National Cancer Control Programme

Interventions to Enhance Public Awareness and Timely Help-Seeking for Cancer Symptoms

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Prepared by PRiCAN Research Team, Department of General Practice, RCSI

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2. Executive Summary

Cancer remains a leading cause of morbidity and mortality worldwide, with late-stage diagnoses contributing to poorer outcomes. Public awareness of cancer symptoms is considered a key factor in promoting earlier help-seeking behaviour and timely diagnosis. However, evidence on the effectiveness of awareness interventions remains mixed, with limited consensus on the most effective strategies.

This report synthesises findings from a systematic review of interventions designed to enhance public awareness of cancer symptoms and encourage early presentation. The review evaluates a range of intervention types, their impact on knowledge, behaviour, and healthcare utilisation, and identifies key challenges in translating awareness into improved cancer outcomes.

Key Findings and Recommendations

1. **Direct Engagement is More Effective than Passive Awareness Campaigns**
   Interventions involving direct, interactive engagement—such as small-group education and one-on-one sessions—were more effective at influencing behaviour than broader, passive campaigns.[1][2][3]
   - **Recommendation**: Prioritise community and educational initiatives that involve direct, interactive engagement to maximise behaviour change.
2. **Actionable Messaging Enhances Impact**
   Campaigns that included clear, practical messages about symptoms and the importance of early detection had a greater influence on healthcare-seeking behaviour than those providing general information.[2][3]
   - **Recommendation**: Design campaigns with clear, action-oriented messaging to effectively prompt healthcare-seeking behaviour, tailored to the audience's context.
3. **Repeated Exposure Reinforces Behaviour Change**
   Interventions incorporating multiple follow-ups showed better knowledge retention and sustained behavioural change compared to one-off campaigns.[4]
   - **Recommendation**: Implement multiple follow-up points in campaign evaluations to enhance long-term knowledge retention and reinforce behaviour change.

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[1] Hughes-Hallett T, Browne D, McElduff P, et al. Evaluation of the "Be Clear on Cancer" campaign: Impact on symptom awareness and referrals for urological cancers. **Br J Cancer**. 2016;115(1):15-22. DOI: 10.1038/bjc.2016.203.

[2] McCutchan GM, Wood F, Edwards A, et al. Impact of symptom awareness campaigns on lung cancer referrals: A systematic review and evaluation. **Thorax**. 2019;74(6):531-539. DOI: 10.1136/thoraxjnl-2018-212539.

[3] Ahmad F, Malik S, Fatima N, et al. Peer-led cancer awareness workshops in rural Pakistan: A pilot intervention study. **J Cancer Educ**. 2021;36(3):530-538. DOI: 10.1007/s13187-020-01775-3.

[4] Nguyen HQ, Carrieri-Kohlman V, Ghaemmaghami C, et al. Effectiveness of multi-modal campaigns for gastrointestinal cancer symptom awareness. **Public Health Nurs**. 2019;36(2):123-133. DOI: 10.1111/phn.12562.

4. **Targeted Messaging Improves Effectiveness**
   Campaigns tailored to specific demographic groups—such as by age, gender, or risk profile—were more successful in prompting healthcare engagement.[56]
   - **Recommendation**: Develop targeted messaging strategies tailored to specific demographic needs to increase relevance and impact.
5. **Multi-Modal Approaches Extend Reach and Effectiveness**
   Interventions that combined mass media with local, interactive components (e.g., community workshops or digital engagement) had the greatest impact.[57]
   - **Recommendation**: Invest in multi-modal strategies that integrate media campaigns with community education efforts to create a comprehensive approach to raising awareness.

Conclusion

While public awareness campaigns can increase knowledge of cancer symptoms and encourage healthcare-seeking behaviour, evidence on their impact on earlier diagnosis and survival remains inconclusive. Future initiatives should focus on interactive, tailored, and multi-modal approaches while incorporating robust evaluation methods to assess their effectiveness in improving cancer outcomes.

[5] Brown KF, Rumgay H, Dunlop C, et al. Tailored cancer awareness campaigns: Impact on knowledge and behavior in high-risk populations. **Int J Cancer**. 2020;147(5):1315-1327. DOI: 10.1002/ijc.32999.
[6] Patel V, Vani S, Kumar M, et al. Mobile health (mHealth) interventions for symptom awareness: A randomized trial in India. **BMC Public Health**. 2018;18(1):1132. DOI: 10.1186/s12889-018-6063-5.
[7] Saab MM, Reidy M, Hegarty J, et al. Evaluation of a community-based intervention to improve prostate cancer awareness. **Cancer Nurs**. 2018;41(5). DOI: 10.1097/NCC.0000000000000589.

3. Systematic Review of Interventions to Enhance Public Awareness of Cancer Symptoms

3.1 Introduction

Cancer remains a major global health challenge, with approximately 20 million new cases and nearly 10 million deaths reported annually (1). It is the second leading cause of premature mortality across 127 countries and is projected to become the leading cause of death worldwide in the coming decades, surpassing cardiovascular disease (2)(3). Early detection is crucial, as it is associated with improved outcomes, including reduced mortality (4,5), lower morbidity (4), enhanced quality of life (4), and decreased healthcare costs (6-10).

Interventions to Promote Early Detection

Strategies to promote early detection fall into two broad categories:

1. **Screening programmes** - These identify cancer in asymptomatic individuals, such as breast and cervical cancer screening. While effective in certain populations, screening accounts for a minority of diagnoses. In Ireland, between 2017 and 2019, only 25% of breast cancers, 32% of cervical cancers, and 6% of colorectal cancers were detected through screening programmes, representing just 5% of all incident invasive cancer cases (excluding non-melanoma skin cancer) (11-13) (5).
2. **Awareness and early presentation interventions –** These aim to encourage symptomatic individuals to seek medical attention earlier. Approaches include public symptom awareness campaigns, healthcare professional education, decision support tools, and system-level changes, such as improved referral pathways. Given that over 90% of cancers present symptomatically, interventions in this category are critical for earlier diagnosis.

The Role of Public Awareness Campaigns

Public awareness campaigns seek to increase recognition of cancer symptoms, reduce delays in seeking medical advice, and improve diagnostic outcomes (14). Various approaches are employed in these campaigns (15), including community education sessions (16), printed informational materials (17), decision aids (6,18), telephone consultations (19,20), and mass media campaigns (21).

While studies report increased awareness following such campaigns (14,15,22–24), translating awareness into earlier diagnosis and improved survival remains a challenge (25,26). For example, the UK's Be Clear on Cancer campaign increased primary care consultations but did not demonstrate a measurable impact on cancer survival rates (27,28). Barriers such as socioeconomic disparities, fear of a cancer diagnosis, and concerns about overburdening healthcare services may limit their effectiveness (3,28,29).

Challenges and the Need for Updated Evidence

Despite the widespread implementation of public awareness interventions, there is limited comprehensive evaluation of their overall impact on cancer outcomes. The last broad systematic review of symptom awareness interventions across multiple cancer types was published in 2009 (14), with subsequent reviews focusing on specific cancers or settings (3,25). Consequently, there is a gap in synthesising evidence across different populations and tumour types.

The need for an updated review is clear. Over the past decade, public health communication strategies have evolved, digital platforms have become more prominent, and health inequalities have gained greater recognition. The COVID-19 pandemic further disrupted cancer diagnoses and care pathways, potentially altering the effectiveness of existing interventions (30). This report aims to provide an updated synthesis of the evidence, adopting a tumour-cluster approach to evaluate awareness interventions by cancer type and inform tailored public health strategies.

Aim and Objectives

This systematic review evaluates the effectiveness of interventions designed to enhance public awareness of cancer symptoms, focusing on their impact on help-seeking behaviour and diagnostic outcomes. The findings will inform the development of evidence-based public health strategies for early cancer detection.

