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Lung Cancer in Never-Smokers: A Content Analysis of Newspaper Media Portrayal in the United Kingdom

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Abstract

Lung cancer in never-smokers (LCINS) is a growing concern. Despite over 6000 annual deaths among never-smokers in United Kingdom (UK), surpassing other cancer fatalities, public awareness remains deficient. Media is an accessible source of health-related information that influences public perception. This study focused on portrayal of LCINS in UK newspapers to understand how media information leverage in improving public awareness and early help-seeking behaviour. Articles mentioning LCINS in UK newspapers, between 01 May 2022 and 31 May 2023, were identified from Nexis database and subjected to summative content analysis. Of 480 articles screened, 10.4% aligned with study objectives. Four main themes were identified: awareness and education, risk factors, personal experiences of LCINS, public figures experience and fundraising support. LCINS publications peaked in November, designated as LC awareness month. Under one-third of articles reported late-stage diagnosis of LCINS. Personal narratives, found in 32% of articles, were more detailed in local newspapers (30%) compared to middle-market (16%), tabloid (8%), and broadsheet (6%) articles. Emotional tone analysis shows that 12% of local newspaper articles combined melancholic and factual tones, including tragic elements in 4% articles. Middle-market articles were mainly factual (16%), while tabloid articles leaned towards melancholic tone (6%). Public figure experiences in 10% of articles were portrayed as voice for early detection and treatment. This content analysis underscores the role of UK newspaper media in disseminating LCINS information, potentially shaping public perception. The study highlights the potential of newspaper in addressing gaps in LCINS awareness, providing strategic dissemination of clear, accurate information.

Keywords

Lung cancer, Never-smokers, Newspaper media, United Kingdom.

Introduction

Lung cancer (LC) is the leading cause of cancer death globally, and responsible for estimated 1.8 million deaths (18% of all cancer deaths) and over 2.2 million cases (11.4% of all cancers cases) in 2020 [1]. Lung cancer in never-smokers (LCINS) regarded as "those who have never smoked or smoked less than 100 cigarettes in their lifetime" is responsible for up to 25% of LC globally with estimated 53% of cases in women and 15% in men [2], yet public awareness is deficient [3]. Studies have reported rising number of LCINS in women [3-7] and whilst reason for rising LCINS is inconclusive it has been attributed to reduction in number of smokers following successful smoking legislation and cessation programmes [8].

Up to 25% of lung cancer (LC) have been attributed to risk factors of LCINS including exposure to occupational carcinogens, radon, second-hand smoking, air pollution and genetic susceptibility [2,7,9] evidence has further elucidated specific role of genetic alterations [6,10] and air pollution in development of LCINS [11].

LC diagnoses in smokers and never-smokers are similar involving presentation to a general practitioner (GP) following symptoms recognition and supported by clinical findings which often prompt further investigations or specialist referral, however, clinical presentations may differ [12]. LCINS can present with no symptoms in early stages or non-specific symptoms which are indistinguishable from symptoms in smokers [5,6], nevertheless, interpretation of LC symptoms are more challenging in never-smokers due to absence of smoking history [12]. Further, never-smokers often lack early symptoms awareness and often misinterpret symptoms leading to late presentation [5,6,13].

The media is a publicly accessible source of health-related information and has influence on public perception, knowledge, behaviours and health service utilisation [14-16]. Public perception of LC as self-inflicted injury due to the well-known link between LC and smoking [17] is a recognised consequence of media framing [15,16]. Although consistent news media coverage can raise cancer aetiological risk factors literacy [18,19], evidence suggests that cancer news coverage attract heightened publicity often fraught with misinformation and conflicting messages [19]. Therefore, accurate information about context and outcomes should be explicitly reported to the public [19] and in empathic tone especially with LCINS to enable elimination of social stigmatisation [20]. Additionally, evidence has shown that media reporting of public figures' cancer experiences significantly influences public perceptions and behaviours [21]. While successful attempts have been made through mass-media campaigns 'Be Clear on Cancer' to raise awareness of LC symptom resulting in improved early-stage diagnosis, the campaign only focused on a particular symptom (cough), and on smokers above 50 years [22]. This study, therefore, explores how UK newspapers portray LCINS.

Methods

Study Design

A summation content analysis of UK newspaper media was conducted following adoption of a pragmatic perspective to provide best understanding of the research problem by using most appropriate research methodology [23,24], hence both quantitative and qualitative methods were employed for data collection and analysis [25]. This study reporting followed the Standards for Reporting Qualitative Research (SROR) guidelines [26] (Appendix A).

Data collection and sampling

All UK newspaper media including their Sunday editions were searched. Articles were systematically identified from Nexis UK database, an online newspapers' database [27] and categorised according to newspaper types: broadsheet, middle-market, tabloid, and local newspapers [28]. Different search terms were used to identify highest number of articles over a specified period. Thus, the following search terms incorporating Boolean operators were used: *"lung cancer" AND "never smok* OR non smok*"* with selection of all UK newspapers in English language published between 1st May 2022 and 31st May 2023. Newspaper and web-based publications only were selected. The 'Metro' newspaper did not appear on Nexis database during time of search so was not included. All searched articles were compiled in Microsoft Excel with basic information that included publication title, publication date, newspaper name and type, inclusion/exclusion, and specific information for analysis. All resulting articles were manually screened by researcher to ascertain which fits into exclusion and inclusion criteria. Articles were included if LCINS were mentioned with contents relevant to study objectives. Articles excluded were duplicate articles, articles with less than 100 words count, articles that mentioned LCINS in passing, articles where LCINS were mentioned but primary cancer located outside the lungs, and articles from other forms of media. Furthermore, for articles having multiple duplicates only one article was selected with preference given to article with highest press hits, followed by highest word count as depicted on Nexis database, latest article version based on publication date and finally based on researcher's discretion after comparing article contents. Articles with different titles but with well over half of the contents exactly same were regarded as duplicate articles. The first 60 articles were double screened to ensure that selected articles were appropriate, and in situations where there was doubt about including or excluding an article, this was resolved by discussion.

