Identifying opportunities for timelier diagnosis

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Epidemiology of Cancer Healthcare & Outcomes (ECHO)
UCL

Identifying opportunities for timelier diagnosis

Supporting patients

Lucy Brindle
Suzanne Scott

Supporting GPs

Meena Rafiq
Olga Kostopoulou

Is acting on patients with symptoms ‘too late’?

No

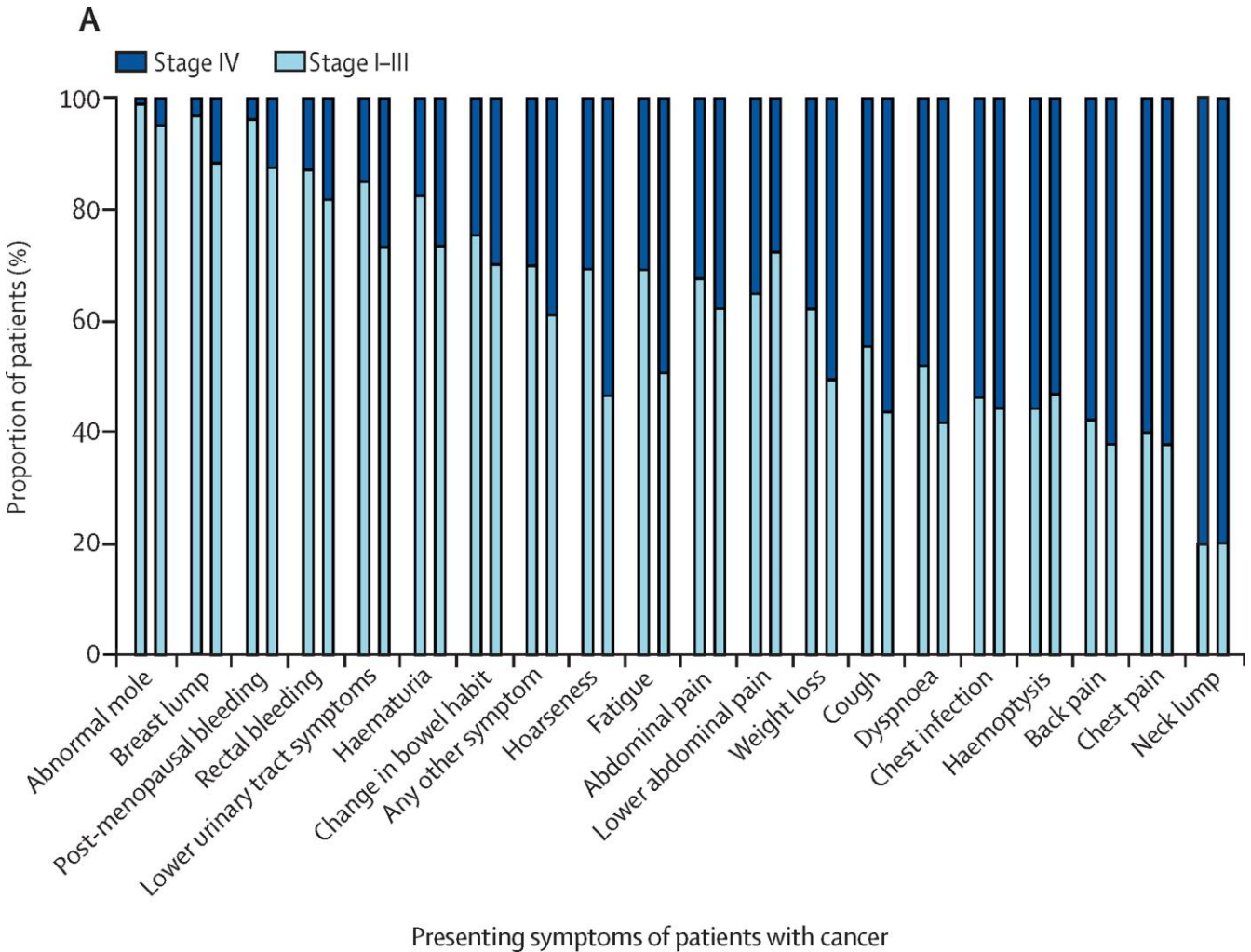


Figure from published research (*Koo MM, et al. Lancet Oncol. 2020;21(1):73-79*) where we had examined the same question in patients with 20 presenting symptoms

