Centers of Excellence in Cancer

Breast Cancer Diagnosis and Staging: A Framework for Progress

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DIAGNOSIS AND STAGING

- Early Detection
- Tissue Sampling
- Cancer Staging
# BREAST CANCER EPIDEMIOLOGY

## STAGE AT DIAGNOSIS: UNITED STATES VS. INDIA

<table>
<thead>
<tr>
<th>STAGE</th>
<th>EXTENT</th>
<th>5 year SURVIVAL</th>
<th>DISTRIBUTION USA</th>
<th>DISTRIBUTION INDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Noninvasive</td>
<td>100%</td>
<td>16%</td>
<td>----</td>
</tr>
<tr>
<td>I</td>
<td>Early stage disease</td>
<td>100%</td>
<td>40%</td>
<td>1%</td>
</tr>
<tr>
<td>II</td>
<td>Early stage disease</td>
<td>86%</td>
<td>34%</td>
<td>23%</td>
</tr>
<tr>
<td>III</td>
<td>Locally advanced</td>
<td>57%</td>
<td>6%</td>
<td>52%</td>
</tr>
<tr>
<td>IV</td>
<td>Metastatic disease</td>
<td>20%</td>
<td>4%</td>
<td>24%</td>
</tr>
</tbody>
</table>

**USA:**
90% DCIS or early staged invasive disease at diagnosis

**INDIA:**
76% locally advanced or metastatic at diagnosis

Sources: SEER Survival Monograph (NCI), 2007; Chopra, Cancer Institute Chennai, 2001
MAMMOGRAPHY SCREENING TRIALS
BREAST CANCER MORTALITY REDUCTION

Study/Author, Year (Reference)

HIP/Habbema et al, 1986 (27)
Kopparberg* / Tabar et al, 1995 (31)
CNBSS-1/Miller et al, 2002 (28)
Malmö/Nyström et al, 2002 (26)
Stockholm/Nyström et al, 2002 (26)
Östergötland* / Nyström et al, 2002 (26)
Gothenberg/Bjurstam et al, 2003 (30)
Age/Moss et al, 2006 (29)
Total

Relative Risk for Breast Cancer Mortality (95% CrI)

RANDOMIZED SCREENING TRIALS
CANADIAN NATIONAL BREAST SCREENING STUDY

Breast Cancer Specific Mortality

Miller et al, BMJ 348:g366, 2014
## RANDOMIZED SCREENING TRIALS
CANADIAN NATIONAL BREAST SCREENING STUDY

### 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
CLINICAL BREAST EXAMINATION: WHAT DO WE KNOW?

- CBE detects about 60% of mammography detected cancers.
- CBE finds some cancers not seen on mammography.
- CBE is necessary for any breast program, especially when tumors present with advanced disease.
Trivandrum Breast Cancer Screening Study (TBCS)

Study design

275 clusters
115,652 women
aged 30-69 years

142 clusters
59,808 women
Control group

133 clusters
55,844 women
CBE once in 3 years
x 3 rounds

CBE +ve

Triple Assessment

Breast cancer cases
Breast cancer deaths


In collaboration with Regional Cancer Centre (RCC), Trivandrum, India
Trivandrum Breast Cancer Screening Study (TBCS)

Cumulative breast cancer incidence and mortality

- Cumulative breast cancer incidence
- Cumulative early stage (I-II) breast cancer incidence
- Cumulative advanced stage (III-IV) breast cancer incidence
- Cumulative breast cancer mortality
DIAGNOSIS AND STAGING

- Early Detection
- Tissue Sampling
- Cancer Staging
Early Detection and Patient Triage
Breast cancer care model

Regional Cancer Institute (Trujillo)

La Fora Reference Hospital

Health Centers

• Mammography
• Pathology
• Surgery
• Chemotherapy
• Radiotherapy

• FNA

• Community education
• CBE

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TISSUE SAMPLING OPTIONS

FINE-NEEDLE ASPIRATION (FNA) vs. CORE BIOPSY

**FNA**

- Low cost (<$5 per patient)
- Immediate result (20 minutes)
- Can be integrated into health system
- Requires expert cytologist for reading

**Core Needle Biopsy**

- Histology services are mandatory in system
- High cost ($30 - 60 per single use needle)
- Delayed result (1 day to <1 month)
Peru Site Visit 2012
Public education about breast cancer and breast health
•Capacitación de proveedores clínicos (obstetrices y médicos) en ECM.