Data analysis

Identifiable text contents were descriptively quantified and linked to the context where they are produced to elicit interpretative meaning [29]. All selected articles were subjected to qualitative content analysis [30] by manually using inductive method of thematic analysis [31]. Firstly, each article was systematically read several times by researcher to become familiar with the entire dataset. Initial codes were then generated and through constant comparison with the entire dataset, relevant codes were grouped into categories and assigned into themes. Saturation of themes was assumed when no new open codes could further be extrapolated from dataset [32]. Categorised codes extracts were reviewed, potential themes refined and crosschecked with dataset to ensure consistency. Any disagreement in coding was deliberated on and consensus reached. Themes were clearly defined and named with the relevant subthemes. Ten percent of articles were shared with researcher's colleague using investigative triangulation to reduce any potential researcher bias [33] and establish inter reliability [24]. For quantitative analysis, information captured in Microsoft excel spreadsheet as previously stated was used and with addition of themes, subthemes and codes from each article, the number of articles reporting respective codes, subthemes and themes were analysed and so was the tone of articles in the newspaper types.

Results

Quantitative analysis

774 articles were identified from searches, 480 were retrieved after initial screening. Fifty (10.4%) had contextualised data relevant to the study purpose and were used for analysis (see Figure 1). Figure 2 shows number of articles that mentioned LCINS according to newspaper type published each month during study period. Most articles were published in November which was LC awareness month. Overall, middle market newspaper published

most of the articles (48%) while broadsheet was the least (8%). Four main themes and accompanying subthemes were identified from the fifty articles and their frequencies recorded (see Table 1). Awareness of, and education about LCINS and personal experience of LCINS from relatives or individuals with diagnosis were the most frequently reported themes at 37.7% and 38.3% respectively. Frequency of reporting of risk factors associated with LCINS was 13.2% while the frequency of mentioning advocacy, public figure and fundraising with supportive initiatives was 10.8%.

The tone of the articles varied across the newspaper types with local newspapers combining both melancholic (12%) and factual (12%) with tragic (4%) tones while middle market was more factual (16%) (see Table 2).

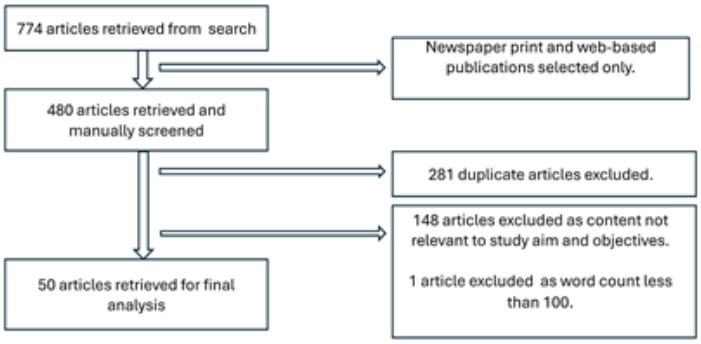


Figure 1: Flow diagram showing the number of articles retrieved during sampling process.

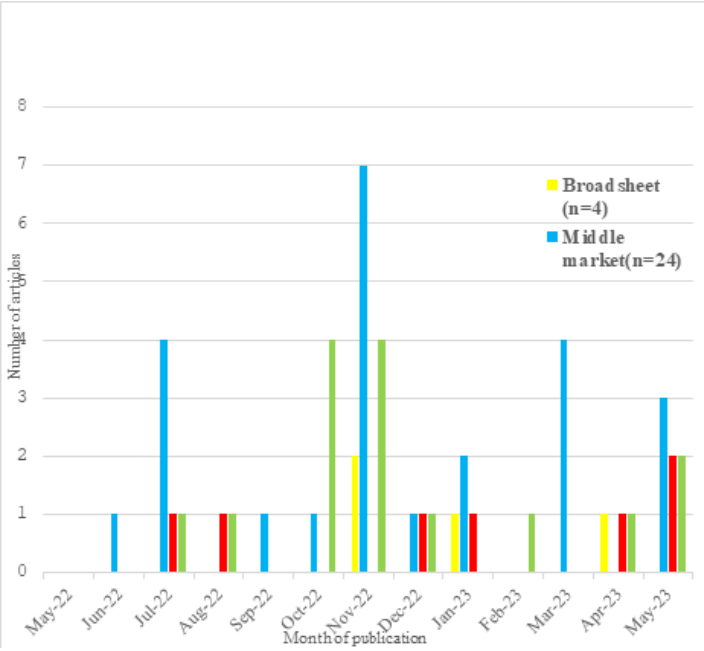


Figure 2: Number of articles mentioning lung cancer in never-smokers (LCINS) published per month according to newspaper types between 01 May 2022 to 31 May 2023.

Table 1: Frequency of themes and subthemes in newspaper articles.