Objectives

1. **To systematically identify and evaluate existing literature** on interventions designed to increase public awareness of cancer symptoms across different tumour clusters, focusing on comparative study designs that include randomised and non-randomised studies as well as before-and-after studies.
2. **To assess the effectiveness of awareness interventions** in improving key outcomes, specifically focusing on earlier help-seeking behaviour, cancer-specific mortality rates, and the stage at diagnosis.
3. **To analyse trends in intervention types and outcomes**, covering a range of strategies such as community-based education, digital media campaigns, and other awareness-raising approaches.
4. **To identify barriers to effective help-seeking behaviour** that may hinder the translation of increased awareness into improved health outcomes. This includes examining the influence of socioeconomic factors, healthcare system limitations, and individual-level concerns.
5. **To highlight gaps in the current evidence base**, particularly regarding understudied cancer types, populations, or geographic regions, in order to inform future research priorities and funding allocations.
6. **To synthesise findings and provide actionable recommendations** for policymakers and healthcare providers, supporting the development of targeted public health strategies to enhance early detection of symptomatic cancers.

3.2 Methods

This systematic review was conducted following a pre-specified protocol (31), and adhered to the Cochrane Handbook for Systematic Reviews of Interventions and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (32) (33).

Eligibility Criteria

Only comparative studies involving adults, over 18 years of age, published on or after November 2008, focused on interventions to increase awareness of cancer symptoms, with the intent to promote earlier presentation were included. Studies of interest included primary outcomes i.e. cancer mortality, stage at diagnosis, survival rate, as well as awareness outcomes, behavioural change outcomes, healthcare utilisation outcomes, and other clinical outcomes. Full details on the eligibility criteria used to operationalise our research question can be found in Table 1:

Table 1 Eligibility Criteria

Concept	Inclusion	Exclusion
Population	Adults (>18yo)	Children and adolescents (<18 years old)
Intervention	Any intervention to increase awareness of cancer symptoms, with the intent to promote earlier presentation	Screening interventions for asymptomatic individuals (e.g. interventions to promote screening/increase screening uptake)
Comparison	The absence of the stated intervention / "standard" public health practice	Non-comparative studies
Outcomes	**Primary outcomes:** 1. Cancer mortality 2. Stage at diagnosis 3. Survival Rate **Any other outcome, e.g.:** Awareness outcomes Behavioural change outcomes Healthcare utilisation outcomes Other clinical outcomes	
Study design	Comparative studies (interventional and observational), including before-and-after studies	Research designs without a comparison group
Additional	Publication year: since November 2008	Studies not published in English

Search Strategy

A comprehensive search was conducted across eight databases: MEDLINE, EMBASE, PsycINFO, Scopus, Web of Science, ProQuest, Cochrane Library, and CINAHL. The search strategy incorporated Medical Subject Headings (MeSH) and relevant keywords covering three core concepts: (1) cancer awareness, (2) early presentation, and (3) intervention. Filters were applied to limit the search to English-language publications from November 2008 to April 2024.

Reference lists of included studies and relevant systematic reviews were manually screened to identify additional studies. The full search strategy is provided in Appendix 2.

Study Selection

Two independent reviewers screened titles and abstracts for relevance using Rayyan, an online systematic review management tool (34). Studies deemed potentially eligible underwent full-text review against the predefined inclusion criteria. Discrepancies were resolved through discussion or consultation with a third reviewer. The screening process followed a structured algorithm (Table 2).

Table 2 Screening Algorithm including Exclusion Criteria

Step	Concept	Question	Exclusion label
1	Cancer	Does this paper deal with cancer?	"NotCancer" "NotPrimaryCancer"
2	Interventions	Does this paper look at interventions?	"NotIntervention"
3	Cancer awareness/ Early presentation	Does the intervention seek to (a) improve awareness of cancer symptoms, or (b) promote early presentation?	"NotSymptomAwarenessOrEarlyPresentation"
4	(INCLUDE)	If positive to all the above, then include	n/a

Data Extraction

A pre-piloted data extraction form was used to ensure consistency. One reviewer extracted data, which was then independently verified by a second reviewer. Data items extracted are outlined in Table 3.

Table 3 Extracted Study Items

Data Item	Sub-items
Publication Details	Authors
	Year of publication
Study context	Study location
	Study population (sociodemographics)
	Year the study was conducted
Intervention details	Cancer type(s)
	Intervention modality
	Duration
	Targeted behavioural change construct
Study details	Study design
	Comparison intervention
	Sample size
Outcomes	All reported outcomes
Additional information	Reported limitations
	Reported patient experience

Outcomes

The primary outcomes of interest were (1) the cancer-specific mortality rate and (2) the stage of cancer at the time of diagnosis, as defined by standard staging criteria (e.g., TNM classification).

Where both were reported, mortality rate was prioritised to avoid multiple comparison adjustments. Secondary outcomes included changes in public knowledge of cancer symptoms, alterations in health-seeking behaviour, and measures of healthcare utilisation (e.g., increased primary care visits, diagnostic referrals).

Quality Assessment

The quality of included studies was assessed using established tools according to study design. For randomised controlled trials, the Cochrane Risk of Bias tool was applied, while non-randomised studies were evaluated using the Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I) tool. Assessments considered selection bias, performance bias, detection bias, and reporting bias. Disagreements were resolved through discussion.

A Risk of Bias assessment was conducted for studies reporting clinical outcomes (cancer mortality and stage at diagnosis) and healthcare utilisation outcomes, as these were the most frequently reported and methodologically robust outcomes across included studies. However, a Risk of Bias assessment was not systematically conducted for certain other outcomes due to key limitations. For example, very few studies reported long-term survival data, and those that did often lacked sufficient follow-up duration or comparative analysis. Likewise, many studies reporting on public knowledge of cancer symptoms relied on self-reported awareness measures, which are subject to recall and social desirability bias. Behavioural changes were also difficult to verify objectively, and studies often lacked validated measures of patient

action following awareness interventions. The potential impact of these outcomes is discussed narratively with an emphasis on interpretational limitations due to possible biases in measurement and reporting.

Data Synthesis

A narrative synthesis approach was employed due to the heterogeneity in intervention types, study designs, and outcome measures. Where possible, studies were grouped by tumour cluster, intervention modality, and clinical or healthcare utilisation outcomes. Heterogeneity was assessed using the I^2 statistic, with values >50% indicating substantial variability. Given the high level of heterogeneity, a meta-analysis was not conducted.

Certainty of Evidence

The overall certainty of the evidence was assessed using the GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) framework. The assessment considered factors such as study design limitations, inconsistency of results, indirectness, imprecision, and potential publication bias. The findings were categorised as high, moderate, low, or very low certainty.

3.3 Results

Study Selection

A total of 12,579 studies were screened by three independent reviewers. After title and abstract screening, 407 studies underwent full-text review, and 132 studies met the inclusion criteria for final analysis (Figure 1). The included studies were assessed for:

- Publication trends (geographic distribution, year of publication).
- Cancer types studied.
- Study design and methodology.
- Types of interventions and communication mediums used.
- Reported effectiveness of interventions.