We are extending this work to other symptoms currently

ED research is expanding…
Time for a taxonomy framework

PERSPECTIVE

Epidemiology

BJC British Journal of Cancer

A taxonomy of early diagnosis research to guide study design and funding prioritisation

Emma Whitfield[1,2], Becky White[1], Spiros Denaxas[2,3,4,5], Matthew E. Barclay[1], Cristina Renzi[1,6] and Georgios Lyratzopoulos[1]

Study types

1 Diagnostic windows

2 Prodromal features

3 Diagnostic Intervals

4 Diagnostic Routes

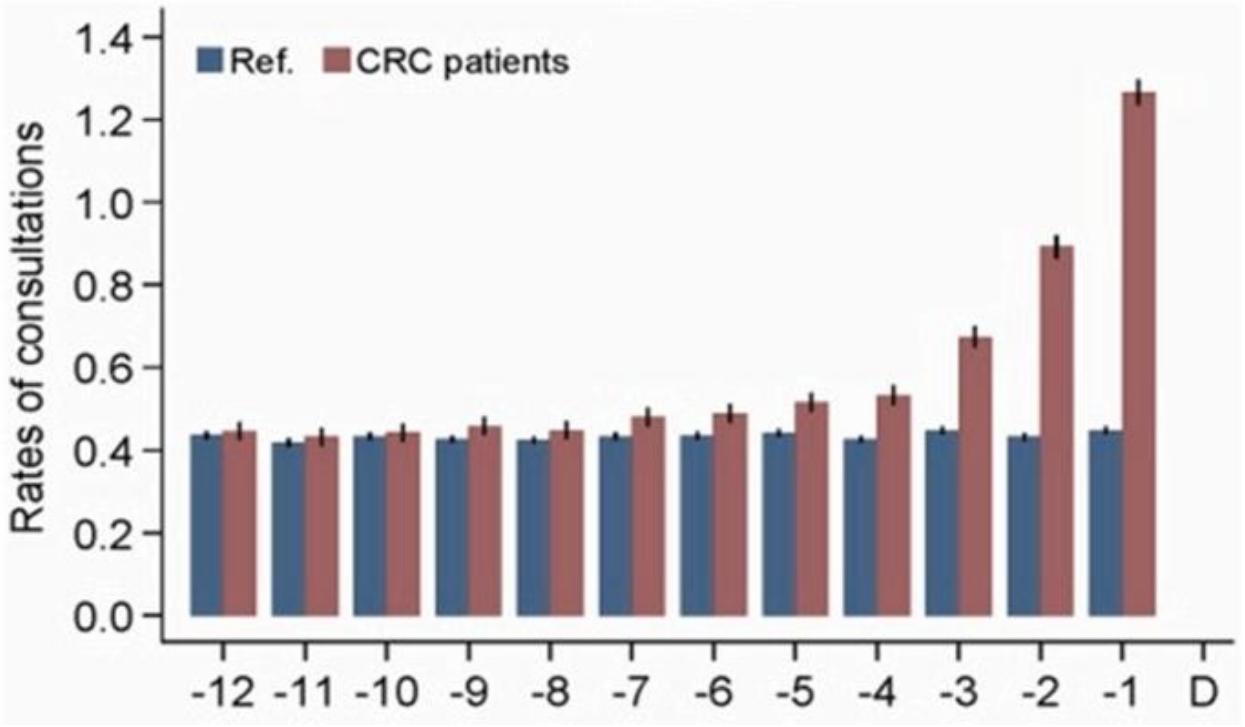
5 Missed diagnostic opportunities

1 Diagnostic windows studies

Q: Do changing healthcare use patterns suggest earlier diagnosis could be possible?

