



The Association of Schools of Public Health
in the European Region



Understanding the concept of excess mortality; Analysis of direct and indirect effects of COVID-19 on cancer care services in the United Kingdom

(Masters Thesis- 2022)

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Background

- The reported number of COVID-19 deaths is likely to be an underrepresentation of overall deaths attributed to the pandemic
- Impact of COVID-19 on – the trajectory of other illnesses, health and care services disruption, avoidant help-seeking behaviour and extended use of non-pharmacological measures.
- the concept of excess deaths- a better measure

AIM

- to understand the direct and indirect effects of the pandemic and related policies on the cancer care pathway and approximate the number of excess deaths due to COVID-19 in cancer patients in the UK.

Epidemiological characteristics of COVID-19 and its variants

Virus and variants	Incubation period	R-value (Basic reproduction number R_0)	Infectiousness (in terms of hospitalization and ICU admission)
SARS-CoV-2	5-6 days, can be up to 14 days [2] [3]	2 to 2.5 [4]	Higher than influenza [5] [6]
Alpha	Approx. 3 days [7]	Higher than other variants	Higher hospital and ICU admission rates particularly among the young age group
Beta	N/A*	1.50 times as transmissible as previous variants [8]	Causes more severe disease (based on initial studies)
Gamma	N/A*	Mixed evidence / higher frequency	Causes severe course of disease (based on initial studies)
Delta	Approx. 4 days [13]	5.10 (3.04 to 7.17) [9]	Double than Alpha [10]
Omicron	Shorter than Delta [11]	9.5 (5.5 to 24) [12]	Lower than Delta (in hospitalizations) [1]

Clinical features

Severity level	Symptoms
Mild	Symptomatic patients who meet the WHO criteria of COVID-19 case definition and have no signs of pneumonia or hypoxia
Moderate	Signs of pneumonia- Fever, cough, difficulty in breathing and tachypnoea SpO ₂ - ≥ 90% on room air
Severe	Severe pneumonia with SpO ₂ <90% on room air
Critical	Acute respiratory distress syndrome (ARDS), Sepsis, Septic shock

Adapted from WHO clinical management of COVID-19, Interim guidance, 27 May 2020 (13)

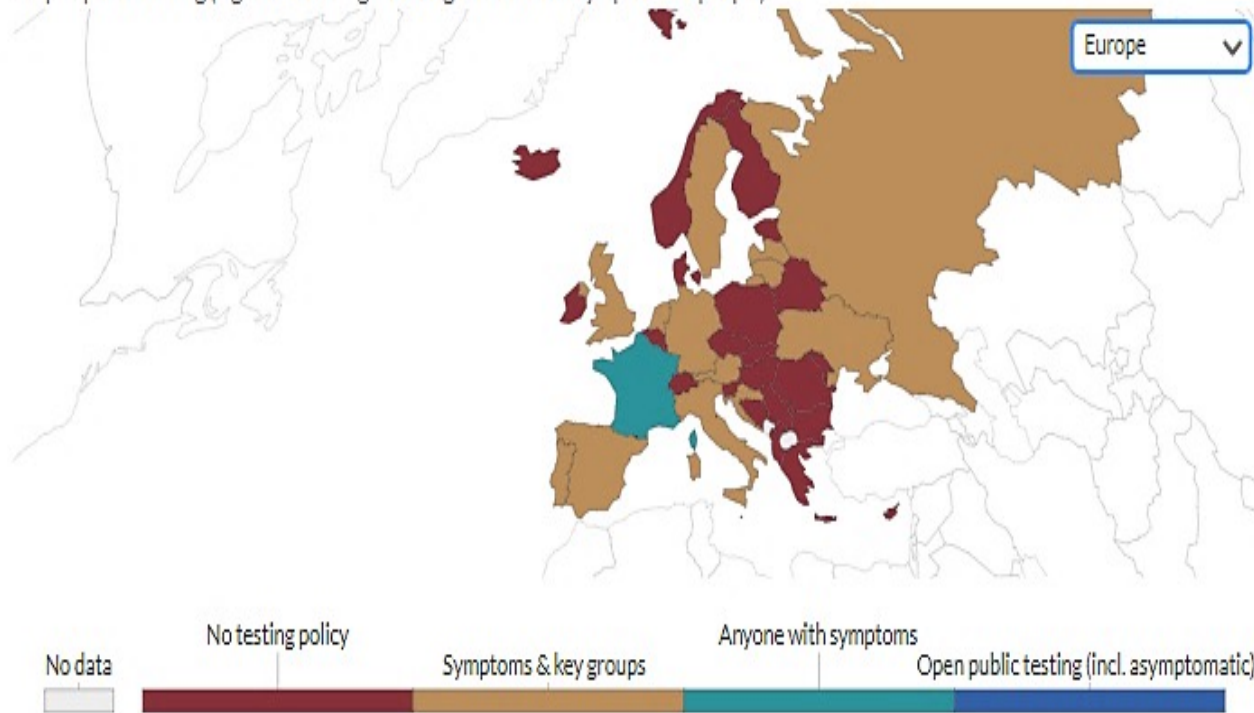
- RT-PCR technique to diagnose COVID-19 as a gold standard procedure
- Limitations- due to low sensitivity (14)

