HEADSpAcE
WP2 – Socioeconomic, logistic, and biological predictors of delayed head and neck cancer diagnosis in Europe and Latin America

David Conway and Al Ross
1st General Assembly, Lyon 2019
“A tale of two cities ... and they are both in Glasgow”

“a boy in the deprived area of Calton had an average life expectancy of 54 years compared with a boy from affluent suburb Lenzie, 12 km away, who could expect to live to 82”

= 28 years inequality
What are health inequalities?

Inequalities in health / social **outcomes**
- life expectancy, QoL, physical / mental health e.g. cancer, obesity, ...
- socioeconomic outcomes – e.g. days lost from work, family

Inequalities in health **behaviours**
- smoking, alcohol, diet, oral hygiene
- combinations – multiple risk factors

Inequalities in **health services**
- access / barriers to health care / health information
People with lower income end up with eight fewer teeth than the rich, study finds

Those with lower income, lower occupational class, higher deprivation and lower educational attainment generally had the worst clinical outcomes.

Research Reports: Clinical

The Interplay between Socioeconomic Inequalities and Clinical Oral Health

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Abstract

Oral health inequalities associated with socioeconomic status are widely observed but may depend on the way that both oral health and socioeconomic status are measured. Our aim was to investigate inequalities using diverse indicators of oral health and socioeconomic determinants, in the context of age and cohort. Multiple linear or logistic regressions were estimated for 7 oral health measures representing very different outcomes (2 caries prevalence measures, decayed/missing/filled teeth, 6-mm pocket widths, number of teeth, anterior spaces, and excellent oral health) against 4 socioeconomic measures (income, education, Index of Multiple Deprivation, and occupational social class) for adults aged ≥19 y in the 2009 UK Adult Dental Health Survey data set. Confounders were adjusted and marginal effects calculated. The results showed highly variable relationships for the different combinations of variables and that age group was critical, with different relationships at different ages. There were significant income inequalities in caries prevalence in the youngest age group, marginal effects of 0.10 to 0.16, representing a 10- to 16-percentage point increase in the probability of caries between the wealthiest and every other quintile, but there was not a clear gradient across the quintiles. With number of teeth as an outcome, there were significant income gradients after adjustment in older groups, up to 4.5 teeth (95% confidence interval, 2.2-6.8) between richest and poorest but none for the younger groups. For periodontal disease, income inequalities were mediated by other socioeconomic variables and smoking, while for anterior spaces, the relationships were age dependent and complex. In conclusion, oral health inequalities manifest in different ways in different age groups, representing age and cohort effects. Income sometimes has an independent relationship, but education and area of residence are also contributory. Appropriate choices of measures in relation to age are fundamental if we are to understand and address inequalities.

Keywords: healthcare disparity, income, tooth, periodontal diseases, dental caries, socioeconomic factors

Introduction

Good health is important to overcoming the other ethical and economic effects of disadvantage (Braveman and Gruskin 2003). Inequalities in health have been well documented, and reducing them is a priority for many governments (Marmot et al. 2008). Oral health is not immune from these; the phenomenon is widespread, with poorer people or those from a disadvantaged social position having poorer oral health (Stathis et al. 2001; Sanders and Spencer 2005; Wanamalu et al. 2006; Turrell et al. 2007; Mortia et al. 2007; Tsakos et al. 2011; Elani et al. 2012). In many cases, there is evidence of a social gradient with an incremental reduction in oral health from richest to poorest, but the inequalities in oral health, as estimated by measures such as the concentration index, is substantial and appears to be at

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A supplemental appendix to this article is published electronically only at http://dx.doi.org/supplemental.
• ~1 in 2-3 poor men
• ~1 in 10 rich men

SMOKING
• ~1 in 3 poor women
• ~1 in 10 rich women
Inverse care law

“The availability of good medical care tends to vary inversely with the need for it in the population served...”

Julian Tudor Hart, Lancet 1971

e.g. Deprived areas have fewer GPs

GPs have more patients, less time and resources
Measurement of socioeconomic status / inequalities

People or Place?

[Macintryre & Ellaway]
Drumchapel & Bearsden (1995) – greatest health inequality over the shortest geographic distance
Harry Burns, BBC Panorama “Dead Poor”
Scottish Index of Multiple Deprivation – SIMD 2016

MAP KEY

SIMD Deciles (2016)

Current Data Zone

Drumchapel North (part)
Local Authority: Glasgow City

<table>
<thead>
<tr>
<th>Total</th>
<th>Population</th>
<th>Income Deprived</th>
<th>Employ Deprived</th>
</tr>
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<tbody>
<tr>
<td>817</td>
<td>552</td>
<td>345</td>
<td>215</td>
</tr>
</tbody>
</table>

Decile 1, Quintile 1

- SIMD overall rank: 16
- Income domain rank: 51
- Employment domain rank: 30
- Health domain rank: 17
- Education/skills domain rank: 71
- Housing domain rank: 499
- Geographic access domain rank: 3071
- Crime rank: 681
Inequalities: Socioeconomic status SES measures