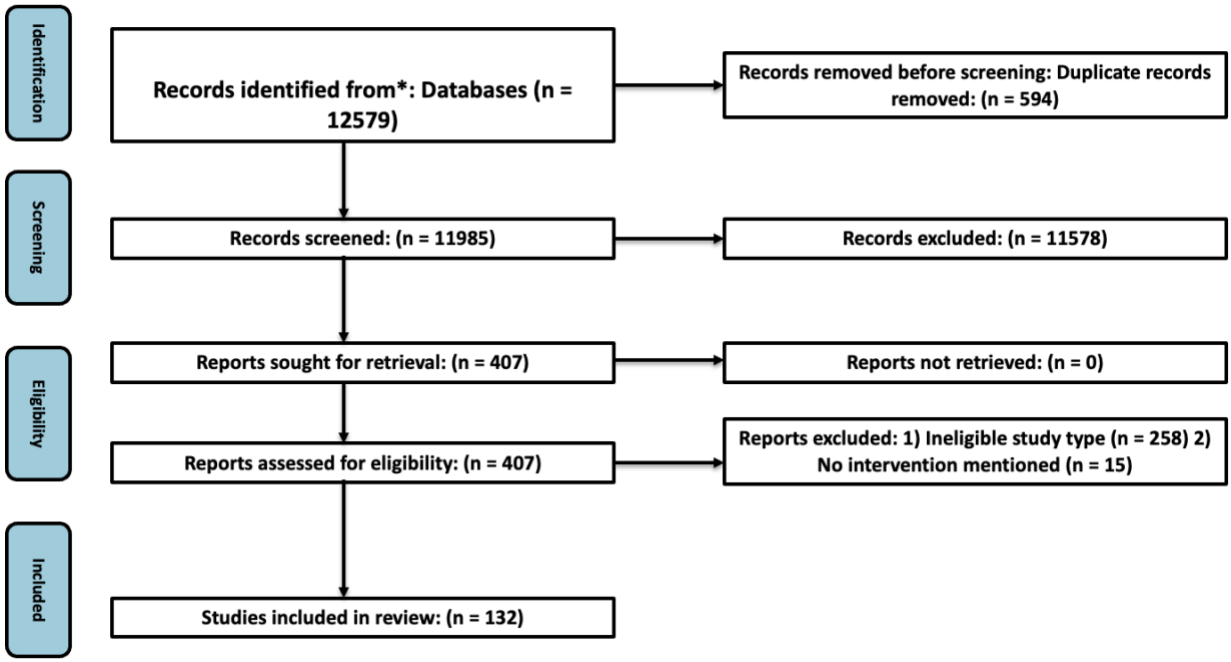

Figure 1 PRISMA Flow Diagram of Study Identification, Screening and Inclusion Process

Study Characteristics

The included studies covered a diverse range of cancer types, populations, and intervention modalities. Breast cancer was the most frequently studied, with 45 studies examining interventions targeting symptom awareness and early detection. Skin cancer was the next most commonly studied cancer type, with 23 studies, followed by gynaecological cancers (14 studies) and oral cancer (10 studies) (Figure 2).

In terms of geographic distribution, the United Kingdom accounted for the largest proportion of studies (41 studies), followed by the United States (20 studies). Research from other regions was more limited, with 10 studies conducted in India, 8 in Australia, and 5 in Iran (Figure 3). The years 2016, 2018, 2022 and 2023 published the most studies on the topic of this analysis, with 19 studies each year. The additional years with publications can be seen in Figure 4.

The majority of studies employed a before-and-after design (73 studies), assessing changes in awareness and behaviour over time. Randomised controlled trials (26 studies) provided higher-quality evidence on intervention effectiveness, while retrospective cohort studies (7 studies) and pilot studies (6 studies) contributed additional insights into feasibility and implementation (Table 4).

Table 4 Study Design and Frequency

Frequency	Before-and-after
26	Randomised Control Trial
2	Randomised Comparative Trial
1	Randomised Factorial Experiment
73	Before-and-after
1	Mathematical modelling
3	Cross sectional
2	Prospective Cohort Study
7	Retrospective Cohort Study
1	Interventional Cohort Study
1	Community Engaged Qualitative Study
6	Pilot Study
1	Controlled Interventional Study
1	Content Analysis Study
1	Conceptual Framework
3	Non-equivalent Control Group
2	N/A