More about DW studies
by Dr Meena Rafiq (forthcoming)

And later on in this talk…

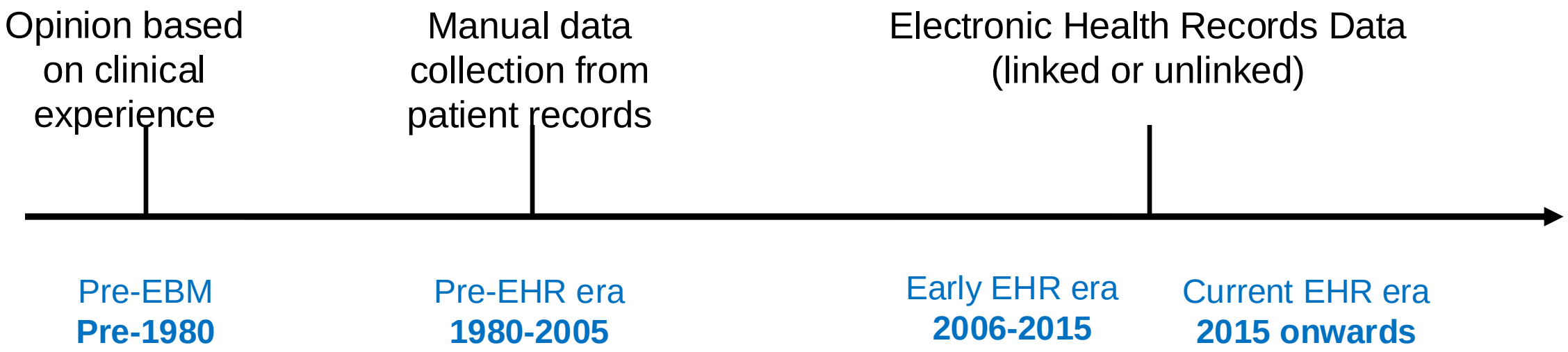


Hansen PL et al., Int J Cancer **2015**

2 Prodromal features studies

Q: What is the risk of cancer given presenting features
(symptoms, signs, test results)

Timeline of evolution of evidence on prodromal features of cancer



Case control studies & small sample sizes

Pioneered by the late Knut Holtedahl **(1944-2022)**

Scand J Prim Health Care 1987; 5:140–3

The Value of Warning Signals of Cancer in General Practice

KNUT ARNE HOLTEDAHL

Kvaløysletta helse og sosialsenter, Kvaløysletta, Norway

Manual data collection from patient records

Pre-EHR era
1980-2005

Typically case-control studies
therefore
typically risk of specific cancer sites

Risk of colorectal cancer in general practice patients presenting with rectal bleeding, change in bowel habit or anaemia

LAWRENSON R., LOGIE J. & MARKS C.

(2006) *European Journal of Cancer Care* **15**, 267–271

Suspected cancer: recognition and referral

NICE National Institute for Health and Care Excellence

Electronic Health Records Data
(*unlinked*)

Early EHR era
2006-2015

Measured weight loss as a precursor to cancer diagnosis: retrospective cohort analysis of 43 302 primary care patients

Brian David Nicholson[1*], Matthew James Thompson[2], Frederick David Richard Hobbs[1], Matthew Nguyen[3], Julie McLellan[1], Beverly Green[3], Jessica Chubak[3] & Jason Lee Oke[1]

Journal of Cachexia, Sarcopenia and Muscle 2022

Intra-abdominal cancer risk with abdominal pain:

Sarah J Price, Niamh Gibson, William T Hamilton, Angela King and Elizabeth A Shephard