- Area-based deprivation
- Housing tenure
- Education
- Occupational social class / prestige
- Income (household)
- Insurance status
- Parental SES

- Inequality measures (absolute and relative)
- [Equality domains]
Genetics, lifestyles, and HPV

Smoking + alcohol

GWAS HPV

Oral HPV
<table>
<thead>
<tr>
<th>Incidence</th>
<th>Prevention</th>
<th>Diagnosis</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>Early detection</td>
<td>Treatment</td>
<td>Quality of life</td>
</tr>
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Across the cancer continuum
Descriptive epidemiology

A case-study in burden HNC from SES perspective – Scotland (1975-2012)
Incidence rates per 100,000 person-years

Most deprived

Least deprived

(Purkayastha et al 2016)
Analytical epidemiology – risk factors

1. **ARCAGE**


2002-2006

14 centres, 11 countries

case-control study

2304 cases, 2227 controls
Analytical epidemiology – risk factors

2. www.inhance.utah.edu

Methods:

Findings:

35 studies: 25,500 cases & 37,100 controls
North America, South/Latin America, Europe – but ltd (SE) Asia
Adv. - subsites / control for confounding
31 studies from 27 countries

23,964 cases of head and neck cancer and 31,954 controls

2.5 (2.02 - 3.09) fold increased risk for low vs high education and income

1/3 not explained by tob/alcohol

OR 1.61 (1.13 - 2.31) in never tob/alcohol

No diff by subsite, sex, age, country

BUT

Greatest in high income inequality countries

(Conway et al 2015)
Survival inequalities

Figure 2: 1-year and 3-year relative survival for men (a) and women (b) diagnosed with oral cavity cancer between 2004 and 2006 in England by deprivation quintile[iii]

- Strong SES relationship in men / less consistent in women [Ellis et al, 2012]
Survival inequalities

[SAHNC data: Ingarfield et al 2019]
Stage and survival

• Oral cancer survival is poor & has only marginally improved in decades

• Meta-analysis showed delay from first symptom to referral is associated with advanced stage presentation and poorer mortality [Seone et al. 2016]

• Inter-relationship between factors under-explored:
  – Tumour / Biological
  – Socioeconomic

  – And the healthcare system – logistic
## WP2 Participating Centres

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<tr>
<th>No.</th>
<th>Centre Name</th>
<th>Location</th>
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<tbody>
<tr>
<td>1</td>
<td>IARC (Lead CI)</td>
<td>International Agency for Research on Cancer</td>
</tr>
<tr>
<td>2</td>
<td>ICO</td>
<td>Catalan Institute of Oncology</td>
</tr>
<tr>
<td>3</td>
<td>UNITO</td>
<td>University of Turin</td>
</tr>
<tr>
<td>4</td>
<td>CUNI</td>
<td>Charles University</td>
</tr>
<tr>
<td>6</td>
<td>UGLA (WP Lead)</td>
<td>University of Glasgow</td>
</tr>
<tr>
<td>8</td>
<td>INCA</td>
<td>Brazilian National Cancer Institute</td>
</tr>
<tr>
<td>9</td>
<td>AC-CCC</td>
<td>A.C. Camargo Cancer Center</td>
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<td>10</td>
<td>HCB</td>
<td>Barretos Cancer Hospital</td>
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<td>11</td>
<td>AFECC</td>
<td>Hospital Santa Rita de Cassia</td>
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<td>UnBosque</td>
<td>University El Bosque</td>
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<td>13</td>
<td>UdelaR</td>
<td>University of the Republic</td>
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<td>14</td>
<td>IOAR</td>
<td>Institute of Oncology Angel H. Roffo</td>
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1. To identify the main factors that lead to a *delay* between time of first symptoms and time of diagnosis, including factors related to the patient, and factors related to medical infrastructure.

2. To assess *inequalities* in late stage of presentation of head and neck cancer – focusing on socioeconomic, logistical (healthcare system), and biological (tumour) factors.
1) quantitative epidemiological analysis of new prospective multicentre clinical cohort;

2) qualitative healthcare system case-studies – investigating individual and system level factors associated with late stage presentation.
Task 2.1. Phase 1 – Obtaining patient data on reasons for diagnostic delay (prospective clinical cohort)

- Data collection: Information on reasons for delay between first symptoms and diagnosis will be obtained from patient interviews of the 1100 (n=100 per centre) prospectively recruited cancer cases in 11 centres (WP1). Standardized questionnaires will be developed to collect information on:
  - demographic, socioeconomic, life stress, behaviours / lifestyle, and medical history.
  - details on history of symptoms and signs, primary and secondary health service appointments, and referral routes to diagnosis pathway (with dates).
  - Items will be included to a) identify barriers and facilitators to access and uptake of care, and b) assess risk perception, beliefs and attitudes (e.g. on the value of early detection, cancer fatalism, self-efficacy), perceptions of causality, and control over global and specific factors via an adapted attributional style questionnaire.
The importance of attribution...