Themes (in bold print) and corresponding subthemes (*in italics*)	Number (%)
Theme 1. Awareness and education	**63(37.7)**
Detection and diagnosis	8(12.7)
impact of late detection on disease progression	5(62.5)
misdiagnosis by professional	3(37.5)
Misconceptions and misbeliefs	16(25.4)
disease of smokers and the elderly	8(50.0)
occur more in men than women.	3(18.8)
no life after diagnosis	5(31.2)
Symptoms and awareness campaigns	39(61.9)
Theme 2. Risk factors for LCINS	**22(13.2)**
Occupational exposure	3(13.6)
Environmental risk	11(50.0)
Genetic susceptibility	8(36.4)
Theme 3. Personal experiences of LCINS	**64(38.3)**
Individual approach to symptoms	3(4.6)
Lack of symptoms awareness	3(4.6)
Stage 4 disease at diagnosis	14(21.9)
Reaction to diagnosis and wider impact	22(34.4)
Experience of treatment	22(34.4)
Theme 4. Public figure, Advocacy and Fundraising	**18(10.8)**
Public figures	5(27.8)
Advocacy for improved access to screening and treatment	7(38.9)
Fundraising and supportive initiative	6(33.3)

Table 2: Newspaper type and article tone with their frequency across different newspaper types.

Tone of article	Middle market n (%)	Broadsheet n (%)	Tabloid n (%)	Local n (%)
Factual	8(16%)	2(4%)	2(4%)	6(12%)
Melancholic	3(6%)	1(2%)	3(6%)	6(12%)
Tragic	1(2%)	1(2%)	1(2%)	2(4%)
Sentimental	2(4%)	-	-	-
Cautionary	3(6%)	-	1(2%)	-
Optimistic	2(4%)	-	-	-
Sympathetic	2(4%)	-	-	-
Supportive	1(2%)	-	-	1(2%)
Humorous	1(2%)	-	-	-
Passionate	1(2%)	-	-	-

Qualitative analysis

Four main themes and corresponding subthemes developed following thematic analysis, from newspaper types (Appendix B), are discussed below with accompanying illustrative quotes (Box 1 to 15 in Appendix C).

Theme 1. Awareness and education

This theme explores level of awareness around LCINS, and the educational information passed on to the public through newspaper media from three different perspectives:

Detection and diagnosis

This subtheme explores failure to detect symptoms either due to lack of knowledge or individual attitudes. It is explored from individuals' perspectives and that of health professionals (HPs):

impact of late detection of LCINS on disease progression, and misdiagnosis of LCINS by HPs.

Impact of late detection of LCINS on disease progression

Only 10% of articles highlighted the consequences of progression of LCINS due to lack of awareness of early symptoms. Many affected individuals, with the self-perception of being healthy and maintaining good lifestyle (including not smoking), tended to overlook potential warning signs (Box 1; a). Additionally, some individuals misunderstood their symptoms as mild illnesses or normal bodily changes, leading to delayed help-seeking and disease progression. (Box 1; b).

Misdiagnosis of LCINS by HPs

Misdiagnoses of LCINS were reported in 6% of articles. HPs were noted for frequently failing to connect patients' symptoms with the actual illness that led patients to seek medical help. Instead, symptoms were often misinterpreted as underlying health conditions the patient might have. (Box 2; a). HPs sometimes dismissed concerning symptoms particularly if patients lacked history of smoking. (Box 2; b)

Misconceptions about LCINS

Misconceptions about LCINS were reported in 32% of articles with experts and those afflicted with the disease, or their relatives carefully addressing it. Three perspectives of this subtheme are explored: LC is a disease of smokers and the elderly; there is no life after diagnosis; and LCINS occur more in men than women.

LC is a disease of smokers and the elderly

It was highlighted in 6% of articles that some individuals wrongly believed that LC only affects the elderly and smokers. Many never-smokers diagnosed with LC were inclined to deny having LC due to the misconception that it is exclusively regarded as disease of smokers and the elderly (Box 3; a). However, some never-smokers with LC diagnosis or those with first-hand experience shared how untrue these misconceptions were (Box 3; b and c).

Diagnosis of LCINS means "no life after diagnosis"

In 10% of articles, individuals were reported to initially view diagnosis of LCINS as a dire outcome with the misconception that their immediate end is certain after the diagnosis (Box 4; a). However, most of never-smokers with LC diagnosis reportedly embraced their situation eventually and continued coping with the psychological and treatment impacts (Box 4; b and c).

LCINS occur more in men than women

In 6% of articles, it was highlighted that some individuals believed that women are less affected by LC which was attributed to the smoking habits of men. This again is linked to the previously mentioned societal misbelief that LC is exclusive to smokers. However, experts reportedly demonstrated that LC is also prevalent among never-smoking women, (Box 5; a and b) and moreso was a young woman who never smoked (Box 5; c).

Awareness campaigns and symptoms

In 78% of articles, symptoms and awareness were reported with highlights that LCINS can be asymptomatic and may be discovered incidentally during unrelated hospital visits. Symptoms, when present, may or may not be directly related to airway passages, especially when the disease has spread beyond the lungs (Box 6; a). Various campaigns by the National Health Service (NHS), charitable organizations, experts, and never-smoking individuals affected by LC aimed to raise awareness about the condition; and key warning signs, such as persistent cough, haemoptysis, breathlessness, and recurrent chest infections, were highlighted for immediate attention (Box 6; b). Additionally, uncommon symptoms, often overlooked until perceived as concerning, were highlighted (Box 6; c).

Theme 2. Risk Factors of LCINS

Different factors from the environment, work-related or genetically linked were reported as playing significant role in the development of LCINS. The three perspectives are discussed below.

Occupational exposure

The potential link between LCINS and occupational hazards were highlighted in 6% of articles. One of the reported cases involved exposure to combustion substances after the devastating 9/11 attack (Box 7; a). The other reported pertinent cases, involving non-smokers, were linked with prolonged exposure in a cement factory and a consistent exposure to passive smoking during professional career as an entertainer (Box 7; b and c).

