The poor cancer patient
- social inequality in outcomes after cancer

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This talk

- Social position and cancer
- Factors mediating social inequality in cancer survival
- Is the inequality in cancer survival changing with time
- Inequality in rehabilitation and survivorship?
- Implications for survivorship
Inequality by education in lifespan among Danish men – doubled from 1987 to 2011
The stage is set

• Over the past 40 years – increasing social differences in life expectancy – parallel to what is observed in other Western countries

• A welfare state with universal benefits and a relatively flat income distribution has not guaranteed lower social inequality in health

• The development of an easy access and efficient health system has not stopped this development
CANULI Study (CANcer og ULIghed) – a national study in Denmark

A study of social position and incidence of and survival after cancer

Total of 4 mill. Danes born 1920-1980

Incidence 1994-2003
Survival up to 2006

Registry linkages between administrative registries
Low social position and cancer incidence

Head&Neck
Esophagus
Stomach
Lung
Cervix
Kidney
Bladder
Pancreas

Colon
Rectum
Endometrium
Ovary
Testicle
Brain
Lymphoma
Leukemia

Breast
Prostate
Melanoma

Dalton et al, 2008
Why social inequality in incidence of cancer?

Risk factors are differentially distributed between social groups i.e.

• Health behaviour (smoking, alcohol, exercise, diet, sexual habits, screening)
• Work environment (occupational carcinogens)
• Local environment (air pollution etc.)
Social inequality in cancer incidence in the future?

With increasing inequality in unhealthy health behaviour

Cancer (in some sites) will increasingly become a social disease…
Observed and expected survival

**Men**

Survival (%)

- Observed
- Expected

Years since diagnosis

0 1/2 1 2 3 4 5

0 20 40 60 80 100

**Women**

Survival (%)

- Observed
- Expected

Years since diagnosis

0 1/2 1 2 3 4 5

0 20 40 60 80 100

Education:  — Basic School  --- Vocational  ------ Higher
Low social position and survival after cancer

- Head&neck
- Esophagus
- Stomach
- Lung
- Cervix
- Kidney
- Bladder
- Pancreas
- Colon
- Rectum
- Uterus
- Ovary
- Testicle
- Brain
- Lymphoma
- Leukemia
- Breast
- Prostate
- Melanoma

Dalton et al, 2008
This talk

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- Is the inequality in cancer survival changing with time
- Inequality in rehabilitation and survivorship?
- Implications for survivorship
Using national clinical databases to investigate factors explaining social inequality in cancer outcomes
Social inequality in survival after cancer

System related factors
- Staff qualifications
- Access
- Cultural factors
- Psychosocial competencies

Stage

Comorbidity

Treatment

Age, gender, year of diagnosis, cancer specific factors

Education

Survival
... and are there social differences in stage at cancer diagnosis?

Patients with short education or who live alone are at higher risk of advanced disease at diagnosis:

**Breast cancer** (Dalton et al 2006)

**Rectum cancer** (Frederiksen et al 2008)

**Lung cancer** (Dalton et al 2011)

**NHL** (Frederiksen et al 2011)

**Cervix cancer** (Ibfelt et al 2012)

**Head&Neck cancer** (Olsen et al, 2015)

**Endometrium cancer** (Seidelin et al, 2015)

But not **colon cancer** (Frederiksen et al 2008) or **ovary cancer** (Ibfelt et al, 2015) – characterised by unspecific symptoms
What does this mean?

Larger spread at diagnosis:
More comprehensive and aggressive treatment
Worse survival

Affects to a larger degree persons with short education, low income, living alone
Why should there be social inequality in stage at diagnosis?

Social differences in:
- Knowledge about symptoms and disease
- Health behavior
- Communication with health personnel
- Ability to “push your way through” in health system?
- Comorbidity/frequency of doctors visits
- Disease aggressivity
- Tumor localisation
Social inequality in survival after cancer

System related factors
Staff qualifications
Access
Cultural factors
Psychosocial competencies

Stage
Comorbidity
Treatment

Education
Survival

Age, gender, year of diagnosis cancer specific factors
... and are there social differences in received treatment for cancer?