Variation in testing policies between the countries

COVID-19 Testing Policies, Feb 15, 2020

Our World
in Data

- No testing policy.
- Only those who both (a) have symptoms and also (b) meet specific criteria (e.g. key workers, admitted to hospital, came into contact with a known case, returned from overseas).
- Testing of anyone showing COVID-19 symptoms.
- Open public testing (e.g. "drive through" testing available to asymptomatic people).



Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 8 July 2022

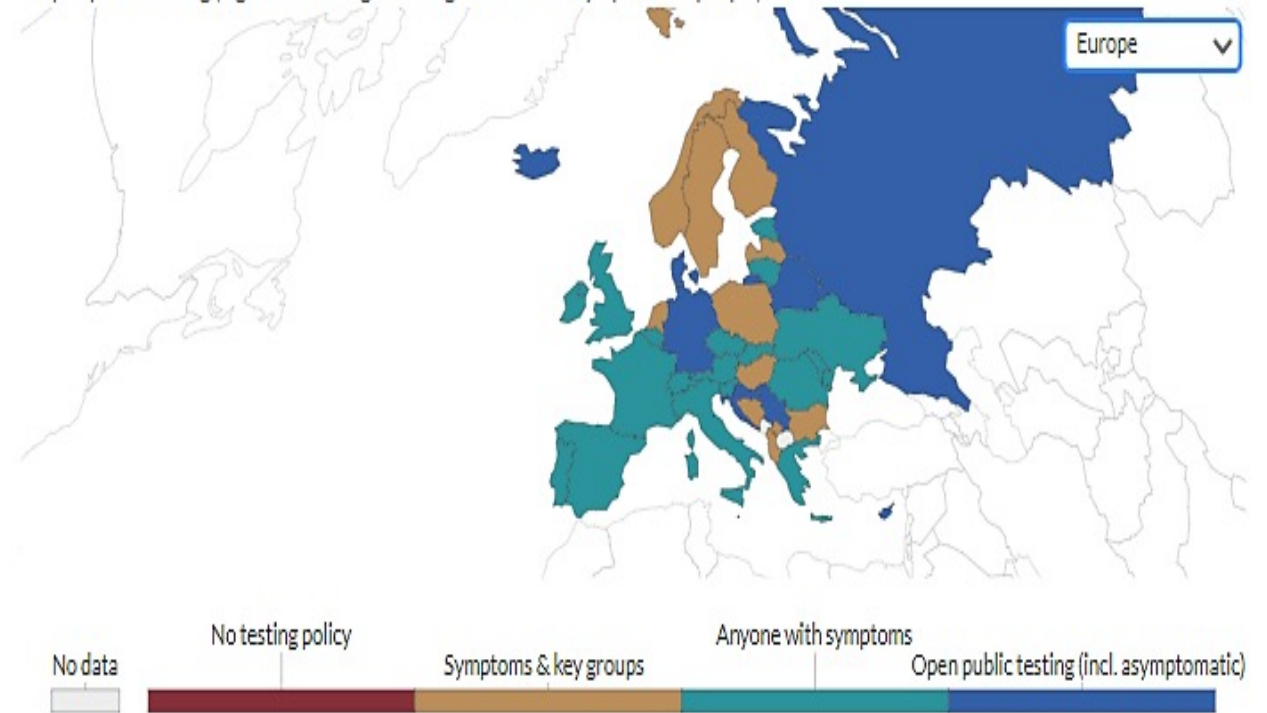
Note: Our data on COVID-19 tests and positive rate is no longer updated since 23 June 2022.