Environmental risks

Identified environmental agents, particularly air pollution, were reported in 22% of articles as potential contributors in the development of LCINS with experts emphasizing that prolonged exposure to substances in the environment, especially in predisposed individuals, can lead to LCINS (Box 8; a-c).

Genetic susceptibility

Genetic susceptibility as a significant factor in development of LCINS was highlighted in 16% of articles with specific mutations identified, through testing, to be notably prevalent amongst young women who never smoked (Box 9; a-c)

Theme 3. Personal experiences of LCINS

Personal experiences of LCINS, including attitudes towards symptoms, lack of awareness, and misdiagnosis by health professionals, were discussed in theme 1. Additional experiences in this section encompass late-stage diagnosis with challenges in accessing healthcare, reaction to diagnosis and treatment experience.

Experience of stage 4 (late-stage disease) at diagnosis

28% of articles reported on diagnoses of stage 4 (late-stage disease) LCINS. Some symptomatic individuals faced challenges in accessing health services, waiting for specialist referrals, leading to emergency hospital visits where diagnoses of LCINS at late stages required urgent intervention (Box 10;a and b).

Reaction to diagnosis

Individual and family reactions to diagnosis of LCINS were demonstrated in 44% of articles. On receiving a LC diagnosis, nearly all never-smokers, especially young women, exhibited strong denial and expressed negative emotions such as shock, mortification, fear, and depression (Box 11; a and b). Some felt blamed for their diagnosis, leading to shame and attempts to explain themselves (Box 11; c). Families were often distraught, heartbroken, and grieving irrespective of whether the diagnosed individual is present or had passed away (Box11; d).

Treatment experience

Both positive and negative treatment experiences of LCINS were reported in 44% of articles.

Individuals with stage 4 diagnosis undergoing drug treatments reported positive impacts on tumour size, expressing optimism and positive messages of hope (18% of articles) (Box 12; a and b). Those never-smokers with early diagnosis expressed their delight at becoming cancer-free with appropriate intervention (10% of articles) (Box 12; c). Conversely, some diagnosed at late stages did not survive (6% of articles) (Box 12; d), while others remained uncertain about their treatment outcomes with chemotherapy (6% of article) (Box 12; e).

Theme 4. Public figures, Advocacy and Fundraising with supportive initiative

Public figures and individuals with personal or indirect experiences of cancer, particularly in never-smokers, advocating for early screening and research funding to support those affected with LCINS were highlighted in 18% of articles.

Public figures

In just 10% of articles, public figures shared experiences of LCINS or losing a relative to the disease thus envisioning championing a course. Notably, while former cabinet minister James Brokenshire, a non-smoker, emphasized on early help-seeking and moved a parliamentary motion for early screening of LCINS before his demise (Box 13; a), a known comedian Kathy Griffin after undergoing curative surgery and expressed surprise at the finding of dormant tumour (LC) in her lungs which she linked to a possible family history thus demonstrating the chances of never-smokers like herself having LC with no obvious symptoms (Box 13; b). Furthermore, a popular entertainer, Dame Esther Rantzen encouraged people not to hide their LC particularly never-smokers like herself because of stigmatization (Box 13; c), whereas another figure like Owl Boyle, following the death of his wife, instigated innovative research for non-invasive diagnosis of LCINS (Box 13; d).

Advocacy

In 14% of articles, never-smoking individuals affected by LC or those who lost loved ones from it were reported advocating for enhanced access to screening, treatment, and increased awareness (Box 14; a and b). The advocacy aims at catching the disease early, ultimately reducing the prevalence of late-stage diagnoses (Box 14; c) as LCINS is deemed curable.

Fundraising with supportive initiatives

In 12% of articles, friends, relatives, and charities were reported to have engaged in fundraising to support never-smoking individuals afflicted with LC, enabling them to undergo and complete treatment (Box 15; a). High treatment costs pose big challenges, and these fundraising efforts play crucial role in providing financial support (Box 15; b). Some individuals, post-treatment, reciprocate by initiating fundraising to support charities and hospices, ensuring the sustainability of such benevolence (Box 15; c).

Discussion

This first-of-its-kind content analysis explored the portrayal of LCINS in UK newspaper media with the aim of assessing its potential to influence early help-seeking behaviour. Findings revealed concentration of publications on LCINS in November, designated as LC awareness month. Late-stage diagnoses of LCINS were also highlighted, however, positive treatment experiences with medications were further portrayed. In addition, personal experiences of those with LCINS were detailed with local newspapers providing more in-depth narratives. Emotional tone in local newspaper articles combined melancholic with factual and tragic tones. Contrastingly, middle-market articles were predominantly factual while tabloid articles leaned towards melancholic tone. Public figures were portrayed as a voice for early detection and treatment. Additionally, never-smokers with LC diagnosis and their advocates sought for improvement in diagnosis while relatives, friends, or charities supported treatment through fundraising thereby addressing financial challenges faced by never-smokers with LC diagnosis.

While this study reveals that some never-smokers with LC are diagnosed at stage 4 (late-stage diagnosis) attributed to lack of individual awareness of symptoms, and symptom misappraisal by HPs, the findings were consistent with previous studies emphasizing the challenge of recognizing LC symptoms [12,34]. Poor access to healthcare was identified as a factor in delaying diagnosis and treatment, aligning with similar findings in an earlier systematic review [35]. Additionally, positive treatment experiences were portrayed, and a previous study found that individual stories associated with symptom recognition and experience of positive treatment influence public behaviour changes [36].

