breast health care system to function.

- **Limited level**: Second-tier resources or services that produce major improvements in outcome such as survival.

- **Enhanced level**: Third-tier resources or services that are optional but important, because they increase the number and quality of therapeutic options and patient choice.

- **Maximal level**: Highest-level resources or services used in some high resource countries that have lower priority on the basis of extreme cost and/or impracticality.
# Detection Strategies and Goals:

## Early Detection

<table>
<thead>
<tr>
<th></th>
<th>Basic</th>
<th>Limited</th>
<th>Enhanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Education and Awareness</td>
<td>Development of culturally sensitive, linguistically appropriate local education programs for target populations to teach value of early detection, breast cancer risk factors and breast health awareness (education + self-examination)</td>
<td>Culturally and linguistically appropriate targeted outreach/education encouraging CBE for age groups at higher risk administered at district/provincial level using healthcare providers in the field</td>
<td>Regional awareness programs regarding breast health linked to general health and women’s health programs</td>
</tr>
<tr>
<td>Detection Methods</td>
<td>Clinical history and CBE</td>
<td>Diagnostic breast US +/− diagnostic mammography in women with positive CBE</td>
<td>Mammographic screening every 2 years in women ages 50-69(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mammographic screening of target group(^1)</td>
<td>• Consider mammographic screening every 12-18 months in women ages 40-49(^1)</td>
</tr>
<tr>
<td>Evaluation Goal</td>
<td>Breast health awareness regarding value of early detection in improving breast cancer outcome</td>
<td>Downsizing of symptomatic disease</td>
<td>Downsizing and/or downstaging of asymptomatic disease in women in highest yield target groups</td>
</tr>
</tbody>
</table>

\(^1\) According to the Breast Health Global Initiative (BCI) guidelines.
NCCN Framework™: Cancer Frameworks 2018

- Currently online (75% of all cancers globally):
  - Adult Cancer Pain
  - Bladder Cancer
  - Breast Cancer
  - Cervical Cancer
  - Colon Cancer \textit{NEW}
  - Esophageal and Esophagogastric Junction Cancers
  - Gastric Cancer
  - Head and Neck Cancers – Cancers of the Lip and Oral Cavity
  - Hepatobiliary Cancers
  - Kidney Cancer
  - Non-Small Cell Lung Cancer
  - Palliative Care
  - Pancreatic Cancer
  - Prostate Cancer
  - Rectal Cancer \textit{NEW}
  - Uterine Neoplasms – Endometrial Carcinoma

\begin{itemize}
  \item 75% Cancer Cases Covered by Framework
  \item 25% Cancer Cases Covered by Framework
\end{itemize}
NCCN Framework™: Screening Parent Guideline

NCCN Guidelines Version 2.2018
Breast Cancer Screening and Diagnosis

Screening or Symptom Category

- Asymptomatic
  - Average risk
    - Age ≥25 but <40 y
      - Increased risk:
        - Prior history of breast cancer
        - Women who have a lifetime risk >20% as defined by models that are largely dependent on family history
        - Patients who receive thoracic RT <30 y (eg, mantle irradiation)
        - 5-year risk of invasive breast cancer ≥1.7% in women ≥35 y (per Gail Model)
        - Women who have a lifetime risk ≥20% based on history of LCIS or ADH/ALH
        - Pedigree suggestive of or known genetic predisposition
          - Referral to genetic counselor, if not already done
    - Age ≥40 y
      - Clinical encounter every 1–3 y
      - Breast awareness
      - Annual mammogram (category 1)
        - Consider tomosynthesis
      - Breast awareness
  - Increased Risk Screening Follow-up (See BSCR-2)

- Symptomatic
  - Clinical encounter including risk assessment
  - (See BSCR-3)

- Presenting Signs/Symptoms
  - (See NCCN Guidelines for Genetic/Familial High-Risk Assessment)
NCCN Guidelines Version 2.2018
Breast Cancer Screening and Diagnosis

NCCN Framework™: Enhanced Resources (Preliminary)

SCRENNING OR SYMPTOM CATEGORY

Asymptomatic
- Age ≥25 but <40 y
  - Increased risk:
    - Prior history of breast cancer
    - Women who have a lifetime risk >20% as defined by models that are largely dependent on family history
    - Patients who receive thoracic RT under 30 y (e.g., mantle irradiation)
    - 5-year risk of invasive breast cancer ≥1.7% in women ≥35 y
      (per Gail Model)
    - Women who have a lifetime risk ≥20% based on history of LCIS or ADH/ALH
    - Pedigree suggestive of or known genetic predisposition
      - Referral to genetic counselor, if not already done

Symptomatic
- Clinical encounter, including risk assessment

SCREENING/FOLLOW-UP
- Clinical encounter every 1–3 y
- Breast awareness
- Annual clinical encounter
- Annual screening mammogram
  - Category 1
  - Consider tomosynthesis
  - Breast awareness
- Consider opportunistic screening mammogram

Increased Risk Screening Follow-up (See BSCR-2)

- (See BSCR-3)
- (See NCCN Guidelines for Genetic/Familial High-Risk Assessment)
- Presenting Signs/Symptoms (See BSCR-4)
NCCN Framework™: Screening Core Level

**NCCN Guidelines Version 2.2018**
**Breast Cancer Screening and Diagnosis**

NCCN Framework™: Core Resources (Preliminary)