- Attribution(al) Theory
- The inferences people make mediate between environmental stimuli, self and behaviours
- Predictions can be made based on the way they explain things that happen to themselves (and others)
  - Helpless patterns; efficacious patterns; internal and external control; global versus specific explanations
Clinical data extraction

- Clinical information on patient stage at diagnosis will be obtained using a details TNM staging incorporating primary tumour size (T), regional lymph nodes (N) and distant metastasis (M), and will be translated into overall stage (I, II, III, IVa, IVb and IVc).

- Baseline clinical information form – stage, path, treatment? Co-morbidities

- Repeated at 12 months (with outcomes)

- BUT PROPOSAL - single 12 months data exactrion
This will be led in UGLA in collaboration with centre PIs. Logistic regression analyses will be performed to analyses the determinants of late stage presentation of head and neck cancer including:

- socioeconomic and other patient-associated factors;
- logistic healthcare system and centre-level factors;
- and tumour related factors (subsite site, HPV positivity, other markers of tumour aggression).

An attendant ROC plot to investigate the predictive ability of the final model. [Alex McMahon]
Discussion points

• Discuss any outstanding issues re questionnaire items
• Pilot questionnaire with patient groups (n=5)
  – Patient Groups are currently reviewing in Glasgow
• Language translation considerations
• Timing or recruitment (post diagnosis, pre-treatment)
• Data capture methods – paper then entry onto central database perhaps preferred option?
• Central database (IARC?)
• Blood / tissue sampling requirements (SOPS) / shipping SOP (WP1). Collate of copies of pathology reports. Specimen shipping log.
• Data and Material Transfer Agreements
Discussion points 2

- Participant Information Sheet
- Consent form
- Participation log (reasons for non-participation)
- ID number system (matching with biological samples)

??
Task 2.2. Phase 2 – Healthcare system centre-level process analysis

• Based on Organisational Systems Theory

• Two stages
  – Process mapping of systems at 11 centres via pro-forma
    • Aim is a functional analysis of key processes and variability
  – In depth case study at 2 centres (Glasgow and A South American Centre TBC)

Werner NE, Holden RJ. Interruptions in the wild: development of a sociotechnical systems model of interruptions in the emergency department through a systematic review. Appl Ergon 2015;51:244–54
Task 2.2. Phase 2 – Healthcare system centre-level analysis

Methods (debating order of these / likely parallel)

• **Pro-forma (process mapping - 11 centres)**
  – Designated point of contact to link with those that can provide information (imagined clinical leads, hospital / service management, research leads, primary care leads, public health specialist, policy leads).

• **In-depth semi-structured interviews (case studies - 2 centres)**
  – Patients; clinicians; managers (purposive recruitment)
  – Schedules based on a) themes from phase 1; b) functions/variance to explore from mapping in phase 2 (guided by EUROCARE and International Cancer Benchmarking Partnership)
Process mapping

- **External environment**
  - Population; geography; demography;
  - Public health activities (e.g. Awareness);
  - Healthcare funding system

- **Patients**
  - Annual HNC case-load (age, gender, subsites; treatment / intent etc)
  - Proportion of late stage (defined?) HNC diagnosis
  - Treatments / intent
  - Other e.g. treatment delays; 30 day mortality; referral to palliative
Task 2.2. Phase 2 – Healthcare system centre-level analysis

Process mapping

- Organisational factors
  - Primary care e.g. settings; waiting times/availability; registration, appointments, geography; weekends; 24 hr; language support/interpreters; co-located services; staffing e.g. nurse provision; experience; training; unfilled posts etc
  - Secondary care e.g. budget/expenditure; waiting times/availability; fast-track pathways; diagnostic onsite; weekends; 24 hr; appointments, geography; language support/interpreters; staffing MDT make up and numbers; (locations n)

- Service performance targets / policy landscape
Process mapping

Organisational factors
- Technology e.g. e-records; e-MDT; patient reminders etc
- Structure e.g. referral pathways; centralisation; specialist located e.g. within ENT and Oral and Maxillofacial (OMF) departments
- Feedback and process measures e.g. Quality performance indicators/QPIs against local targets e.g. cytological or histological diagnosis before treatment; MRI before treatment; pre-op oral assessment; Proportion cases discussed at MDT before treatment; public involvement
- Proportion cases seeing e.g. nutritionist, speech and language, smoking cessation; addiction; psychology; social services; fertility; finance; other
- Proportion consented to research
- Incidents, complaints
Discussion points

• Help from group to identify key informants from all 11 centres – stakeholders
  – Clinical leads (Surgery, Oncology, Pathology specialties)
  – Hospital / service management
  – Primary care leads,
  – Public Health Specialists
  – Policy Leads

• Mapping data sources

• Close working with other South American Centre – re in-depth case study
48 months – start Jan 2019

Deliverables

- Cohort Protocol development (international and local process protocol – based on patient flow)
  - Other local set-up activities.
  - Local ethics and R&D approvals (link cohort and qualitative work into one protocol / application)

- Aim to start recruiting August 2019 for 1 year to July 2020
- Follow-up (1 year) clinical data to July 2021
- Data cleaning to Dec 2021
- Analysis 2022