The media plays a significant role in shaping public perceptions. This study highlights the use of newspaper media in conveying stories of LCINS experiences, potentially influencing public behaviour. It also revealed media reporting of variable presentation of LCINS, thus providing essential information to improve public attitudes towards, and their symptoms perception of, LCINS. This aligns with previous research emphasizing the importance of knowledge and awareness in facilitating help-seeking behaviour and early cancer diagnosis [14].

The potential links between LCINS and risk factors including occupational exposure, environmental agents, and genetic susceptibility, were highlighted in the study. This underscores the significance of these risk factors in LCINS, especially considering

the general population's low knowledge and awareness of cancer risk factors potentially contributing to the persistent stigma surrounding LCINS. Finding is consistent with previous studies reporting on role of genetics, occupational hazard, and environmental pollution in LCINS [6,9,10].

Previous studies indicate that when a public figure is diagnosed with cancer, there is increased public interest in seeking information about the disease [21]. In this study, public figures are noted for being inspirational and passionate advocates for early detection of LCINS, emphasizing link to improved survival with early treatment. They also encouraged elimination of nihilistic behaviours and reduction of stigma associated with diagnosis of LCINS.

Furthermore, this study identified differences in the reporting of personal experiences of LCINS in local newspapers compared to other newspaper types, with detailing of emotional and personal experiences of individuals and their families throughout the diagnosis journey. These narratives encompassing symptom manifestation, symptom misperceptions, help-seeking behaviour, and reaction at diagnosis, were more comprehensive in local newspapers than other newspaper types. This suggests that other newspaper media can equally contain adequate information that will inform the public about LCINS thereby promoting early access to healthcare. This is vital as previous reports have shown that newspaper media are often criticised for lack of detail in reporting about individuals' experiences [36,37].

From public health perspective, this study demonstrates that newspaper media can potentially improve public health media coverage of LCINS for the purpose of disseminating information on different presentations of LCINS, the risk factors and causes of LCINS or the misconceptions and stigma attached to the disease. This complements the emerging evidence of potential influence of new media platforms in disseminating information quickly to wider audience thereby shaping public perceptions [38]. However, it is important that information in newspaper media are accurate and align with evidence, hence the need to ensure that journalists are knowledgeable in health topic and information skilfully verified prior publication.

Strengths of this study include the availability of the study information in the public domain. Also, the comprehensive search strategy spanned a year yielding rich data and offering a snapshot of newspaper media representation of LCINS. Moreover, the researcher acknowledged and minimized biases through keeping a reflective journal and employing bracketing methods [39]. Findings of the study suggest a need for future research, potentially using direct interviews with never-smokers diagnosed with LC to gain a deeper understanding of their social world. Conversely, limitations include that the study focused exclusively on newspaper media, excluding other sources like television and social media. Also, the subjective nature of the narratives relied on both the reporter's knowledge and experience, and the researcher's interpretation of themes.

In conclusion, this study shows persistence of late-stage diagnosis of LCINS with the contributory individual and system factors. Additionally, the study highlights the positive treatment experiences of LCINS reported mostly in local newspapers which underscores the role of UK newspaper media in disseminating information about LCINS, potentially shaping public perception. Importantly, the study highlights the potential of newspaper in addressing gaps in LCINS awareness thereby providing strategic dissemination of clear, accurate information. It is, therefore, hoped that policy makers would consider incorporating newspaper media information dissemination into current means of creating public awareness of LCINS, to promote early medical help-seeking behaviour for better health outcomes.

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SUPPLEMENTARY FILE

Supplementary File Appendix A: Standard for Reporting Qualitative Research

No.	Topic	Item
	Title and abstract	
S1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended
S2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions
	Introduction	
S3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement
S4	Purpose or research question	Purpose of the study and specific objectives or questions
	Methods	
S5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale[b]
S6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability
S7	Context	Setting/site and salient contextual factors; rationale[b]
S8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale[b]
S9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues
S10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale[b]
S11	Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study
S12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)
S13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/deidentification of excerpts
S14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale [b]
S15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale[b]
	Results/findings	
S16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory
S17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings
	Discussion	
S18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field
S19	Limitations	Trustworthiness and limitations of findings
	Other	
S20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed
S21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting

[a]The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

[b]The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

ACADEMIC MEDICINE

Supplementary file Appendix B: Microsoft Excel sheet of fifty selected articles including article tone and given code for newspaper type.