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COVID-19 Testing Policies, May 30, 2020

Our World
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Epidemiology of COVID-19 in the UK

- On 5th March 2020, the UK officially reported its first COVID-19 death (16)
- Nearly two weeks after the first COVID-19 death, a sharp rise in excess all-cause mortality was observed (17)
- The registered number of deaths as well as the excess all-cause mortality were high in England during this period, ever since 2015/16 (17)

Cancer and COVID-19 in the UK

- One of the leading causes of death
- New regulations to modify cancer care pathway- NHS guidance was widely practised
- Despite the prioritized care, the number of patients utilizing the services was declined
- Re-existing capacity limits (18) (19)

Introduction

- At the beginning of the pandemic, many COVID-19 deaths were not documented. COVID-19 deaths in care homes were missed (21).
- The underlying cause of death of COVID-19 was misinterpreted, particularly in death of a person with comorbidities (22).
- There is no well-established pandemic surveillance system in low and middle-income countries. Those countries with a strong surveillance system faced challenges in the timely reporting and quality data (23).

Disruption in care pathway

- Access to major and essential healthcare services was hampered significantly - survey by the WHO on assessing the effect of the pandemic on non-communicable disease (NCD) services (24)
- Social distancing and hesitancy to attend health care services due to fear of infection (25) (26)
- Lack of data explaining the association between disrupted health care and indirect deaths due to the pandemic – these statistics are not available immediately
- Reduced number of deaths due to respiratory diseases and road traffic accidents (27) (28) (29) (30)

COVID-19 Death definition by WHO and adapted definitions by the countries

“A death due to COVID-19 is defined for surveillance purposes as a death resulting from a clinically compatible illness, in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID disease (e.g., trauma). There should be no period of complete recovery from COVID-19 between illness and death. A death due to COVID-19 may not be attributed to another disease (e.g., cancer) and should be counted independently of pre-existing conditions that are suspected of triggering a severe course of COVID-19.” (31) (32)

COVID-19 death based on Clinical diagnosis (probable and confirmed)	Australia, Belgium, Bulgaria, Canada, Croatia, Cyprus, Estonia, France, Germany, Greece, Ireland, Israel, Latvia, Lithuania, Malta, New Zealand, Poland, Portugal, Serbia, Romania, USA
COVID-19 death based on the laboratory confirmation test	Austria, Bosnia and Herzegovina, Cyprus, Czech Republic, Denmark , Finland , Greece, Hungary, Iceland, Italy, Netherlands, Norway, Serbia, Slovenia, Spain, Romania, Sweden, Switzerland, United Kingdom
COVID-19 death based on both clinical diagnosis and laboratory test	Cyprus, Greece, Romania, Serbia

Concept of Excess Mortality

- Excess mortality (EM) is the difference between the number of observed deaths and expected deaths (which otherwise would not have happened if the outbreak has not occurred) (33).
- Excess mortality due to COVID-19- total number of deaths due to COVID-19 + the number of deaths that occurred as an indirect consequence of the pandemic restrictions (34).
- **How to measure it-** “Excess deaths = Reported deaths - Expected deaths” (35)
- What is the baseline to be considered?

