Pattern of Comorbidities among Colorectal Cancer Patients in Spain

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- Approximately 60% of CRC patients are older than 70 years. CRC incidence is likely to increase in the near future (Grey Tsunami) [2].
- **Ageing**, increased life expectancy and life style changes may contribute to this increase.
- Furthermore, the presence of comorbidities or multi-morbidity is highly prevalent among older cancer patients (≥ 70 years) [3].

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Comorbidity and multi-morbidity definitions

- **Comorbidity** is the existence of a long-term health condition or disorder in the presence of a primary disease of interest, such as cancer [4].
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- **Comorbidity** and **multi-morbidity** can influence treatment options in CRC patients [7].

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Pattern of Comorbidities among CRC Patients

There is consistent evidence showing the influence of comorbidities and multi-morbidity on cancer outcomes among CRC patients, but little evidence is available regarding the descriptive pattern of comorbidities/multi-morbidity and risk factors associated to their presence.
The objective of this project is to study the Pattern of comorbidities among CRC Patients. Thus, we described the frequency and distribution of comorbidities and multimorbidity as well as the risks factors associated with their presence among a cohort of CRC patients.
We developed a **population-based cohort study** including all CRC incident cases (C18-C21), according to the International Classification of Diseases for Oncology, 3rd Edition, (ICD-O-3) diagnosed in the year 2011 and follow-up until December 31st, 2016, from two Spanish cancer registries: **Girona and Granada**, with **1,061** cases.
Methods: Data

Data source

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  - Tumor factors
  - Healthcare determinants
Methods: comorbidities

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- Comorbidities were classified based on the Royal College of Surgeons modified Charlson classification [8]:

- Myocardial infarction
- Congestive heart failure
- Peripheral vascular disease
- Cerebrovascular disease
- Dementia
- Chronic pulmonary disease
- Rheumatic disease
- Liver disease
- Diabetes mellitus
- Hemiplegia/paraplegia
- Renal disease
- AIDS/HIV

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- **Frequency and distribution** of comorbidities by patient, tumor and healthcare factors using counts and proportions.

- **Comorbidity risk** (for each of the 12 comorbidities) by patient, tumor and healthcare factors using generalized linear models with binomial family and link log to derive **Prevalence ratios**.
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- **Open source web application:** watzilei.com/shiny/CoMCoR/
- **Reproducibility:** GitHub repository with all the code: (github.com/migariane/CoMCoR)
Results: pattern of comorbidities

Prevalence and Top Three

- More than half (59%) of colorectal cancer patients had one or more comorbidities six months before cancer diagnosis.
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The most common comorbidities were diabetes (23.6%), chronic obstructive pulmonary disease (COPD) (17.2%) and congestive heart failure (14.5%).
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Results by Sex and Age

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- 60% of patients with dementia or rheumatologic disease were female.
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- 60% of patients with dementia or rheumatologic disease were female.

- Dementia was the most common comorbidity among older patients (75+ years), showing a higher proportion (30%) of late cancer diagnosis (stage IV), and the highest prevalence of diagnosis at emergency room (33%).
Open source web application: watzilei.com/shiny/CoMCoR/
Results: Web Application heat-map top 10 comorbidities

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Percentage of patients having the comorbidity showing the characteristic selected:

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>75+</th>
<th>65-74</th>
<th>55-64</th>
<th>&lt;55</th>
</tr>
</thead>
<tbody>
<tr>
<td>I = Myocardial infarct</td>
<td>58.2%</td>
<td>25.4%</td>
<td>13.4%</td>
<td>3%</td>
</tr>
<tr>
<td>II = Congestive heart failure</td>
<td>64.3%</td>
<td>22.1%</td>
<td>11%</td>
<td>2.6%</td>
</tr>
<tr>
<td>III = Peripheral vascular disease</td>
<td>46%</td>
<td>29%</td>
<td>17.7%</td>
<td>7.3%</td>
</tr>
<tr>
<td>IV = Cerebrovascular disease</td>
<td>58.5%</td>
<td>30.8%</td>
<td>7.7%</td>
<td>3.1%</td>
</tr>
<tr>
<td>V = Dementia</td>
<td>75%</td>
<td>10.4%</td>
<td>4.2%</td>
<td>4.2%</td>
</tr>
<tr>
<td>VI = Chronic obstructive pulmonary disease</td>
<td>52.7%</td>
<td>31.3%</td>
<td>4.4%</td>
<td>4.4%</td>
</tr>
<tr>
<td>VII = Rheumatologic disease</td>
<td>52.9%</td>
<td>28.8%</td>
<td>5.8%</td>
<td>5.8%</td>
</tr>
<tr>
<td>VIII = Liver disease</td>
<td>37.5%</td>
<td>26.8%</td>
<td>16.1%</td>
<td>16.1%</td>
</tr>
<tr>
<td>IX = Diabetes</td>
<td>46.4%</td>
<td>34.4%</td>
<td>16.8%</td>
<td>2.4%</td>
</tr>
<tr>
<td>X = Hemiplegia/Paraplegia (excluded from the analysis)</td>
<td>69.6%</td>
<td>21.7%</td>
<td>5.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>XI = Renal disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XII = AIDS/HIV (excluded from the analysis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Web Application: Forest plot comorbidities’ risk factors

**Patient factors / Chronic pulmonary disease**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Risk ratio</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>55-64 vs &lt;55</td>
<td>1.57</td>
<td>(0.72 - 3.45)</td>
</tr>
<tr>
<td></td>
<td>65-74 vs &lt;55</td>
<td>3.44</td>
<td>(1.69 - 7)</td>
</tr>
<tr>
<td></td>
<td>&gt;74 vs &lt;55</td>
<td>3.67</td>
<td>(1.83 - 7.35)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>Women vs men</td>
<td>0.42</td>
<td>(0.3 - 0.58)</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>1 vs 0</td>
<td>2.17</td>
<td>(1.43 - 3.29)</td>
</tr>
<tr>
<td></td>
<td>2 vs 0</td>
<td>2.01</td>
<td>(1.13 - 3.58)</td>
</tr>
<tr>
<td></td>
<td>3 vs 0</td>
<td>2.36</td>
<td>(1.16 - 4.82)</td>
</tr>
<tr>
<td></td>
<td>4 vs 0</td>
<td>3.44</td>
<td>(1.05 - 11.32)</td>
</tr>
<tr>
<td><strong>Smoker</strong></td>
<td>Previous vs current</td>
<td>1</td>
<td>(0.71 - 1.4)</td>
</tr>
<tr>
<td></td>
<td>Never vs current</td>
<td>0.4</td>
<td>(0.27 - 0.58)</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td>25-29.9 vs &lt;25</td>
<td>0.71</td>
<td>(0.47 - 1.06)</td>
</tr>
<tr>
<td></td>
<td>&gt;29.9 vs &lt;25</td>
<td>1.43</td>
<td>(0.99 - 2.08)</td>
</tr>
</tbody>
</table>
Discussion

Validity and Replicability

- Little **generalizability** and **transportability** of results to other regions and countries.

However, similarities with previous studies such as in the UK. Replicability is the strength of the study. Small size and just one calendar-year cohort are the main limitations.
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Implications and further steps

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- **Next steps:** Impact of Comorbidities on the **Time** from Cancer Diagnosis to Surgery treatment.
Next steps

Time to surgery (non-parametric regression)

Open source web application: watzilei.com/shiny/timsurg/

Daniel Redondo-Sánchez

Comorbidities and Colorectal Cancer

22 November 2018
Thank you!

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Carlos III Institute of Health, Grant/Award Number: CP17/00206
Andalusian Department of Health, Grant Number: PI-0152/2017