British Journal of General Practice **2022**

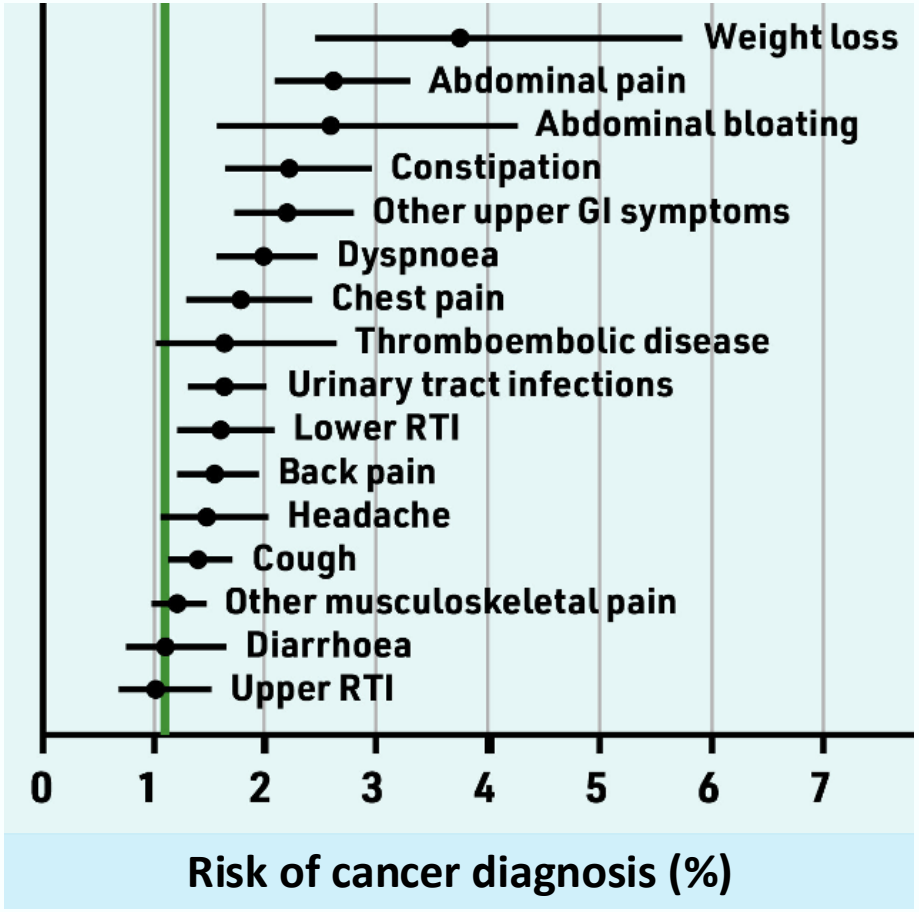
Risk of cancer following primary care presentation with fatigue: a population-based cohort study of a quarter of a million patients

Becky White[1✉], Meena Rafiq[1], Arturo Gonzalez-Izquierdo[2], Willie Hamilton[3], Sarah Price[3] and Georgios Lyratzopoulos[1]

British Journal of Cancer 2022

Profiling risk of non-specific symptoms
(e.g. weight loss, abdominal pain, fatigue)

Current EHR era
2016 onwards



Combining information from different non-specific symptoms

Risk following fatigue presentation
- Alone (**green** vertical line)
- In pairwise combinations with other non-specific symptoms (**horizontal** data points)

Underlying cancer risk among patients with fatigue and other vague symptoms:

Becky White, Cristina Renzi, Matthew Barclay and Georgios Lyratzopoulos

British Journal of General Practice 2023

Current EHR era
2016 onwards

4 Diagnostic routes studies

Q. How do patients progress from presentation to diagnosis?

Routes to diagnosis for cancer – determining the patient journey using multiple routine data sets

L Elliss-Brookes[1], S McPhail[*,2], A Ives[3], M Greenslade[3], J Shelton[2], S Hiom[4] and M Richards[5]

BJC British Journal of Cancer 2012

ICBP
International Cancer Benchmarking Partnership

Risk factors and prognostic implications of diagnosis of cancer within 30 days after an emergency hospital admission (emergency presentation): an International Cancer Benchmarking Partnership (ICBP) population-based study