Is Excess Mortality a better indicator?

- to understand the overall effect of COVID-19 on mortality (36)
- to interpret the differences in defining and reporting COVID-19 deaths by countries that include deaths from all causes (37)
- tracking EM over time and across countries, disaggregated by age and gender helps to evaluate the causes that might have contributed to excess mortality among particular age groups and gender (38).
- to assess the impact of health policies and to analyse (not only mortality burden) the social and economic consequences of the pandemic due to lockdown restrictions (39).

Methods

- A comprehensive literature search was conducted using search terms ‘COVID-19’, ‘SARS-CoV-2’, ‘Mortality’, ‘United Kingdom/epidemiology’, ‘Oncology service’ on PUBMED
- Additional literature using similar articles function on PUBMED and manual search on LitCovid, Eurosurveillance, Elsevier, Lancet, Wiley Library, International Journal of Public Health, and BMJ journal websites.
- Reports from the UK’s government official websites, WHO, IHME, and ECDC and UK’s public health and cancer registry
- Search range 1963 to 2022
- Direct deaths statistics- UK’s four countries’ public health and cancer registry websites
Indirect deaths- based on available data on three routes to diagnosis

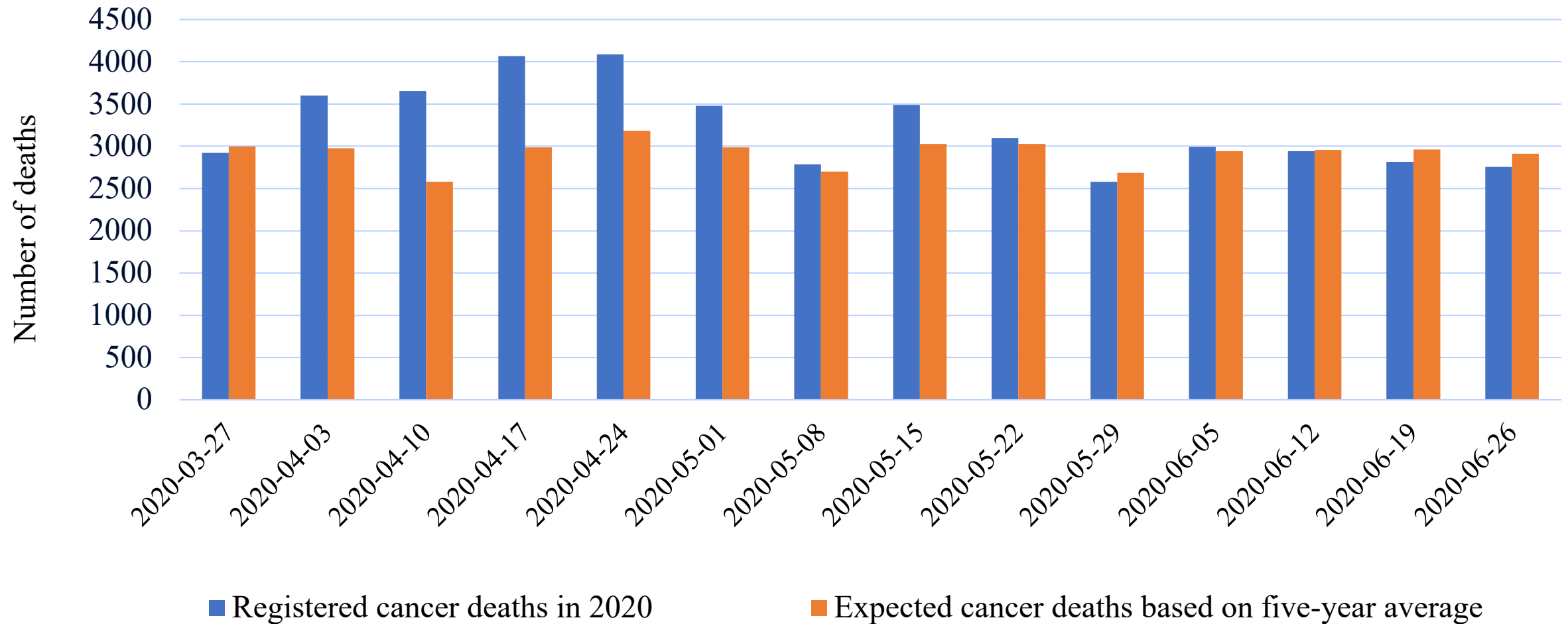
Results

Excess deaths in the UK between 29th February and 12th June 2020

	England	Scotland	Wales	Northern Ireland
Deaths from all causes (2020)	198,794	21,169	11,852	5,353
Five-year average	142,217	16,284	9,679	4,503
Total Excess deaths	56,577	4,885	2,173	850
Excess deaths in %	39.8	30.0	22.5	18.9

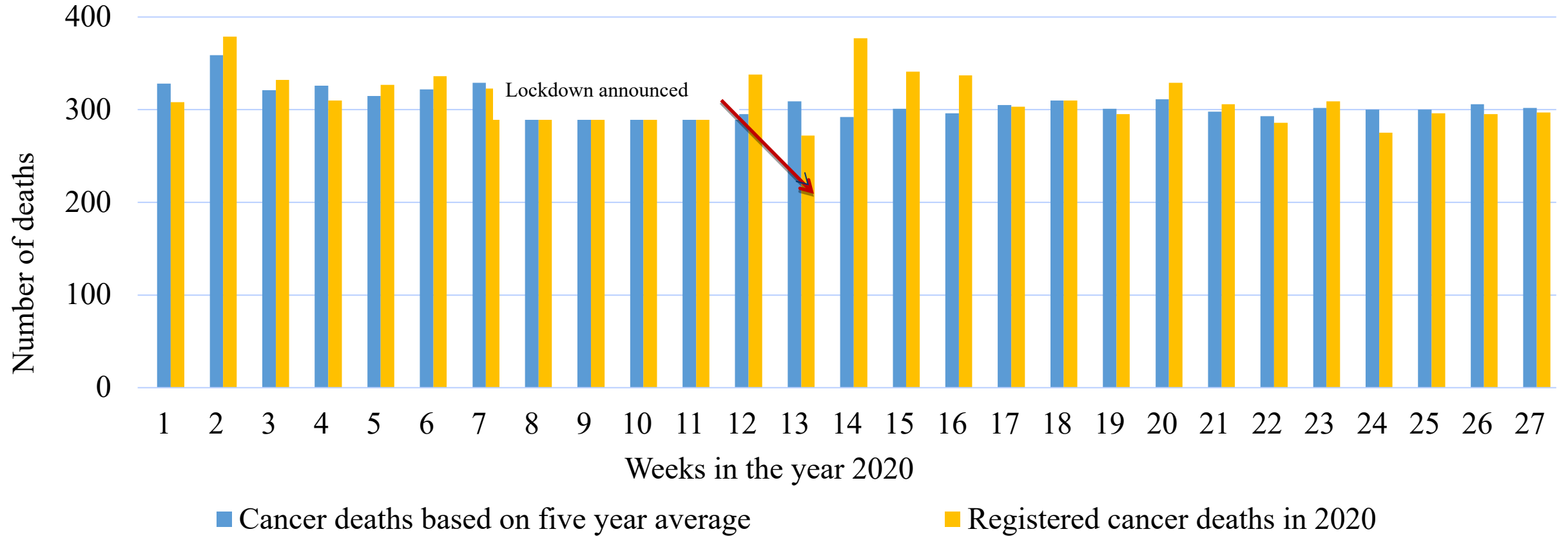
Adapted from Technical Advisory Group: Examining deaths in Wales associated with COVID-19 (40)