Article Title	Publication date	Newspaper name	Newspaper type (NT)	NT Code	Article tone	Press hits
Paramedics,24, who never smoked died weeks after lung cancer (LC) diagnosis	31-May-23	Walesonline.co.uk	Local	L1	Tragic	5
5 myths about LC everyone needs to stop believing	29-May-23	The Independent	Middle market	M1	Factual	24
Dame Esther Rantzen faces stage four LC: key facts about the disease	26-May-23	The Independent	Middle market	M2	Optimistic	21
Did you know?	23-May-23	Daily Mirror	Tabloid	T1	Factual	5
'I've got LC, but I don't smoke'- teacher shocked after deadly diagnosis	23-May-23	Express online	Middle market	M3	Sympathetic	7
Fit and healthy teacher diagnosed with stage 4 LC calls for screening of young people & non-smokers	22-May-23	Ellon Times	Local	L2	Factual	12
Little-know LC warning sign that may strike while you're asleep	12-May-23	Dailyrecord.co.uk	Tabloid	T2	Cautionary	12
Brave Leeds teacher given 'shock' terminal cancer diagnosis vows to help Roy Castle LC Foundation	20-Apr-23	Yorkshire Evening Post	Local	L3	Factual	10
LC symptoms and three signs you should see your GP immediately	17-Apr-23	Dailyrecord.co.uk	Tabloid	T3	Factual	18
Pollution 'awakens' mutant cells that cause LC clean air for all	06-Apr-23	The Times	Broadsheet	B1	Factual	20
Ohio man and 9/11 first responder on a trip to San Diego diagnosed with stage 4 cancer which he believes is linked to efforts after terror attack.	28-Mar-23	MailOnline	Middle market	M4	Sentimental	5
Family claims doctors made scan error before tragic nurse's death	27-Mar-23	Express Online	Middle market	M5	Tragic	2
Woman,64, becomes second person to be cured of terminal stage 4 LC after rare double lung transplant surgery	16-Mar-23	MailOnline	Middle market	M6	Factual	11
The small sign of LC you can see on your right hand -symptoms	14-Mar-23	Express Online	Middle market	M7	Factual	12
Fitness instructor only found out she had stage four cancer after getting out of breath walking into her own class	08-Feb-23	walesonline.co.uk	Local	L4	Melancholic	5
How eating a pizza saved my life: mother, 45, claims she'd have never spotted her cancer without tucking into a £5 meat feast from Asda	30-Jan-23	MailOnline	Middle market	M8	Humorous	9
4 warning signs of LC the NHS doesn't want you to ignore	29-Jan-23	The Independent	Middle market	M9	Cautionary	12
She embraced life and lived it to the fullest, despite her LC diagnosis at 28	19-Jan-23	Telegragh.co.uk	Broadsheet	B2	Tragic	15
Scots man defies cane odds after being given six months to live in 2016	06-Jan-23	Dailyrecord.co.uk	Tabloid	T4	Melancholic	3
SNP MP backs life-saving LC research after shock loss of his brother	11-Dec-22	The National (Scotland)	Local	L5	Melancholic	20
Mum diagnosed with terminal cancer after doctors said back pain was pregnancy cramps	08-Dec-22	mirror.co.uk	Tabloid	T5	Melancholic	7
Kathy Griffin, 62, reveals she's having vocal cord surgery after losing her voice during LC treatment - an emotional star says: I'll do anything to get my voice back.	06-Dec-22	MailOnline	Middle market	M10	Sentimental	9
Cancer symptoms are changing, and two signs are becoming more common, says 17-year UK study	29-Nov-22	Expert Online	Middle market	M11	Factual	6
Look closely at your critical illness policy…the small print could save your life	27-Nov-22	Scottish Mail on Sunday	Middle market	M12	Factual	7
Two LC patients who have never smoked speak out about symptoms to look out for...	26-Nov-22	Manchester Evening News	Local	L6	Factual	30
I see more joy in things than before Lee Trewhela meets a mother from Cornwall, diagnosed with stage 4 lung cancer, but with an inspiring and important story to tell…	26-Nov-22	Western daily Press	Local	L7	Factual	15

Jonnie Irwin illness: experts address misconceptions around LC after presenter's terminal diagnosis	25-Nov-22	The Independent	Middle market	M13	Sympathetic	24
I've never smoked, so why do I have LC?	24-Nov-22	Telegragh.co.uk	Broadsheet	B3	Melancholic	20
Texas grandmother, 61, beat LC on the same day she was diagnosed - after doctors decided to act fast while carrying out biopsy	23-Nov-22	MailOnline	Middle market	M14	Optimistic	18
'In the prime of my life': Man,50, with stage 4 LC describes his first symptoms	19-Nov-22	Express Online	Middle market	M15	Melancholic	10
UK breakthrough on LC helps target patients at risk of relapse	12-Nov-22	The Observer	Broadsheet	B4	Factual	12
The 'less common' symptoms of LC' we don't always associate with the disease	12-Nov-22	Express Online	Middle market	M16	Factual	19
Huge praise for Hywel Dda Health Board's lung cancer service	11-Nov-22	South Wales Guardian	Local	L8	Factual	9
Cachexia is 'key red flag' symptom of LC that appears in 60% of patients	06-Nov-22	Express Online	Middle market	M17	Factual	13
Billy Boyle celebrates teamwork at heart of Owlstone's success	02-Nov-22	Cambridge Independent	Local	L9	Factual	9
Symptoms of LC as NHS nurse who had back pain given terminal diagnosis	31-Oct-22	Gazettelive.co.uk	Local	L10	Melancholic	20
Friends of newly married Liverpool fan who died from cancer cycle to Anfield in his memory	26-Oct-22	Oxford mail	Local	L11	Supportive	2
Lockdown's collateral cancer timebomb: 40 thousand tumours were 'missed' during first year of Covid pandemic - the equivalent of one every 13 minutes... but top experts fear this is just 'the tip of the iceberg'	20-Oct-22	MailOnline	Middle market	M18	Melancholic	5
Dying mother vows to fight on for her daughters after heart-breaking diagnosis	17-Oct-22	Coventrytelegraph.net	Local	L12	Tragic	3
Mum claims LC missed by hospital because she never smoked	13-Oct-22	coventrytelegraph.net	Local	L13	Melancholic	15
LC screening for non-smokers to be rolled out on anniversary of Roy Castle death	01-Sep-22	Express Online	Middle market	M19	Melancholic	14
Rise & brutal fall of the brilliant Erol Christie	28-Aug-22	Sunday Mercury	Local	L14	Melancholic	3
Touching someone else's clothing can increase cancer risk, study claims	27-Aug-22	mirror.co.uk	Tabloid	T6	Factual	3
Coughing three weeks? Get lung cancer, health chiefs say	31-Jul-22	Express Online	Middle market	M20	Cautionary	14
Tributes paid to 'inspirational' Gateshead mum, 50, who died of lung cancer aged 50 despite never smoking	25-Jul-22	chroniclelive.co.uk	Local	L15	Melancholic	8
Widows of presenter Roy Castle and MP James Brokenshire whose non-smoker husbands died of LC call for national screening programme	21-Jul-22	MailOnline	Middle market	M21	Passionate	16
Lung cancer: The 'unexplained ' symptom that needs an 'urgent referral' - new BMJ report	14-Jul-22	Express Online	Middle market	M22	Cautionary	17
Mum and dad's terminal cancer diagnosis within five months of one another	12-Jul-22	mirror.co.uk	Tabloid	T7	Melancholic	5
Lung cancer: expert warns of risk factor in your home that many people are 'unaware of '	10-Jul-22	Express Online	Middle market	M23	Factual	5
Lung cancer: Symptoms 'that don't seem related ' to lung cancer -what to spot	03-Jun-22	Express Online	Middle market	M24	Factual	23