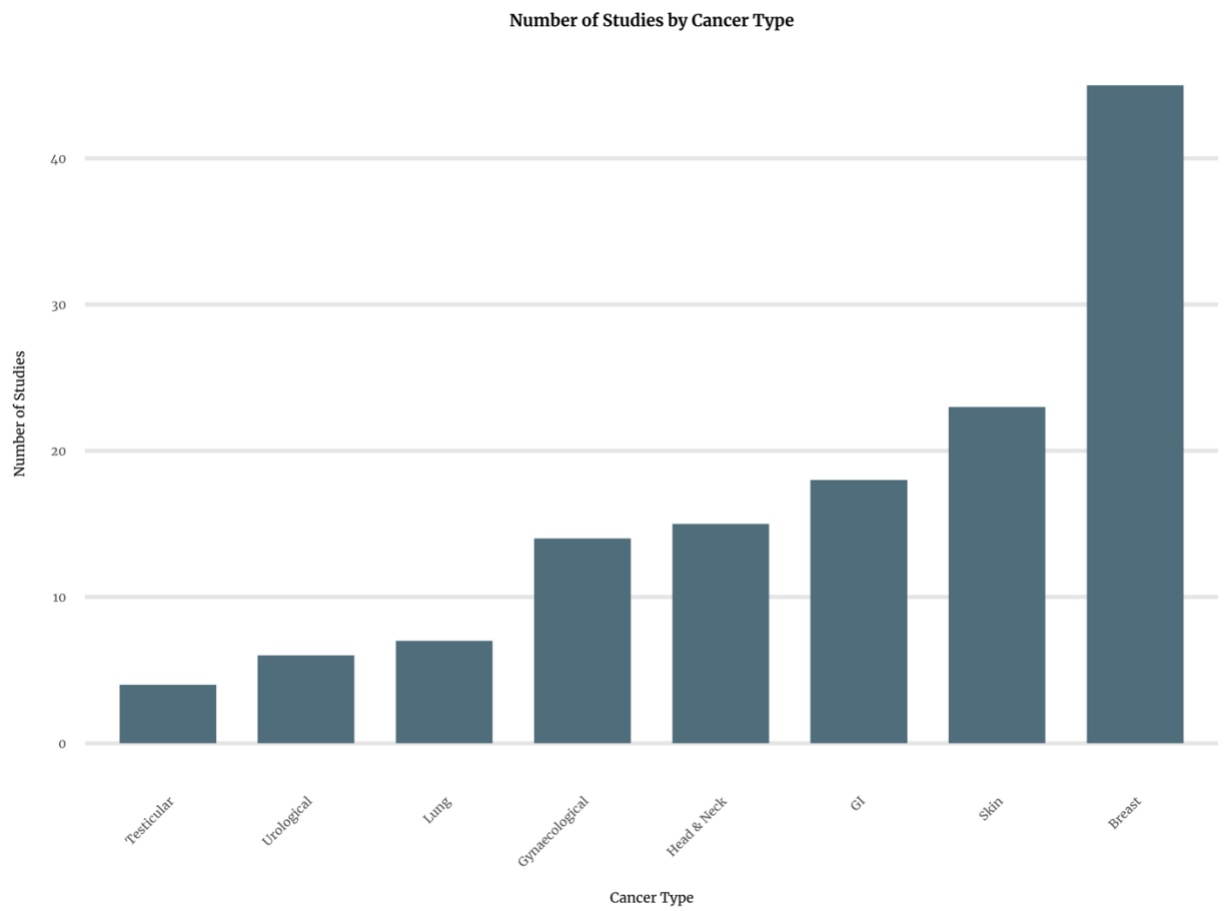

Figure 2 Cancer Type and Frequency

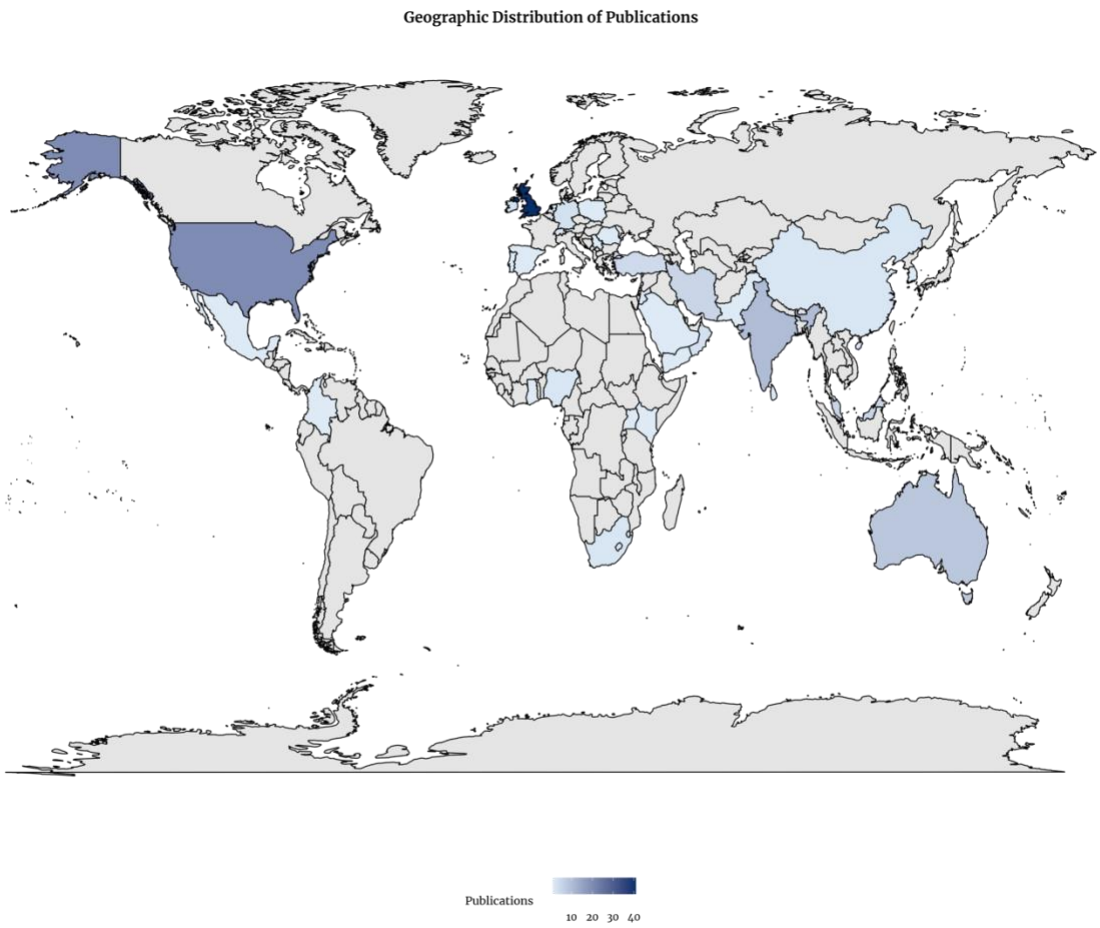

Figure 3 Geographic Locations of Publications

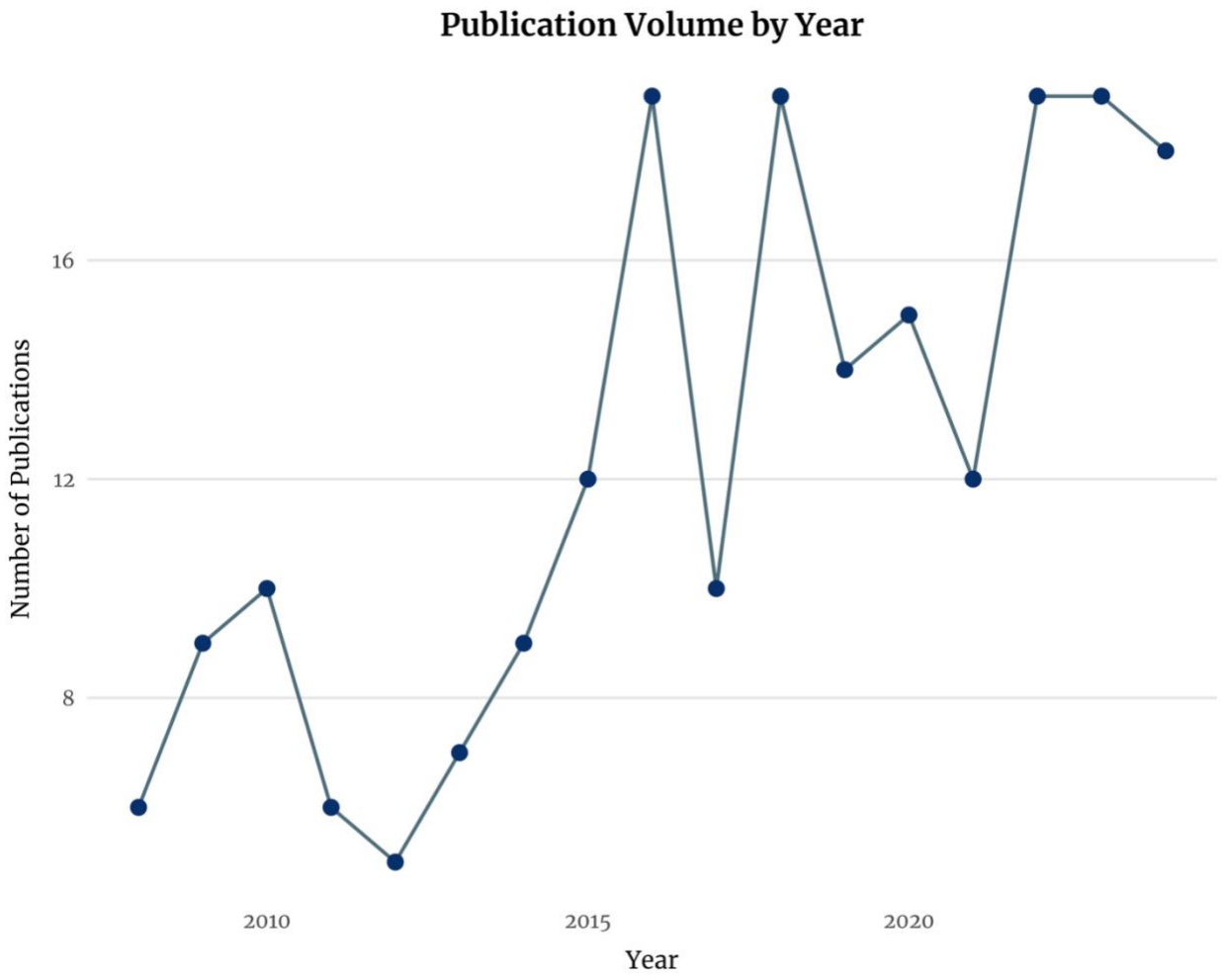

Figure 4 Publication Volume by Year (Adjusted 2008 and 2024)

Intervention Types and Communication Mediums

Interventions used a variety of approaches to increase public awareness of cancer symptoms and encourage early help-seeking. Community-based interventions were the most commonly implemented, appearing in 42 studies. These typically involved in-person education, peer-led workshops, and broader community engagement initiatives aimed at enhancing knowledge and reducing barriers to early presentation.

Multi-faceted campaigns were identified in 41 studies and combined media-based strategies with educational components, reflecting an effort to reinforce messaging through multiple channels. Mass media interventions, which included television, radio, and social media campaigns, were reported in 26 studies, focusing on broad public engagement. Individual education sessions, delivered through clinician-

led discussions or targeted educational materials, were described in 14 studies. In contrast, print media campaigns were the least common, appearing in only 4 studies, suggesting a decline in reliance on static informational materials such as leaflets, posters, and newspaper articles (Figure 5).