Sean McPhail, Ruth Swann, Shane A Johnson*, Matthew E Barclay*, Hazem Abd Elkader, Riaz Alvi, Andriana Barisic, Oliver Bucher, Gavin R C Clark, Nicola Creighton, Bolette Danckert, Cheryl A Denny, David W Donnelly, Jeff J Dowden, Norah Finn, Colin R Fox, Sharon Fung, Anna T Gavin, Elba Gomez Navas, Steven Habbous, Jihee Han, Dyfed W Huws, Christopher G C A Jackson, Henry Jensen, Bethany Kaposhi, S Eshwar Kumar, Alana L Little, Shuang Lu, Carol A McClure, Bjørn Møller, Grace Musto, Yngvar Nilssen, Nathalie Saint-Jacques, Sabuj Sarker, Luc te Marvelde, Rebecca S Thomas, Robert J S Thomas, Catherine S Thomson, Ryan R Woods, Bin Zhang, Georgios Lyratzopoulos, ICBP Module 9 Emergency Presentations Working Group*

THE LANCET Oncology **2022**

	All cancer sites
Narrow definition*	
Denmark	30·9%
England	31·3%
Northern Ireland	27·9%
New South Wales	30·9%
Victoria	24·0%
Broad definition†	
Norway	36·5%
Scotland	38·5%
Wales	37·4%
Alberta	30·0%
Atlantic Canada	26·9%
British Columbia	30·5%
Ontario	26·1%
Saskatchewan-Manitoba	28·3%
New Zealand	42·5%

Emergency diagnosis of cancer is not a ‘single-country’ issue

Consistent predictors and prognostic consequences

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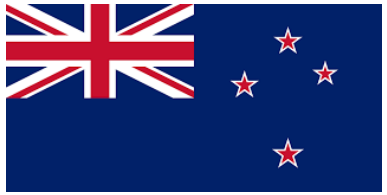
Emergency diagnosis of cancer is not a ‘single-country’ issue

Consistent predictors and prognostic consequences

Large international variation



ICBP
International Cancer Benchmarking Partnership

2022

Cancer Quality Performance Indicator Programme

Route to cancer diagnosis report

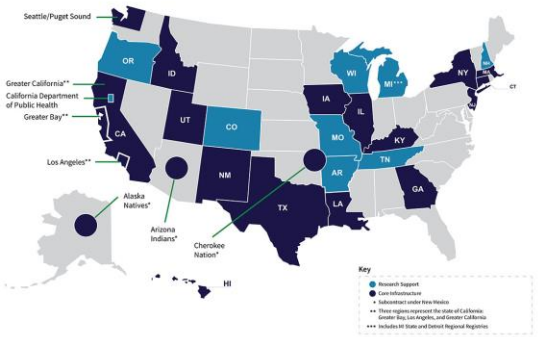
TE AHO O TE KAHU CANCER CONTROL AGENCY

2024

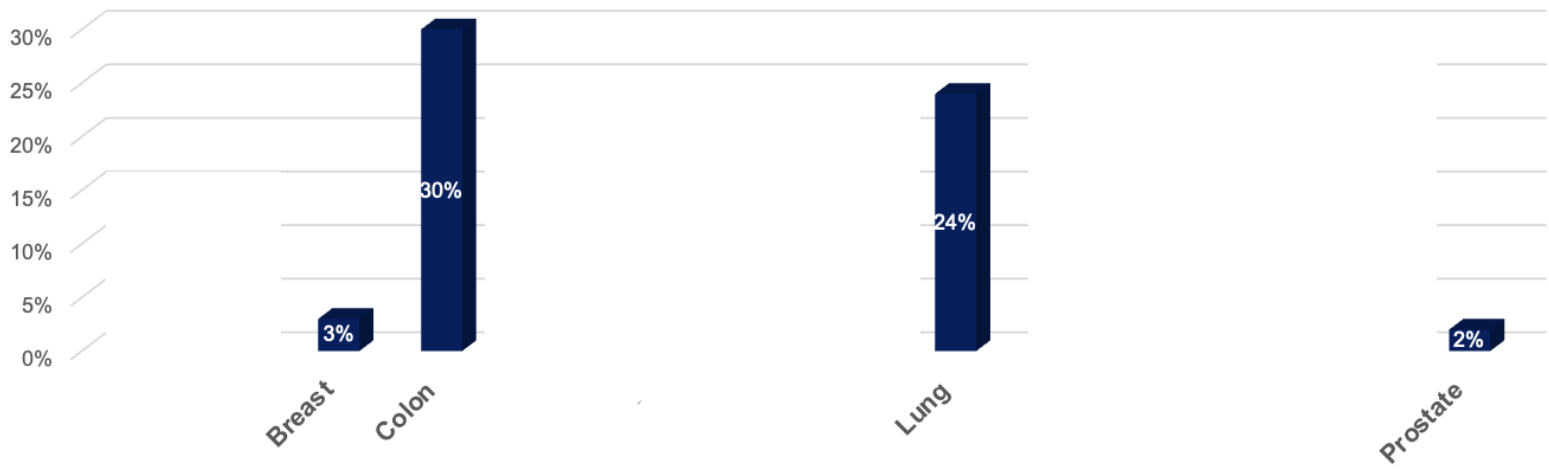
Emergency presentation prior to lung cancer diagnosis: A national-level examination of disparities and survival outcomes