•El 1 y 2 de julio de 2011, un grupo de médicos y enfermeras de INEN, IREN Norte y PATH, asistió a un curso conjunto en ECM y BAAF celebrado en IREN-Norte. Donde ocho obstetrices de la Red de Salud de Pacasmayo y tres médicos del Hospital La Fora recibieron la formación en teoría científica, aplicación práctica y orientación de pacientes con respecto al ECM.
1. Hinchazón, calor, oscurecimiento o enrojecimiento de la mama.

2. Cambio en el tamaño y/o forma de la mama.

3. Hoyuelos o arrugas en la piel.

4. Picazón, úlceras o llaga escamosa en la piel o sarpullido en el pezón.

5. Hundimiento del pezón o de otras partes de la mama.


7. Dolor reciente y persistente en alguna parte de la mama.

8. Aparición de alguna masa, bolita dura, o la piel más gruesa dentro de la mama.
DATOS GENERALES
Nombre del establecimiento
Primer Apellido  Segundo Apellido  Nombres
Dirección  Distrito  Teléfono
N° Historia Clínica
Fecha de nacimiento  Edad (años)  Establecimiento que refiere
¿Has escuchado acerca de salud mamaria de un promotor(a) de salud?
No  Sí, en una sesión educativa en el establecimiento de salud  Sí, en una sesión educativa en mi comunidad  Sí, a través del contacto individual con el promotor
Fecha de consulta

ANAMNESIS
Motivo de consulta:  Por tamizaje  Por síntomas mamarios  Por referencia
Síntomas
D / M / A  Duración
Relación con ciclo menstrual:  Sí  NO  Peso: _______ Kg.  Talla: _______ cm

ANTECEDENTES MAMARIOS:
Exámenes previos:  Biopsia  Mammografía  Ecografía  Fecha: _______  Resultado:________
Mastitis  Otros:
Edad menarquía: _______ A  Edad menopausia: _______ A  Gf  Pg  Pg
Uso de anticonceptivos:  Sí  NO  Tipo: Oral  Inyectable  Duración: _______ M / A
Terapia de reemplazo hormonal:  Sí  NO  Edad primer embarazo: _______ Años  Lactancia Materna:  Sí  NO

Antecedentes personales y familiares:
Historia personal de:  Cáncer de mama:  Sí  NO  Cáncer de ovario:  Sí  NO  Otro cáncer:________
Historia de familiar directo de: Cáncer de mama:  Sí  NO  Cáncer de ovario:  Sí  NO  Otro cáncer:________
Hábitos:  Tabaco:  Sí  NO  Alcohol:  Sí  NO

EXAMEN CLINICO DE MAMA:

<table>
<thead>
<tr>
<th>CARACTERÍSTICAS DEL TUMOR</th>
<th>Mama Derecha</th>
<th>Mama Izquierda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor palpable</td>
<td>cm/cm</td>
<td>cm/cm</td>
</tr>
<tr>
<td>Tamaño Tumor 1</td>
<td>cm</td>
<td>cm</td>
</tr>
<tr>
<td>Tamaño Tumor 2</td>
<td>cm</td>
<td>cm</td>
</tr>
<tr>
<td>Consistencia del tumor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forma del tumor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Síndrome del tumor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gelatina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretión por pezón</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retracción</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eczema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulcera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entema o escama</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Pie de naranja&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distancia del pezón ______ cm.  Distancia del pezón ______ cm.
BREAST CANCER ASSESSMENT

LOW INCOME COUNTRY

Rwanda

Early Detection Capacity Analysis
HEALTH FACILITY OVERVIEW

RWANDA, EAST AFRICA

Tertiary
- Anatomic pathology / Surgery
- Chemotherapy / hormonal therapy
- Radiotherapy (?)

Secondary
- Clinical Diagnosis
- Tissue Sampling

Primary
- Clinical Breast Exam (CBE)
- Awareness Education

Source: MOH, 2009
Ultrasound: Kibagabaga Hospital
Dr. Ssendi Bwogi, Cytopathologist: CHUB
DIAGNOSIS AND STAGING

- Early Detection
- Tissue Sampling
- Cancer Staging
METRICS & QUALITY IMPROVEMENT