Several well-known public health campaigns were frequently cited in the included studies. The "Be Clear on Cancer" campaign was referenced in 13 studies, making it the most commonly evaluated named intervention. Other named campaigns included the Cancer Patient Empowerment Program (PEP), which appeared in 5 studies, and The Pink Chain Campaign, which was evaluated in 2 studies (Table 5).

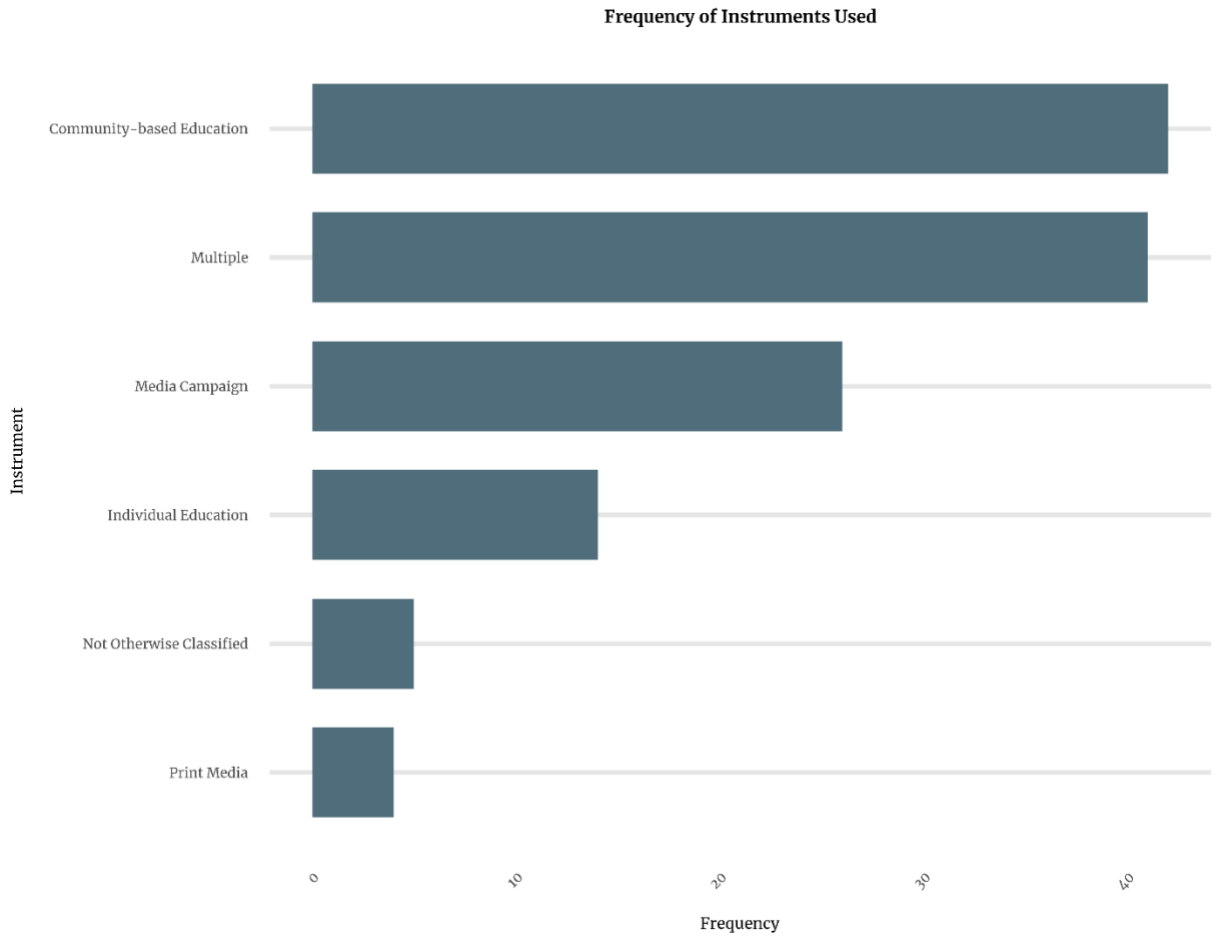

Figure 5 Medium of Communication

Table 5 Campaign Names and Frequency

Campaigns	Frequency
No campaign name	88
PEP (Cancer Patient Empowerment Program)	5
Be Clear on Cancer	13
Pink Chain Campaign	2
Find Cancer Early	1
Open up to	1
Early Detection of Cancer	1
Be cancer alert	1
ABACus Health Check Initiative	1
Healthy communities	1
Check yo nutz	1
West of Scotland Cancer Awareness	1
Jordan Breast Cancer Program	1
We Are a Powerful Movement	1
Breast Care International (BCI)	1
NCCCP	1
Know Your Lemons	1
OnkoLogika	1
Check it out	1
Cervixcheck	1
SHEP Education Program	1
Look Show and Test	1
Mouth cancer awareness	1
The Croaky Voice Campaign	2
Get the Facts about Gynecological Cancer	1
Welsh Be Clear on Cancer	1
UK National Bowel Cancer Awareness Campaign	1
CRC awareness campaign	1

Effectiveness of Cancer Awareness Interventions

The effectiveness of cancer awareness interventions varied across tumour clusters, influenced by differences in intervention delivery, target populations, and healthcare system contexts. While many studies reported improvements in symptom awareness and healthcare-seeking behaviours, the evidence linking these interventions to earlier-stage diagnoses or improved survival outcomes remains inconsistent. This section synthesises key findings by cancer type, focusing on intervention effectiveness and limitations.

Breast Cancer

Interventions targeting breast cancer symptom awareness have been extensively studied, with peer-led education and community-based strategies emerging as the most effective approaches. Yurt et al. (2019) evaluated a three-month peer-education programme in Turkey, comparing interactive seminars with static print campaigns. While print materials modestly increased knowledge, they had little effect on self-examination practices or intentions to seek mammography screening. In contrast, the peer-led approach significantly improved self-efficacy and reduced perceived barriers to seeking medical advice. Similarly, Ahmad et al. (2021) examined a rural intervention in Pakistan and found a 40% increase in symptom knowledge and a corresponding rise in clinic attendance for suspected symptoms. These findings highlight the importance of interactive and culturally relevant educational methods in promoting early detection behaviours.

Gastrointestinal (GI) Cancers

Public health campaigns targeting gastrointestinal (GI) cancers, including colorectal and oesophageal cancers, demonstrated varying success in influencing patient behaviour. A systematic review by Brown et al. (2020) found that interventions incorporating demographic-specific messaging—particularly for older adults and socioeconomically disadvantaged populations—resulted in a 40% improvement in symptom awareness and a 20% increase in primary care consultations. However, interventions relying solely on print materials had only modest effects on symptom recognition and were less effective in prompting healthcare-seeking behaviour. Multi-component campaigns that combined community-based workshops with media outreach achieved greater engagement, particularly when follow-up mechanisms were incorporated to reinforce awareness. These findings suggest that tailored messaging and sustained engagement strategies are necessary for maximising impact.

Gynaecological Cancers

Digital interventions have shown promise in increasing awareness of gynaecological cancers, particularly in settings where access to healthcare is limited. Patel et al. (2018) assessed a six-week mobile health (mHealth) intervention in India, which used interactive SMS campaigns to deliver symptom-related information. The intervention resulted in a 25% increase in clinic visits, outperforming traditional leaflet-based awareness campaigns. However, McCutchan et al. (2019) found that mass media campaigns alone had limited impact on early-stage diagnoses, suggesting that broad media outreach needs to be supplemented with localised, interactive components. The combination of digital engagement with in-

person education may improve accessibility and healthcare-seeking behaviour, particularly for marginalised populations.