Supplementary file Appendix C: Illustrative quotes for themes and subthemes in Box 1 to 15.

Box 1

a. *"We wondered…if there was something we should have looked for…But Diarmid was fit and healthy, he played five-a-side football and took everything in moderation. He didn't fit the stereotypical view we have of someone diagnosed with lung cancer". L5; 11 December 2022; The National (Scotland).*

b. *"It started in March 2021 with a cough, a month later, I had painful, swollen lymph nodes in my neck. After a few rounds of antibiotics, I wasn't getting better, so I had an x-ray. But my cancer didn't look like cancer. It wasn't until end of May when I was so breathless, I couldn't talk and had lost 10kg that I was sent to hospital" B2; 19 January 2003; telegraph.co.uk.*

Box 2

a. *"Mazeda Aktar,29, has now been diagnosed with an inoperable terminal cancer… the mum-of-two said she went for months with pains and terrible headaches. And after each visit to A&E with excruciating pain, the mum's concerns were dismissed. Tragically, it was discovered that she had stage four lung cancer just two weeks after giving birth to her son" T5; 8 December 2022; mirror.co.uk.*

b. *"Marva…The gran-of-14, who never-smoked, took herself to…hospital where a scan was performed but doctors concluded the woman was suffering from asthma…they sent her away with more inhalers… her breathing was getting worse and worse. In November, she went to the hospital for suspected pneumonia. She had another scan, this time medics saw that her lung had collapsed, but they had missed it in the previous scan- and that she had stage four cancer". M5; 27 March 2023; Express Online.*

Box 3

a. *"I had this idea that lung cancer was something that only happened to older people who smoked 50 cigarettes every day, all their lives. I'd never smoked so I didn't think I could ever get it" [L6; 26 November 2022; Manchester Evening News].*

b. *"Since I've been diagnosed, I know lung cancer can affect anyone. I've met people in support groups in their 20s, 30s, 40s, 50s and beyond. The youngest I met was just 17. If you've got lungs, you can get lung cancer…" L6; 26 November 2022; Manchester Evening News.*

c. *"Many people still think lung cancer is a smoker's disease, but that's just not the case. Both myself and Cathy have lost husbands we loved very much to lung cancer despite neither of them ever smoking" M19; 1 September 2022; Express Online.*

Box 4

a. *"People say things to you, like 'keep fighting' but it's not cured, I am going to die…I know I'm going to die but I try not to think about it" T4; 6 January 2023; daily record.co.uk.*

b. *"Just because you've got cancer it doesn't mean to say that your life has to stop, because it really doesn't…As far as I'm concerned, I'm going to be here in 10 years' time" L2; 22 May 2023; Ellon Times.*

c. *"Alix embraced life and lived it to the fullest, despite her diagnosis and struggles…" B2; 19 January 2023; telegraph.co.uk.*

Box 5

a. *"…cases in women have risen by a third (32 percent), according to Cancer Research. Many of these are in younger women- those aged 50 or below – and are diagnosed late" B2; 19 January 2023; telegraph.co.uk.*

b. *"We see a lot more women with this type of lung cancer than we do for men, and we're not sure why…" B3; 24 November 2022; telegraph.co.uk.*

c. *"Meadhbh was told she had stage 4 combined small cell lung cancer, an extremely aggressive and rare form of cancer, not typically seen in a young, non-smoker in good health"*
L1; 31 May 2023; walesonline.co.uk.

Box 6

a. *"Earlier in the year the NHS launched a campaign to mark Lung cancer Day in August and highlighted specific symptoms that people should be aware of." M9; 29 January 2023; The Independent.*

b. *"I never had a cough or breathlessness. It's important for doctors, nurses, and the public to know and remember that lung cancer can affect 'never smokers' and they may not have classic symptoms" L6; 26 November 2022; Manchester Evening News.*

c. *"There are less common symptoms that we might not always associate with lung cancer including pain in the shoulder travelling down the arm" M16; 12 November 2022; Express online.*

Box 7

a. "*Your uniforms could be covered in ashy soot, a short amendment after your shift had begun, and you're breathing it all in…my diagnosis is linked to my time near Ground Zero" M4; 28 March 2023; MailOnline.*

b. "Mr Khoury received his transplant in September 2021. A non-smoker, he worked as a cement finisher for the Chicago Department of Transportation in early 2020 when he started to suffer back pain, sneezing, chills and coughing up mucus" M6; 16 March 2023; Mail Online.

c. "The diagnosis came as an enormous shock to the musician … who had never smoked a cigarette in his life. He went public with his battle against the disease explaining that he believed cancer can grew after years of playing in smoky jazz clubs early in his career" M19; 1 September 2022; Express Online.