Jason Gurney [a,*], Anna Davies [a], James Stanley [a], Virginia Signal [a], Shaun Costello [b], Paul Dawkins [c], Kimiora Henare [d], Chris Jackson [b,e], Ross Lawrenson [f,g], Jesse Whitehead [h], Jonathan Koea [i]

Lung Cancer 2023



Many US cancer patients > 65 years old (SEER-Medicare) are Inpatient Emergency Presentations

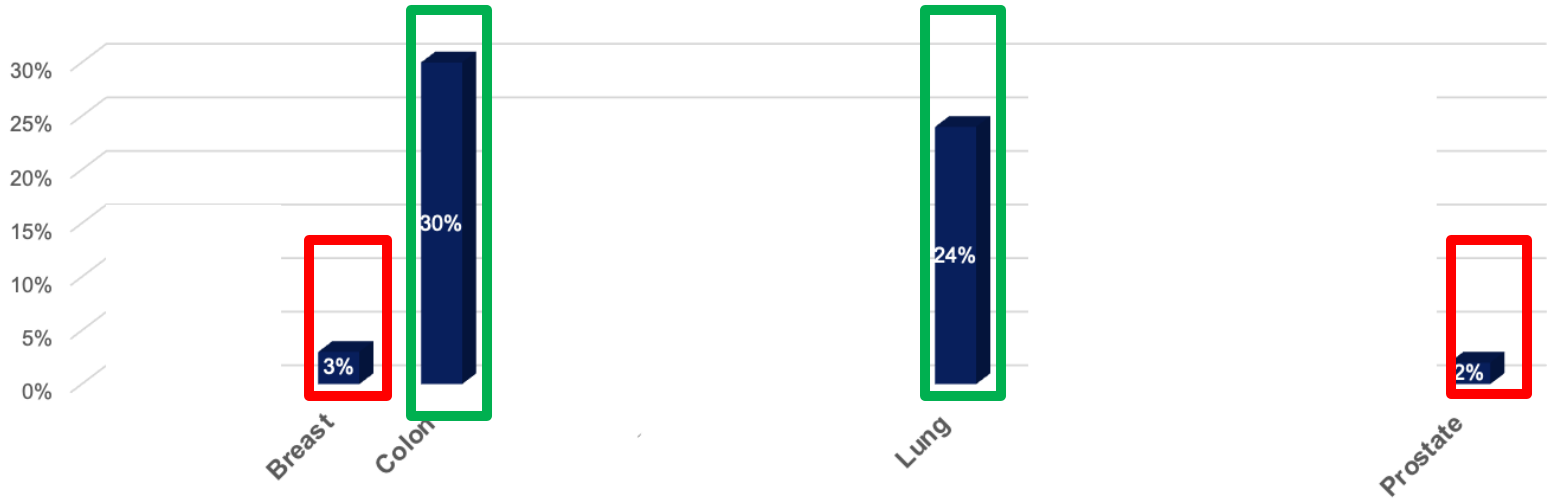


Emergency department involvement in the diagnosis of cancer among older adults: a SEER–Medicare study 2024