Testicular Cancer

Educational interventions for testicular cancer awareness primarily focused on promoting testicular self-examination (TSE). Ryszawy et al. (2022) and Shallwani et al. (2010) found that structured video-based interventions improved knowledge retention of TSE practices. Similarly, Saab et al. (2018) reported that virtual reality-based interventions enhanced engagement and increased self-reported adherence to self-examination routines. However, these studies lacked long-term follow-up, making it unclear whether improved awareness led to earlier-stage diagnosis. While referral rates for suspected abnormalities increased in groups exposed to structured educational interventions, there was no clear evidence linking these referrals to improved diagnostic outcomes. These findings suggest that while educational campaigns are effective in raising awareness, further research is needed to determine their impact on clinical outcomes.

Urological Cancers

The UK's Be Clear on Cancer campaign has provided some of the most robust evidence on the impact of large-scale, multi-faceted interventions. Hughes-Hallett et al. (2016) reported that television, radio, and print campaigns promoting awareness of haematuria—a potential symptom of bladder and kidney cancer—resulted in a 53.2% increase in referrals for haematuria-related symptoms. However, no significant stage shift was observed, likely due to the short campaign duration and the slow progression of many urological cancers. This finding underlines the challenge of demonstrating measurable clinical benefits from awareness campaigns within limited timeframes. Sustained, iterative interventions may be required to achieve long-term improvements in early detection and clinical outcomes.

Skin Cancer

Interventions encouraging skin self-examination (SSE) have yielded mixed results regarding early skin cancer detection. Janda et al. (2013) conducted a randomised controlled trial evaluating a video-based SSE intervention and found that while there was no significant difference in overall clinical skin examination (CSE) attendance between intervention and control groups, participants in the intervention group had higher rates of full-body CSEs and diagnosed malignant lesions. Robinson et al. (2016) also reported that structured SSE training improved melanoma detection rates; however, this also contributed to overdiagnosis of benign lesions. Cost-effectiveness concerns were raised by Gordon et al. (2017), who found that increased melanoma detection through educational interventions resulted in higher healthcare costs without a clear survival benefit. These findings suggest that while awareness interventions can improve detection rates, they should be carefully designed to avoid unnecessary procedures and healthcare burden.

Head & Neck Cancer

Public awareness interventions for head and neck cancers frequently employed multi-modal strategies, integrating mass media with healthcare professional education. Sethi (2016) and Ismail (2012) found that such interventions increased patient inquiries about oral cancer screening and led to a rise in urgent two-week referrals from primary care. Evans (2024) examined the effectiveness of virtual workshops for healthcare professionals, reporting improved knowledge of human papillomavirus (HPV)-associated oropharyngeal cancers. This approach has potential implications for increasing HPV vaccination uptake and early detection efforts. However, mass media campaigns alone showed inconsistent effects on diagnostic rates, with Al Dahli (2020) reporting increased awareness without corresponding improvements in early-stage detection. Stronger evidence supports the integration of public awareness initiatives with professional education and primary care engagement.

Lung Cancer

Mass media campaigns aimed at raising awareness of lung cancer symptoms have been effective in increasing healthcare engagement. Studies by Ironmonger (2015) and McCutchan (2020) found that television, radio, and print media campaigns led to significant increases in GP consultations for persistent coughs and higher rates of diagnostic imaging, including chest X-rays and CT scans. However, evidence linking these campaigns to earlier-stage diagnoses remains limited. McCutchan (2020) reported no significant difference in the proportion of early- versus late-stage lung cancers following campaign implementation. Similarly, Ironmonger (2015) observed a modest 4% increase in one-year survival in intervention areas, though this was not statistically significant compared to non-intervention regions. These findings suggest that while mass media campaigns are effective in prompting GP consultations, their impact on survival and early detection remains uncertain. Further research is needed to assess their long-term effectiveness.

Cross-Cancer Findings

Across different tumour clusters, several key patterns emerged regarding intervention effectiveness. While print media contributed to raising awareness, its standalone impact was often limited. Multi-modal approaches, particularly those combining mass media with interactive or community-based strategies, tended to be more effective in sustaining engagement and encouraging behaviour change. In addition, interventions tailored to specific demographic groups—such as peer-led education for breast cancer or digital tools for gynaecological cancer awareness—were more successful in prompting healthcare-seeking behaviour than broad, untargeted campaigns.

However, a common limitation across studies was the lack of long-term follow-up data. Many interventions successfully increased short-term awareness and healthcare utilisation, but their effects on earlier-stage diagnoses and survival remain uncertain. The findings highlight the need for future research to incorporate longitudinal assessments and routine healthcare data linkages to evaluate the sustained impact of awareness interventions on clinical outcomes.

Table 6 Findings from Individual Studies for Community Education Sessions
Click here to view table

Table 7 Findings from Individual Studies for Broadcast and Outdoor Media Campaigns

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Table 8 Findings from Individual Studies for Individual Health Education Sessions

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Table 9 Findings from Individual Studies for Multi-Faceted Campaigns

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Table 10 Findings from Individual Studies for Print Media Campaigns

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Table 11 Master Table of Included Studies

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Synthesis of Findings

Across tumour clusters, awareness campaigns that combined multimedia approaches with direct community outreach demonstrated greater effectiveness in improving public engagement and knowledge outcomes. Interventions incorporating in-person educational sessions were particularly effective in increasing awareness and modifying attitudes, outperforming those reliant solely on digital or print media. However, the extent to which these interventions translated into meaningful clinical outcomes—such as earlier-stage diagnoses or improved survival—varied depending on cancer type, healthcare system accessibility, and the availability of long-term follow-up data.

For breast and testicular cancers, peer-led education and interactive workshops consistently resulted in improved knowledge and self-examination practices. However, the absence of long-term follow-up in most studies limits the ability to determine whether these changes translated into earlier detection or survival benefits. Similarly, community-based interventions targeting lung and gastrointestinal cancers achieved high levels of engagement, particularly among underserved populations. While these interventions successfully increased healthcare-seeking behaviour, evidence of their impact on reducing late-stage diagnoses or improving mortality outcomes was largely inconclusive. This aligns with broader findings indicating that while symptom awareness campaigns can influence knowledge and consultation rates, their effectiveness in reducing advanced-stage cancer diagnoses remains uncertain.

In contrast, urological and skin cancer interventions, particularly those incorporating mass media campaigns, demonstrated measurable increases in healthcare utilisation. Campaigns such as the UK's *Be Clear on Cancer* led to higher referral rates for haematuria and increased clinical skin examinations, reflecting heightened public awareness and engagement with healthcare services. However, these

improvements did not always result in a significant stage shift at diagnosis, raising concerns about the long-term sustainability and clinical impact of such interventions. Cost-effectiveness analyses of skin cancer awareness initiatives further highlighted the potential drawbacks of increased screening, including overdiagnosis of benign lesions and unnecessary healthcare costs without clear survival benefits.

A recurring limitation across studies was the short duration of follow-up, which restricted the ability to assess long-term trends in cancer staging and mortality. This issue was particularly evident for rarer cancers and those with slow progression, where shifts in diagnostic stage would require extended observation periods. Some awareness campaigns did not incorporate sufficient follow-up mechanisms to track outcomes such as stage at diagnosis or survival, making it difficult to determine their overall effectiveness in improving clinical pathways. Addressing this gap through longer-term evaluations and integration with routine healthcare data could strengthen the evidence base and provide a clearer understanding of intervention effectiveness.