Direct Impact of COVID-19 - excess cancer deaths in England



Registered cancer deaths (between March and June 2020) and expected cancer deaths based on a five-year average (2015-19) (41)

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Registered cancer deaths (between March and June 2020) and expected cancer deaths based on the previous five-year average (2015-19) during the same period in Scotland (42)

Situation in Wales & Northern Ireland

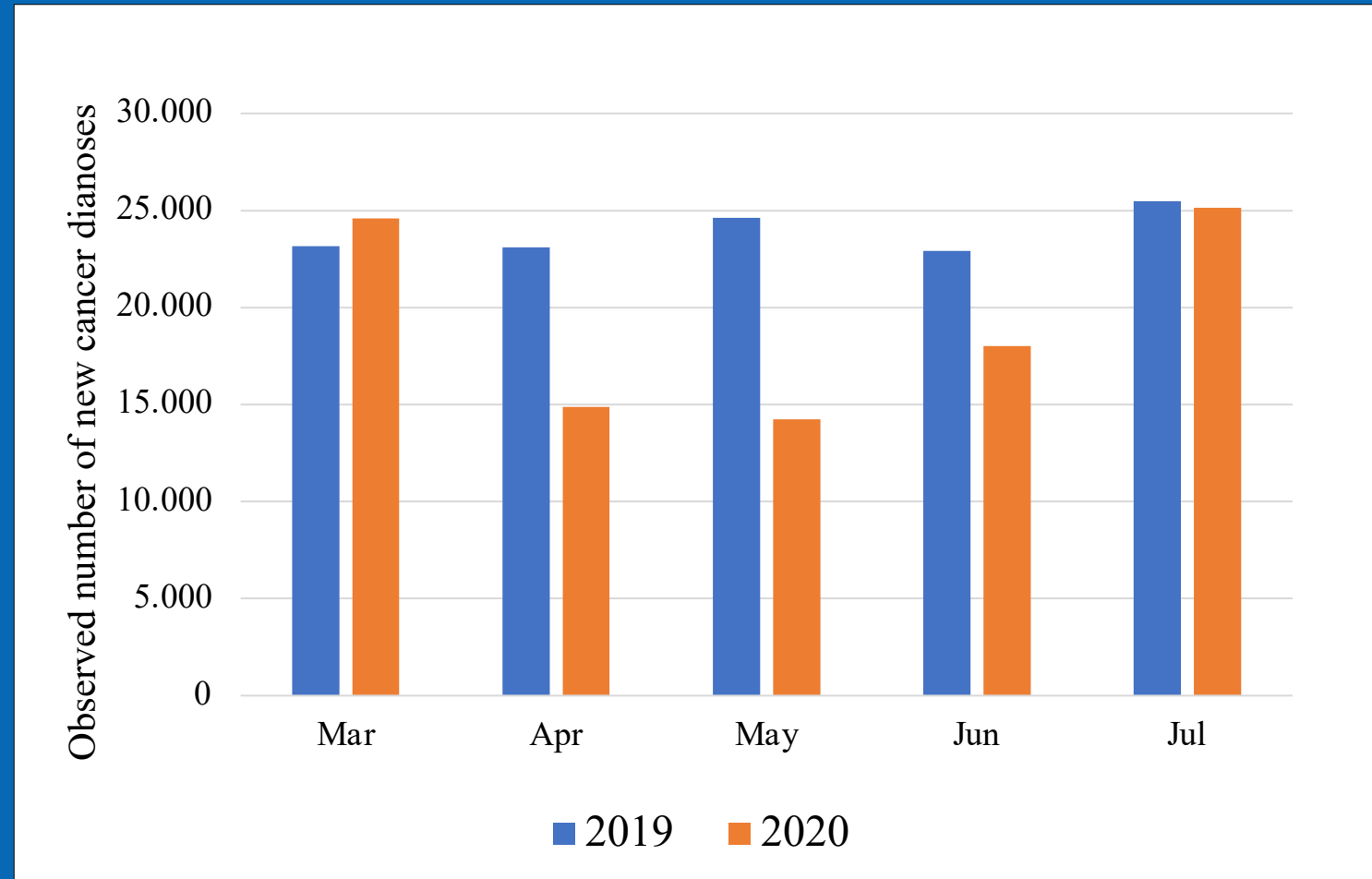
- Wales: the registered number of cancer deaths were low at 61 between March and June 2020 (43)
- Northern Ireland: 75 excess cancer deaths between March and May 2020 (6.8% higher compared to previous five-year average) (44)