- Breast cancer: **no difference** in receipt of surgery, chemotherapy or radiation (Dalton et al, 2007)
- Gynecological cancer – **no difference** in receipt of surgery; receipt of adjuvant treatment ?? (Ibfelt et al, 2012, 2015)
- NHL: **no difference** for chemotherapy or immunotherapy; lower OR for receipt of radiation among patients with low SEP (edu, income and living alone) (Frederiksen et al, 2011)
- Lung cancer – **difference in 1st line tx** (edu and living alone) both for curative intent and palliative tx (Dalton et al, 2015)

Mixed picture emerges – mostly inequality for cancers with worse prognosis and complex tx
Why should there be social differences in received treatment for cancer?

Social differences in:
• health literacy
• communication with health personnel
• ability to negotiate and question
• fatalism/preconceptions of treatment effects
• comorbidity and general health status
Social inequality in survival after cancer

System related factors
- Staff qualifications
- Access
- Cultural factors
- Psychosocial competencies

Education
- Comorbidity
- Age, gender, year of diagnosis
  cancer specific factors

Stage

Treatment

Survival
Comorbidity – what is the relevance for oncology

- The average 75-year old has 3 chronic diseases and receives 5 prescription medications (CDCP 2004)

- Polyfarmaci; median 5-7 mecations (Lees; Lancet Oncology July 2011)

- Comorbidity – multidisease is relevant for many elderly

- Up to 25% of population in Western world will be >65 år in 2030
Comorbidity associated with reduced survival after cancer

- Higher mortality of comorbid diseases


- Increased toxicity of treatment -> lower compliance (...or increased mortality per se)

- Comorbidity is associated with later diagnosis in some cancers (f.e ks. Bjerager et al, 2006; Ibfelt et al, 2011)
Comorbidity in cancer patients – reflect age profiles and shared risk factors

[Bar chart showing comorbidity distribution across different cancer sites and stages]
Comorbidity and survival – the example of breast cancer

5-years survival among 47,695 women with breast cancer diagnosed 1990-2004

<table>
<thead>
<tr>
<th></th>
<th>CCI 0</th>
<th>CCI 1</th>
<th>CCI 2</th>
<th>CCI 3+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-4</td>
<td>72.5 (71.7-73.3)</td>
<td>56.8 (52.8-58.6)</td>
<td>53.0 (48.9-56.8)</td>
<td>42.0 (35.8-48.1)</td>
</tr>
<tr>
<td>1995-99</td>
<td>77.3 (76.6-78.1)</td>
<td>61.5 (58.9-63.9)</td>
<td>56.9 (53.5-60.3)</td>
<td>44.7 (39.9-49.5)</td>
</tr>
<tr>
<td>2000-4</td>
<td>81.6 (80.9-82.2)</td>
<td>68.0 (65.9-69.9)</td>
<td>62.6 (59.8-65.3)</td>
<td>43.5 (39.8-47.0)</td>
</tr>
</tbody>
</table>

• Survival has increased considerably among women through this period – no increase in women with severe comorbidity (CCI3+)

Land et al, 2012
Do stage, treatment and comorbidity mediate social differences in cancer survival?

System related factors
- Staff qualifications
- Access
- Cultural factors
- Psychosocial competencies

Stage
Comorbidity
Treatment

Education

Survival

Age, gender, year of diagnosis cancer specific factors
Cervix cancer – survival by education

HR adjusted for stage, comorbidity and risk behav
Long edu: 1
Medium edu: 0.98 (0.82-1.17)
Short edu: 0.97 (0.68-1.40)
And for lung cancer – survival by education

**Low stage**

**HR overall:**
- Long edu: 1
- Medium edu: 1.06 (0.92-1.22)
- Short edu: 1.02 (0.89-1.18)

(adjustment for age, gender, year, stage, treatment, PS and comorbidity)
HR for death overall:
Long edu: 1
Medium edu: 1.22 (1.13-1.34)
Short udd: 1.37 (1.24-1.50)
This talk

- Is the inequality in cancer survival changing with time
- Inequality in rehabilitation
- Implications for survivorship
### Difference in 5-yr RS between patients with highest and lowest income