Beyond campaign design, health system capacity remains a crucial factor in determining the impact of awareness initiatives. Even when interventions successfully increase symptom recognition and healthcare engagement, delays in diagnostic pathways and resource constraints can limit their ultimate benefit. Improving healthcare system responsiveness—such as enhancing primary care referral pathways, reducing diagnostic wait times, and ensuring equitable access to services—may play a greater role in improving cancer outcomes than awareness efforts alone. Addressing barriers such as fear of diagnosis, socioeconomic disparities, and health system bottlenecks is therefore essential to ensuring that increased awareness translates into meaningful improvements in early detection and survival.

Taken together, these findings suggest that multi-faceted, community-integrated approaches are the most effective in promoting symptom awareness and encouraging early healthcare engagement. However, future interventions should be designed with long-term sustainability in mind, incorporating extended follow-up periods, health system capacity-building, and targeted strategies for high-risk populations to maximise their clinical impact

Reporting Biases

Several biases were identified across the reviewed studies, potentially affecting the perceived effectiveness of cancer awareness interventions. Many studies selectively emphasised positive findings while failing to report null or negative results, leading to publication bias. Self-reported behaviour changes were frequently used as outcome measures, introducing measurement bias, particularly in studies evaluating awareness and healthcare-seeking intentions. Without independent verification of healthcare actions—such as confirmed screening attendance or early-stage diagnoses—the reliability of these findings remains uncertain. A formal Risk of Bias assessment was conducted for clinical and healthcare outcomes; however, inconsistencies in study design and the lack of long-term follow-up limited its applicability to other reported outcomes. Addressing these biases through greater transparency, incorporation of neutral findings, and routine healthcare data integration would improve the evidence base. A Risk of Bias assessment of clinical and healthcare utilisation outcomes across tumour clusters can be seen in Figure 6.

Cancer-Specific Biases

For breast cancer, studies often reported increases in knowledge and screening uptake but failed to assess whether these changes translated into earlier-stage diagnoses. Many relied on self-reported behavioural changes without independent verification, while passive interventions (e.g., print campaigns) were sometimes deemed effective based on recall surveys alone.

In gastrointestinal cancers, research frequently focused on healthcare utilisation metrics—such as increases in two-week wait referrals—without assessing whether these referrals led to earlier detection or improved outcomes. Additionally, there was limited discussion of the potential strain on diagnostic services, such as increased endoscopy demand.

For gynaecological cancers, studies prioritised engagement metrics (e.g., app downloads, message views) rather than clinical endpoints. Many digital interventions reported increased willingness to attend screening but did not verify whether individuals followed through.

In urological cancers, the *Be Clear on Cancer* campaign led to increased referrals for haematuria, but there was little evidence of stage shift. Some researchers raised concerns that heightened awareness may have contributed to overdiagnosis of benign conditions rather than meaningful improvements in early detection.

Skin cancer studies often focused on increases in self-reported sun protection behaviours and screening participation, without addressing the risk of overdiagnosis, particularly for non-melanoma skin cancers. Cost-effectiveness analyses were frequently missing, despite concerns that heightened screening could lead to unnecessary healthcare expenditure.

For testicular cancer, many studies relied on convenience sampling, particularly among university students, limiting the generalisation of findings to broader populations. Studies incorporating virtual reality and mobile health interventions reported high engagement, but there was limited discussion on whether these were more effective than traditional education methods in influencing real-world behaviour.

In head and neck cancer, studies showed inconsistencies in reporting outcomes. While some provided detailed analyses of referral rates and diagnostic trends, others relied on knowledge surveys without assessing whether awareness improvements led to earlier clinical presentations. The reliance on uncontrolled pre-post study designs also introduced potential confounding, as broader healthcare trends may have influenced observed changes.

For lung cancer, mass media interventions increased GP consultations and diagnostic imaging, but evidence linking these changes to improved survival or earlier-stage diagnoses was weak. Many studies focused on the immediate impact of campaigns, with limited long-term follow-up to assess clinical benefits. Additionally, there was a lack of stratified analysis exploring the differential impact of interventions across socioeconomic and demographic groups, potentially masking disparities in healthcare access.

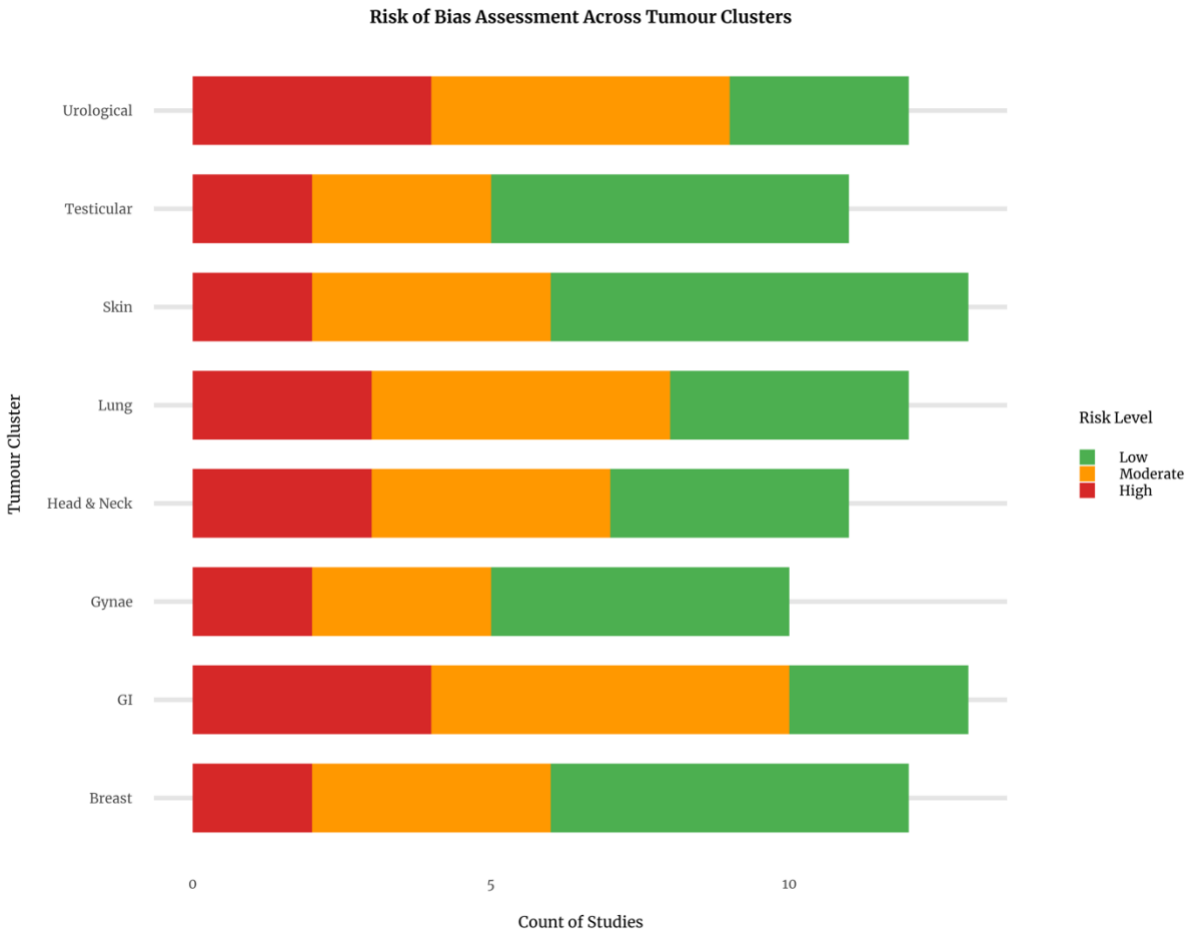

Figure 6 Risk of Bias Across Tumour Clusters

Certainty of Evidence

The evidence quality varied across studies. While randomised controlled trials provided higher certainty, many before-and-after studies lacked control groups, reducing the overall certainty of conclusions. Knowledge and engagement outcomes are relatively robust, however, there is lower certainty in sustained behavioural and healthcare utilisation impacts in part due to short follow-up periods. Longitudinal data to confirm long-term impacts on behaviour and health outcomes were generally lacking across studies. A GRADE assessment of the certainty of evidence involving healthcare utilisation and clinical outcomes across tumour clusters can be seen in Table 12.