**Screening or Symptom Category**

- **Asymptomatic**
  - Average risk
    - Age ≥25 but <40 y
    - Increased risk:
      - Prior history of breast cancer
      - Women who have a lifetime risk >20% as defined by models that are largely dependent on family history
      - Patients who receive thoracic RT under 30 y (eg, mantle irradiation)
      - 5-year risk of invasive breast cancer ≥1.7% in women ≥35 y (per Gail Model)
      - Women who have a lifetime risk ≥20% based on history of LCIS or ADH/ALH
      - Pedigree suggestive of or known genetic predisposition
    - Referral to genetic counselor, if not already done
  - Age ≥40 y
  - Clinical encounter every 1–3 y
  - Breast awareness
  - Annual clinical encounter
  - Annual screening mammogram (category 1)
  - Consider tomosynthesis
  - Breast awareness
  - Increased Risk Screening Follow-up (See BSCR-2)
  - (See BSCR-3)
  - (See NCCN Guidelines for Genetic/Familial High-Risk Assessment)

- **Symptomatic**
  - Presenting Signs/Symptoms (See BSCR-4)
NCCN Guidelines Version 2.2018
Breast Cancer Screening and Diagnosis
NCCN Framework™: Basic Resources (Preliminary)

**SCREENING/FOLLOW-UP**

- Clinical encounter\(^a,\,c,\,i\), every 1–3 y
  - Clinical Breast Exam
  - Breast awareness\(^l\)

- Annual clinical encounter\(^a,\,c,\,i\)
- Annual screening\(^a\) mammogram\(^k\)
  (category 1)
  - Consider tomosynthesis\(^a,\,l\)
  - Breast awareness\(^l\)

- Increased Risk Screening Follow-up (See BSCR-2)

- (See BSCR-3)

- Presenting Signs/Symptoms
  (See BSCR-4)

---

\(^{a}\text{See Risk Factors Used in the Modified Gail Model, Age } \geq 35 \text{ Years (BSCR-B).}\)

---

\(^{b}\text{When women are seen for other concerns, provide opportunistic clinical breast exam and risk reduction counseling about importance of maintaining healthy lifestyles, healthy weight, physical activity, limiting alcohol, etc.}\)
Breast Cancer Early Detection

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Breast Cancer Early Detection

- Screening v. Early Diagnosis
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**PHASED IMPLEMENTATION**

**Prerequisites**
- Standardized guidelines, protocols and trained health care workforce.

**Phase 1**
- Systematic triage and diagnosis of palpable breast disease.

**Phase 2**
- Resource-adapted stage-appropriate treatment planning.

**Phase 3**
- Scaling up of targeted education interventions for public and health care staff & CBE to promote early detection of clinically detectable disease.

**Phase 4**
- Systematic upgrading of image-based diagnostic systems (technology & training) for management of non-palpable disease as a prerequisite to image-based (mammographic) screening.
LMC IMPLEMENTATION RESEARCH
LOWER-MIDDLE INCOME COUNTRY

Peru

Early Detection and Patient Triage
**PERU IMPLEMENTATION RESEARCH**

**SOURCES OF DELAYED DIAGNOSIS**

---

**Table 3. Multivariate Analysis of the Association Between Breast Cancer Stage at Diagnosis and Clinical Breast Examination**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Early Stage at Diagnosis, OR (95% CI)(^a)</th>
<th>Unadjusted</th>
<th>(P) Value</th>
<th>Adjusted(^b)</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>2.74 (1.18-6.36)</td>
<td>.02</td>
<td>2.44 (1.01-5.95)</td>
<td>.048</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1 [Reference]</td>
<td>NA</td>
<td>1 [Reference]</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Monthly household income, S/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\leq 500)</td>
<td>1 [Reference]</td>
<td>NA</td>
<td>1 [Reference]</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>501-1000</td>
<td>1.90 (0.72-5.04)</td>
<td>.20</td>
<td>1.26 (0.44-3.59)</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>(&gt;1000)</td>
<td>3.33 (1.04-5.04)</td>
<td>.04</td>
<td>1.74 (0.48-6.25)</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government or none</td>
<td>1 [Reference]</td>
<td>NA</td>
<td>1 [Reference]</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Employer or private</td>
<td>5.50 (1.66-18.20)</td>
<td>.005</td>
<td>4.30 (1.19-15.56)</td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>

Breast cancer care model

Regional Cancer Institute (Trujillo)
- Mammography
- Pathology
- Surgery
- Chemotherapy
- Radiotherapy

La Fora Reference Hospital
- FNA

Health Centers
- Community education
- CBE

Photos courtesy of Ben Anderson
Slide used with permission from
Two phases

- **Phase 1:**
  - Pilot demonstration of the model of care.

- **Phase 2:**
  - National scale-up of the model.
  - Integration of post-treatment support for patients:
    - Clinical support at the local level for women who need follow-up care and monitoring.
    - Psychosocial support in the community.
PHASED IMPLEMENTATION

Improving Breast Health Care through Resource-Stratified Phased Implementation

A BHGI Global Summit
Seattle, Washington, USA | October 15-17, 2018

Day 1: Phased Implementation for Breast Cancer Early Diagnosis
Day 2: Phased Implementation for Breast Cancer Treatment and Supportive Care
Day 3: Integration of Breast Care Strategies into Existing Health Systems
BREAST CANCER EARLY DETECTION

SUMMARY

- The combination of early diagnosis and breast cancer treatment improves breast cancer outcomes and survival.

- Screening by CBE downstages disease and is a necessary prerequisite to mammographic screening.

- Resource-stratified guidelines provide a framework for prioritizing sustainable health care strategies.

- Phased implementation defines sustainable approaches that integrate into existing healthcare systems to improve outcome.
The Breast Health Global Initiative

www.bhgi.info

BREAST CANCER INITIATIVE 2.5
Making breast health a global priority

www.BCI25.org