<table>
<thead>
<tr>
<th>Cancer</th>
<th>1987-91</th>
<th>2005-9</th>
<th>Change over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>-4.2%*</td>
<td>-4.5%*</td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>-2.3%</td>
<td>-2.5%</td>
<td></td>
</tr>
<tr>
<td>Prostate</td>
<td>-7.5%*</td>
<td>-5.0%</td>
<td></td>
</tr>
<tr>
<td>Colon</td>
<td>-1.9%</td>
<td>-9.9%*</td>
<td></td>
</tr>
<tr>
<td>Melanoma</td>
<td>-3.0%</td>
<td>-4.1%*</td>
<td></td>
</tr>
<tr>
<td>Bladder</td>
<td>-6.6%*</td>
<td>-9.9%*</td>
<td></td>
</tr>
<tr>
<td>Brain</td>
<td>-1.6%</td>
<td>-2.2%</td>
<td></td>
</tr>
<tr>
<td>Rectum</td>
<td>-4.8%</td>
<td>-11.3%*</td>
<td></td>
</tr>
<tr>
<td>NHL</td>
<td>-5.5%</td>
<td>-3.6%*</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>-0.5%</td>
<td>-1.6%</td>
<td></td>
</tr>
<tr>
<td>Kidney</td>
<td>-8.7%</td>
<td>-8.9%*</td>
<td></td>
</tr>
<tr>
<td>Ovary</td>
<td>-3.0%</td>
<td>-4.3%</td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td>-0.2%</td>
<td>-3.2%</td>
<td></td>
</tr>
<tr>
<td>Endometrium</td>
<td>-1.6%</td>
<td>-2.6%</td>
<td></td>
</tr>
<tr>
<td>Head and Neck</td>
<td>-10.8%*</td>
<td>-21.5%*</td>
<td></td>
</tr>
</tbody>
</table>
Social inequality in survival after cancer – how much can be gained in terms of postponed deaths

Partition of the annual number of deaths in cancer patients within three years since diagnosis into the number expected from background mortality and the number of excess deaths (attributable to cancer). This hypothetical example shows the proportion of all excess deaths that would be avoidable (27%) if relative survival in all deprivation categories were as high as in the most affluent patients.
Excess cancer deaths

If patients in 1-4 income quintile had same survival as patients in 5 quintile

Postponed number of deaths at 5 years after diagnosis among patients diagnosed 2005-9 i.e.

Breast cancer: 557 (Total deaths at 5 years: 4478; 12%)
Colon cancer: 729 (8423; 9%)
Head and Neck: 488 (1622; 30%)
This talk

- Inequality in rehabilitation
- Implications for survivorship
Social inequality in cancer rehabilitation?

- Up to 70% of all cancer patients have a need for rehabilitation (Tvede et al. 2003)

- Short education and low income – patients participate less in rehabilitation and have more unmet needs (Holm et al. 2013)

- 25-40% patients with short education – increased risk for leaving work market permanently after cancer (Diderichsen et al. 2011)
Rate of referral to rehabilitation by education (Moustsen et al, 2015)

Higher referral rate with higher education
Patients with high education have 33% higher likelihood for referral to rehabilitation than patients with short education – why is that?

- Knowledge about available rehabilitation services
- Ability to express needs for rehabilitation
- Communication barriers
- Relevant services
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Social inequality in cancer

1. Social differences in who gets which type of cancer – and this is changing over time

2. Social differences in survival:
   a) stage at diagnosis
   b) no/minor differences in adequate treatment
   c) comorbidity (and health behavior?)

3. Social differences in consequences of cancer?
   a) return to work
   b) Referral to rehabilitation services
Is it at all possible to make a difference on this observed social inequality in cancer outcomes....?
Examples on interventions addressing social inequality in health

Patient navigation:
Promising results for both diagnostic process and for time to start of treatment for cancer.

Effect of both nurse led and volunteer led navigation

Especially effect in connection with care transitions (between sectors/departments/treatments) (i.e. Freund 2014; Ko 2014)
An example of a targeted intervention

Stratified information, inclusion and retainment:

Experiences from heart disease – resultados from a study in Aarhus -> developed a heart rehab program targeting vulnerable patients

• Systematic visitation of all patients – with extended information to vulnerable patients
• Longer rehabilitering program, extra consultations, involving family doctor, booster consultation after program end
In summary

It seems like social inequality is NOT to a large degree introduced by the health care system

BUT......

This does not mean that the health care system can not be a major part of the solution!!

Systematic interventions for all – equal chance

Targeted interventions to vulnerable groups – challenge the paradigm that if we treat all equal the result is equal
"We’d now like to open the floor to shorter speeches disguised as questions."