Caroline A Thompson, PhD, MPH ✉, Paige Sheridan, PhD, MPH, Eman Metwally, MD, PhD, Sharon Peacock Hinton, MPA, Megan A Mullins, PhD, MPH, Ellis C Dillon, PhD, Matthew Thompson, MBChB, DPhil, MPH, Nicholas Pettit, DO, PhD, MPH, Allison W Kurian, MD, MSc, Sandi L Pruitt, PhD, Georgios Lyratzopoulos, MD, FFPH, FRCP, MPH, DTM&H

JNCI CANCER SPECTRUM

15% of US cancer patients > 65 years old (SEER-Medicare) are Inpatient Emergency Presentations



Pattern of variation in % of emergency presenters by cancer site is highly similar to that observed in England and other countries though absolute % vary

(NB: Definitional, data source and population age differences mean that direct comparisons in this instance should not be attempted)

5 Missed Diagnostic Opportunities

Q. Could something have been done differently to expedite the diagnosis?

Maximising opportunities for timelier diagnosis

Supporting patients

Lucy Brindle
Suzanne Scott

Supporting GPs

Meena Rafiq
Olga Kostopoulou

Features	Number of patients who did not receive an urgent referral N (%)	Number of patients who did receive an urgent referral N (%)
Anaemia (n=1268)	1007 (79.4%)	261 (20.6%)
Rectal bleeding (n=13 067)	10 752 (82.3%)	2315 (17.7%)
Dysphagia (n=8197)	6813 (83.1%)	1384 (16.9%)
Breast lump (n=16 118)	5111 (31.7%)	11 007 (68.3%)
Haematuria†(n=6529)	4043 (61.9%)	2486 (38.1%)
Post-menopausal bleeding (n=3536)	1319 (37.3%)	2217 (62.7%)
Total (n=48 715)	29 045 (59.6%)	19 670 (40.4%)

Risk of cancer in subsequent 12 months:

~3 %

~9 %

Concordance with urgent referral guidelines in patients presenting with any of six 'alarm' features of possible cancer: a retrospective cohort study using linked primary care records

Bianca Wiering [1], Georgios Lyratzopoulos [2], Willie Hamilton [1], John Campbell [1], Gary Abel [1]