Box 8

a. "*… some other lung cancers are caused by exposures to substances like asbestos, radon gas and passive smoking..." M1; 29 May 2023; The Independent.*

b. "Other important risk factors are exposure to asbestos, exposure to silica often through sandblasting or glass making, diesel engine exhaust, and aerosols inhaled while painting or welding" M6; 6 November 2022; Express Online.

c. "Research also suggests that being exposed to diesel fumes over many years increases risk of developing lung cancer" M22; 14 July 2022; Express Online.

Box 9

a. "They [health professionals] did an endoscopy and took a sample from my lung…did tests and realised I had a rare mutation – MET exon 14 skipping mutation – which is quite difficult to treat." L7; 26 November 2022; Western Daily Press.

b. "*Both [a 41-year-old and 28-year-old, never-smokers] have ALK+ non-small cell lung cancer, which is only the case of 4 to 5 percent of patients but is more common in women and those under 50 years of age" B3; 24 November 2022; telegraph.co.uk.*

Box 10

a. "She was waiting for a GP referral to a neurologist when she suffered the appalling headache…My husband took me to A&E – we were worried… Looking back there were other strange symptoms. I sometimes felt like I couldn't control my temper – which isn't like me at all… At A&E, doctors ordered CT scan which revealed large brain lesions…On May 12, Amara was told she had combined small cell and non-cell lung carcinoma." L12; 17 October 2022; coventrytelegraph.net.

b. "Non-smoking single mother [36-year-old] who thought her cough was due to Covid is diagnosed with terminal lung

Box 11. Personal experiences of LC by never-smokers: Reaction to diagnosis

Box 11

a. "There was one night …, it was the weirdest experience - I just lay in bed in the dark and couldn't stop crying. I felt like being in a horror film…" L7; 26 November 2022; Western Daily Press.

b. "I felt like my whole world was falling apart… Suddenly, I was faced with the possibility I wouldn't live to see my children grow up" L12; 17 October 2022; coventrytelegraph.net

c. "There's definitely stigma around lung cancer" …If I tell someone, they ask, did I smoke?" B2; 19 January 2023; the telegrah.co.uk.

d. "I can't even remember her having a flu and she rarely had a cold." L15; 26 July 2022; chroniclelive.co.uk

Box 12

a. "The drug I'm [a 66-year-old, never-smoker] on suppresses and reduces the tumours to stop them growing…I had lots of miniscule nodules on my brain at the time I was diagnosed. I found out three days before Christmas that I've got nothing in my brain anymore…" L4; 8 February 2023; walesonline.co.uk.

b. "It's not a sob story… I [49-year-old, never-smoker] want this to be a story of hope… I mean, there isn't a cure but if it wasn't for these amazing medicines, then my life would be very limited- but it's not. It's given me so much hope" L3; 20 April 2023; Yorkshire Evening Post.

c. "The symptom [recurrent chest infection] was first highlighted by Tracy Bourne, [a 59-year-old never smoker] …who first noticed a cough around Christmas 2018. In March 2019, she developed a bad chest infection and fell ill. She was diagnosed with lung cancers weeks after seeing her doctor and getting an X-ray. Since then, she has undergone surgery to remove part of her lung and received the all-clear" M9; 29 January 2023; The Independent.

d. *"Meadhbh Cameron,24, died on March 11 after being told two days before Christmas that she had weeks to live." L1; 31 May 2023; walesonline.co.uk.*

e. *"He [50-year-old, never-smoker] is currently undergoing chemotherapy, his prognosis is, however, unclear" M4; 28 March 2023; Mail online.*

Box 13

a. *"The earlier you catch cancer, the better the chances of survival" M20; 31 July 2022; Express Online.*

b. *"I'm cancer free. I don't know why I had a tumour, right? And I've never smoked, and it was in there for 10 years". M10; 6 December 2022; MailOnline.*

c. *"I have decided not to keep this secret anymore because I find it difficult to skulk around various hospitals wearing an unconvincing disguise and was remaining optimistic" M2; 26 May 2023; The Independent.*

d. *"The 100k mission is already well under way…to improve non-invasive diagnosis for lung cancer. It's still the leading cancer both in the UK and globally with people being diagnosed with lung cancer who never smoked. Early detection increases survival rates up to 10 times which can make a huge difference". L9; 2 November 2022; Cambridge independent.*

Box 14. Advocacy**.**

Box 14

a. *"I really want to push for a national universal screening programme. We really need to put it down in people's consciousness that if you've got lungs, you can get lung cancer" L2; 22 May 2023; Ellon Times.*

b. *"Today we are launching a Twitter campaign…to get national screening. James started the fight for it. Unfortunately, he is not here, and I am just happy to pick up the mantle. M20; 21 July 2022; MailOnline.*

c. *"The LUMEN project provides people living in Carmarthenshire, who are experiencing respiratory problems either as smokers or non-smoker, with direct access to a specialist nurse who can discuss symptoms, and if appropriate refer them directly for further investigations." L8; 11 November 2022; South Wales Guardian.*

Box 15. Fundraising with supportive initiative.

Box 15

a. *"Ayrshire pub workers and customers raise over £2k…He underwent chemotherapy for months in a bid to shrink the tumours in his lungs and prolong his life". T4; 6 January 2023; dailyrecord.co.uk.*

b. *"Even with good medical insurance, the costs of long-term care and daily expenses quickly sapped my savings…" M4; 28 March 2023; MailOnline.*

c. *"Michelle and her family are raising money in memory of her mum… starting a GoFundMe for a new radiotherapy machine that can detect problems like collapsed lungs and cancer in early stages" M5; 27 March 2023; Express Online.*

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