**Patient Factors**

**PROCESS**
- Diagnosis and staging
- Cancer treatment
- Symptom management
- Surveillance

**OUTCOME**
- Survival
- QOL
- Satisfaction

**STRUCTURE**
- Resources (e.g. radiation)
- Coverage and reimbursement
# BHGI SYSTEMS METRICS

<table>
<thead>
<tr>
<th>Level of resources</th>
<th>Early Detection</th>
<th>Diagnosis</th>
<th>Treatment</th>
<th>Programmatic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong></td>
<td># Pts with documented H&amp;P / # Pts evaluated</td>
<td># Pts with tissue dx / # Pts with suspicious mass</td>
<td># Pts treated for ca / # Pts with tissue dx ca</td>
<td>Median pathologic tumor size</td>
</tr>
<tr>
<td></td>
<td>Description: The ratio of the number of patients who have a recorded history and physical examination within the target group to the number of patients who were clinically evaluated within the target group for a center or program providing organized breast healthcare.</td>
<td>Description: The ratio of the number of patients who receive a tissue diagnosis (benign or malignant) to the number of patients who had a “suspicious mass” (finding on CBE that the clinical examiner considers abnormal and therefore warranting further evaluation).</td>
<td>Description: The ratio of the number of patients who receive cancer treatment of some fashion (surgery beyond surgical biopsy, radiation tx and/or systemic tx) to the number of patients who had a tissue diagnosis of cancer.</td>
<td></td>
</tr>
<tr>
<td><strong>Limited</strong></td>
<td>% Pts with CBE-detected abnormalities who undergo breast imaging for work-up</td>
<td>% Pts with biopsy-proven cancer diagnosis who have documented TNM stage</td>
<td>% Pts with ca diagnosis who start treatment within 120d of tissue diagnosis</td>
<td>% cancer Pts who have TNM stage I or II disease at initial biopsy-proven diagnosis</td>
</tr>
<tr>
<td><strong>Enhanced</strong></td>
<td>% Pts age 50-69 who had screening mammogram within past 24 months</td>
<td>% Pts with biopsy-proven cancer diagnosis who have documented HER-2/neu status</td>
<td>% Pts treated by lumpectomy starting XRT within 120d of last surgical procedure</td>
<td>% cancer Pts who have TNM stage I or II disease who at 5 yrs have no evidence of disease recurrence</td>
</tr>
<tr>
<td><strong>Maximal</strong></td>
<td>Maximal category process metrics determined based upon standards of care in high-income countries</td>
<td>Maximal category process metrics determined based upon standards of care in high-income countries</td>
<td>Maximal category process metrics determined based upon standards of care in high-income countries</td>
<td>Maximal category process metrics determined based upon standards of care in high-income countries</td>
</tr>
</tbody>
</table>

Cancer: 113 (8 suppl), 2008
“T” is most fundamental element in TNM staging and is measured on clinical breast exam (CBE)

MTS is surrogate measure of early detection success in healthcare delivery system

MTS suggests early detection strategy:

- > 4 – 5cm: Awareness + CBE (no mammography)
- < 2cm: Image screening needed for down-staging

Harford, Cancer: 113 (8 suppl):2282, 2008
HOW DO WE DETERMINE “STAGE”? 

- Staging is the process of determining how much cancer is in the body.
- Staging is done both before and after a patient goes to operating room.

**Clinical** staging is pre-operative.

**Pathologic** staging is post-operative.
STAGING FOR BREAST CANCER = TNM

AJCC-UICC

Tumor Size (T)

Nodal Stage (N)

Metastasis (M)

AJCC = American Joint Committee on Cancer

UICC = Union for International Cancer Control


Cancer 1983;52:1551–1557

SLIDE CREDIT: Gilles Erb, PhD
# TNM Staging

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>Stage I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td>Stage II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Stage IIIa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N3</td>
<td>Stage IIIb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>Stage IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AJCC** = American Joint Committee on Cancer  
**UICC** = Union for International Cancer Control
BREAST CANCER FOUNDATION

TNM STAGING

Metastatic

Early Stages

Treating for Cure

Treating for Control

AJCC= American Joint Committee on Cancer   UICC= Union for International Cancer Control

SLIDE CREDIT: Gilles Erb, PhD
DIAGNOSIS AND STAGING

SUMMARY

- Late-stage presentation is a fundamental obstacle to improving global breast cancer outcomes.
- Systematic approaches to make prompt, accurate cancer diagnoses is essential for cancer systems to work.
- Tissue sampling approaches with FNA and cytology can facilitate cancer patient triage.
- Cancer staging provides the necessary framework for determining cancer treatment as well as building cancer registration.
The Breast Health Global Initiative

www.bhgi.info

BCI 2.5
Making breast cancer a global priority

www.BCI25.org