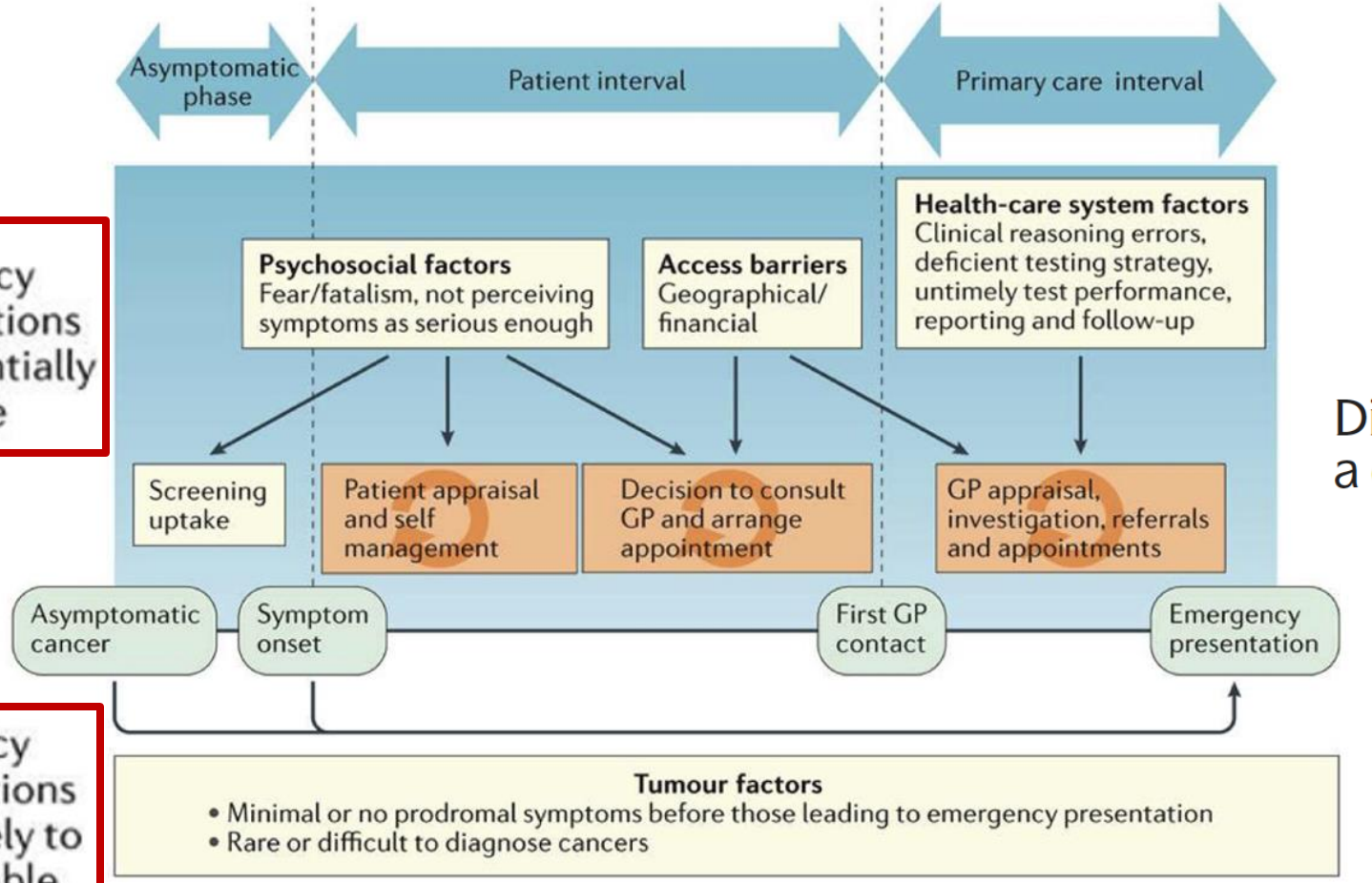
BMJ Quality & Safety 2022

Some emergency presentations are ‘unavoidable’

(tumour factors / aggressiveness)

Where are the missed diagnostic opportunities?

Emergency presentations are potentially avoidable



Emergency presentations are unlikely to be avoidable

Diagnosis of cancer as an emergency: a critical review of current evidence

Yin Zhou[1], Gary A. Abel[1,2], Willie Hamilton[2], Kathy Pritchard-Jones[3,4], Cary P. Gross[5], Fiona M. Walter[1], Cristina Renzi[6], Sam Johnson[7], Sean McPhail[7], Lucy Elliss-Brookes[7] and Georgios Lyratzopoulos[1,6,7]

Nature Reviews | Clinical Oncology **2016**

73% of all sampled emergency presentations using ‘data definitions’ were also *true* emergencies against clinical criteria

For 70% of all true emergency presentations there was evidence of *missed opportunities* for earlier diagnosis

“The findings suggest a promising automated approach to measuring quality of cancer diagnosis in … health systems”

Development and Implementation of a Digital Quality Measure of Emergency Cancer Diagnosis

Journal of Clinical Oncology®

2024

Paarth Kapadia, MD[1,2]; Andrew J. Zimolzak, MD, MMSc[1,2]; Divvy K. Upadhyay, MD, MPH[3]; Saritha Korukonda, MD, MS[3]; Riyaa Murugaesh Rekha, MBBS[3]; Umair Mushtaq, MBBS, MS[1,2]; Usman Mir, MBBS, MPH[1,2]; Daniel R. Murphy, MD, MBA[1,2]; Alexis Offner, MPH[1,2]; Gary A. Abel, PhD, MSc[4]; Georgios Lyratzopoulos, MD, MPH[5]; Luke T.A. Mounce, PhD, MSc[4]; and Hardeep Singh, MD, MPH[1,2]