Estimated excess deaths, QALYs loss and economic impact due to delayed cancer services

Author, Year	Method of the study	Purpose of the study	Types of cancer studied	Results
Gheorghe et al (May -2021) [45]	Nationwide Population-based modelling study	The economic impact of avoidable cancer deaths due to diagnostic delays and additional QALYs	Brest, Bowel, Lung, and Oesophagus	<ul style="list-style-type: none"> Productivity losses are estimated to be 103.8million GBP for all four cancers over five years QALYs lost due to excess cancer deaths across four cancers would be 32,700 over five years
A. Sud (May -2020) [46]	Observational study	Impact of 3 and 6months delay in cancer surgery on LYG ¹ based on 5year survival	31 cancer types/subtypes according to cancer stage and age at diagnosis	<ul style="list-style-type: none"> 4,755 and 10,760 excess deaths would occur over one year upon three months delays and six months delays in cancer resection. LYG¹ reduction by 17.1 and 15.9 for three months delay and six months delay respectively.
Camille Maringe (Jul -2020) [47]	Nationwide Population-based modelling study	Cancer diagnostic delay on survival impact in 1, 3 and 5 years	4 cancers - Breast, Cervical, Lung, Oesophagus	<ul style="list-style-type: none"> 3,291 to 3,621 avoidable cancer deaths and 59,204 to 63,229 YLLs² were attributable to delayed cancer diagnoses
Alvina G Lai (Nov -2020) [48]	Cohort study	Impact on cancer services and excess 1-year mortality	24 cancer types	<ul style="list-style-type: none"> estimated 7,165 to 17,910 excess deaths over one year assuming 40% of cancer patients will be affected in the long-term nearly 80% of excess deaths in cancer patients with one comorbidity

Indirect effects of COVID-19 on cancer care services

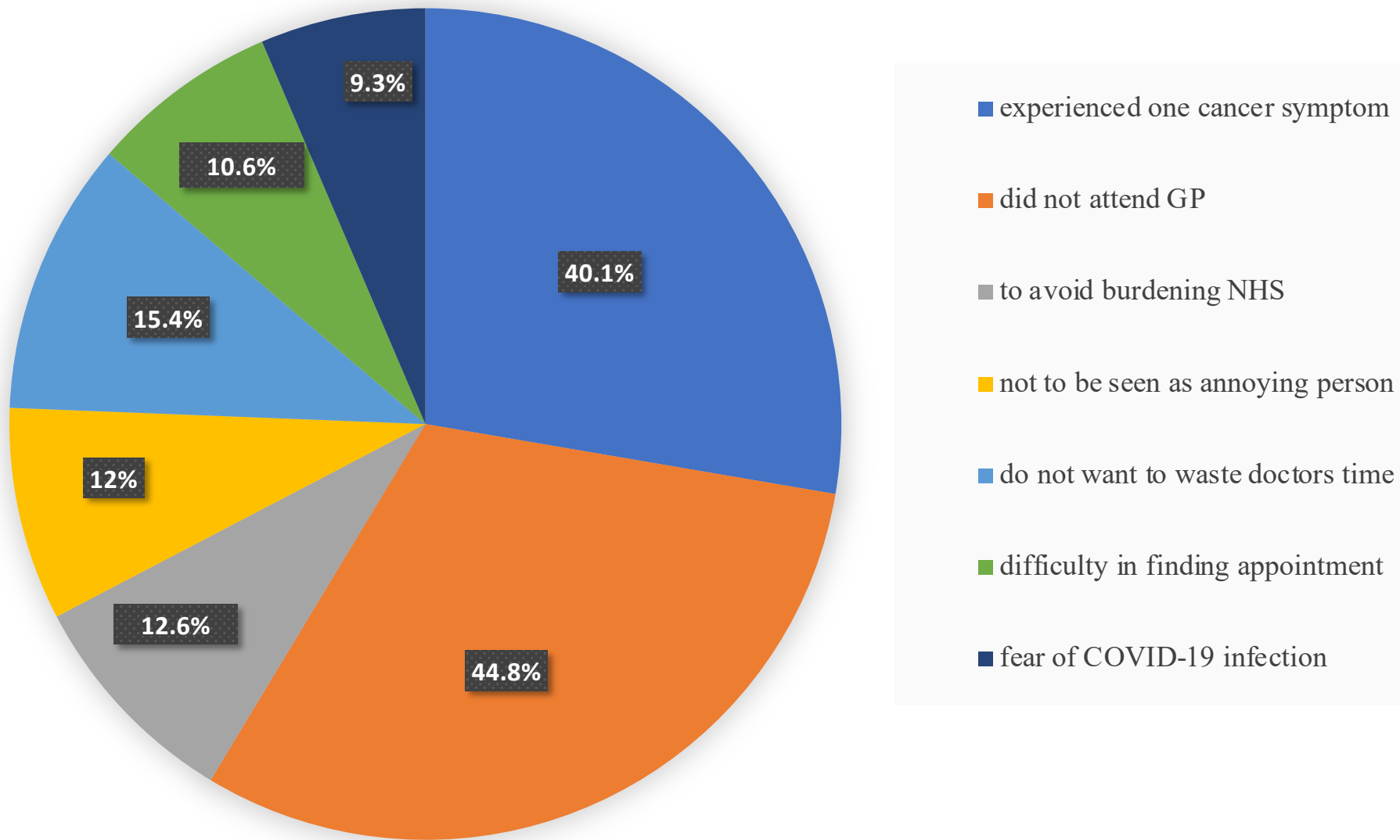
- Decline in physician TWW referrals; number of screening services, primary care referrals to specialist, emergency presentations and hospital admission
- Impact on cancer therapy – radiation, SACT, and surgical treatment-
- Overall decline in cancer incidence (49)



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- Delayed cancer diagnosis would cause 3,291 to 3,621 avoidable cancer deaths (47).
- Years of life lost (YLL) among cancer patients were estimated to be between 56,204 to 63,229 (47).
- Delays in the surgical treatment of incident solid tumours by three months and six months would result in 4,755 and 10,760 excess deaths respectively over the 12 months (46).

Changes in the help seeking behaviour of patients due to the pandemic



Discussion

- Halting the screening services and reduced number of patient attendances could have caused nearly 2300 cancer cases left undiagnosed each week (47) (51)
- NHS deployed information campaigns and enhanced 111 online service capacity
- Remote consultation services
- Despite the renewed health care services, the number of people consulting physician was low

Limitations

- Articles included were not evaluated for validity
- Did not acknowledge the information on excess deaths estimates at specific location settings (community, care homes, prisons)
- Focus was more on England due to the lack of weekly excess mortality estimates

Conclusion

- Comparison of excess mortality across nations is essential and significant research regarding the use of excess mortality as a measure for precise assessment of the direct and indirect effects of the pandemic is crucial.
- There was high all-cause mortality and excess cancer mortality during the first pandemic wave in the UK particularly in England (indirect and direct).
- Requirement for developing pre-prepared tools that aid in mitigating the risk of morbidity and mortality due to the pandemic
- Effective preventive policies that reduce the spread of the infection, increase preparedness to strengthen the health care delivery system and continued evaluation of the implemented policies

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Thank you!