Table 12 GRADE Assessment of Healthcare Utilisation and Clinical Outcomes

GRADE Assessment: Healthcare Utilisation			
Tumour Cluster	**Outcome**	**Studies Included**	**Average Final Grade**
Breast	Healthcare Utilisation	Mazari et al, Lyon et al, Gaddigi et al, Eberhardt et al	Very Low
Lung	Healthcare Utilisation	Ironmonger 2015, McCutchan 2020, Moffat 2015	Low
GI	Healthcare Utilisation	Peacock 2013, Hall 2016, Khong 2015, Pande 2014, Lyon 2009, Koo 2017, Torrance 2021	Low
Gynae	Healthcare Utilisation	Shankar 2015, Kocaöz 2018, Ijezie 2022, Hombaiah 2020, Drukow 2021, Interis 2015	Very Low
Skin	Healthcare Utilisation	Walton et al 2014, Gordon et al 2017, Janda et al 2013, Rowell et al 2017	Low
Urological	Healthcare Utilisation	Matshela 2014, Molazem 2018, Hughes-Hallett 2020, Emery 2017, Merriel 2022, Laake 2021	Moderate
Testicular	Healthcare Utilisation	Ryszawy et al, Saab et al, Ugwumba et al, Ibrahim et al	Low
Head & Neck	Healthcare Utilisation	Mistry 2017, Al Dhahli 2020, Al Kahiry 2016, Ghani 2019, Sethi 2016, Evans 2024, Ismail 2012	Very Low

GRADE Assessment: Clinical Outcomes			
Tumour Cluster	**Outcome**	**Studies Included**	**Average Final Grade**
Breast	Clinical Outcomes	Emery et al, Mazari et al, Gadgil et al, Eberhardt et al, Lyon et al	Low
Lung	Clinical Outcomes	McCutchan 2020, Ironmonger 2015, Moffat 2015	Low
GI	Clinical Outcomes	Peacock 2013, Hall 2016, Khong 2015, Pande 2014, Lyon 2009, Koo 2017, Torrance 2021	Low
Gynae	Clinical Outcomes	Shankar 2015, Kocaöz 2018, Ijezie 2022, Hombaiah 2020, Drukow 2021, Interis 2015	Very Low
Skin	Clinical Outcomes	Janda et al, Rowell et al, Walton et al, Robinson et al, Meyer et al, Kauffman et al	Low
Urological	Clinical Outcomes	Matshela 2014, Molazem 2018, Hughes-Hallett 2020, Emery 2017, Merriel 2022, Laake 2021	Moderate
Testicular	Clinical Outcomes	Ryszawy et al, Saab et al, Ugwumba et al, Ibrahim et al	Low
Head & Neck	Clinical Outcomes	Mistry 2017, Al Dhahli 2020, Al Kahiry 2016, Ghani 2019, Sethi 2016, Evans 2024, Ismail 2012	Very Low

3.4 Discussion

Summary of Findings

This review demonstrates that public health campaigns can enhance cancer symptom awareness and encourage healthcare-seeking behaviours, often leading to increased healthcare utilisation. However, no clear evidence supports a direct impact on earlier-stage diagnoses or mortality reduction. The effectiveness of interventions varied across cancer types, delivery methods, and healthcare system contexts, highlighting the need for more targeted, sustainable strategies.

Interventions that integrated diverse media channels with in-person or community-based education achieved higher public engagement and knowledge transfer than those reliant on mass media or static materials alone. Increased healthcare utilisation, including higher referral rates and self-examinations, suggests that these campaigns can prompt short-term public action. However, their long-term impact remains uncertain, as sustained behaviour change often requires ongoing reinforcement—particularly for cancers with long latency periods, where continuous symptom awareness is essential for early detection.

Despite these positive trends, no interventions demonstrated a measurable effect on cancer stage at diagnosis or survival outcomes. This suggests that awareness alone is insufficient without concurrent improvements in diagnostic pathways and healthcare accessibility. Barriers such as fear of diagnosis, socioeconomic disparities, and inefficiencies in referral systems may limit the effectiveness of symptom awareness interventions unless they are integrated with broader systemic improvements.

Context of Existing Knowledge

Traditionally, cancer awareness campaigns have been assessed based on mortality reduction and stage at diagnosis. However, these long-term clinical outcomes are influenced by multiple factors beyond awareness interventions, including healthcare access, diagnostic advancements, and treatment availability. The Be Clear on Cancer campaign, for example, has shifted away from measuring mortality and staging due to these challenges.

There has been a recent shift towards focusing on earlier indicators. These include focusing on public knowledge of cancer symptoms, self-reported intention to seek medical advice, diagnostic activity in primary care and the volume of urgent suspected cancer referrals. These upstream measures offer faster and more directly attributable insights into campaign effectiveness while minimising confounding factors. However, while they provide valuable short-term data, they must be supplemented by long-term studies to assess whether increased healthcare engagement translates into improved survival.

Limitations

Several methodological challenges affect the strength of the available evidence on cancer awareness interventions. A key limitation is the reliance on self-reported outcomes, with many studies measuring symptom awareness and healthcare-seeking behaviour through surveys. These methods introduce recall bias and social desirability bias, raising concerns about the reliability of reported behaviour changes. Additionally, few studies used objective healthcare data, such as routinely collected patient records or cancer registries, to verify whether interventions led to earlier-stage diagnoses or improved survival.

Short follow-up periods further limit the ability to assess sustained behavioural change and long-term clinical outcomes. Many studies focused on immediate post-campaign effects, such as increased GP visits or referral rates, without tracking whether these changes translated into earlier diagnoses or better survival rates. The exclusion of grey literature, including unpublished government reports and internal evaluations, presents another concern, as unsuccessful or neutral findings may be less likely to be published. This may have overestimated the effectiveness of interventions and contributed to publication bias.

The quality and design of included studies also varied considerably. Many employed before-and-after or observational designs without control groups, making it difficult to attribute observed effects directly to interventions. The COVID-19 pandemic likely exacerbated these methodological weaknesses, as research disruptions may have led to incomplete data collection and delays in publication. Taken together, these factors highlight the need for more rigorous evaluation methods. Future research should prioritise the use of randomised controlled trials, cohort studies with comparison groups, and linked datasets from healthcare systems to provide more reliable assessments of intervention impact.

Implications for Policy and Practice

Public health campaigns designed to increase cancer symptom awareness must be evidence-based and tailored to specific cancer types, populations, and healthcare contexts. The findings from this review suggest that multi-modal interventions—combining mass media with community engagement and healthcare professional involvement—are more effective in sustaining knowledge retention and prompting healthcare-seeking behaviour than standalone campaigns. However, increasing awareness alone is insufficient unless diagnostic pathways are streamlined, accessible, and responsive to increased demand.

Future awareness strategies should focus on high-risk populations, particularly those with low health literacy, financial or logistical barriers to care, and limited engagement with healthcare services. Socioeconomic factors play a significant role in healthcare-seeking behaviour, and one-size-fits-all approaches risk widening existing health disparities. Ensuring that campaigns reach underserved populations requires a targeted and context-sensitive approach, integrating tailored messaging with accessible referral pathways and improved support systems.

Campaign evaluation frameworks also need to shift towards more actionable, upstream indicators. While cancer staging and mortality remain important endpoints, they are influenced by multiple external factors and often require large-scale, long-term studies to assess accurately. Instead, measuring changes in public knowledge, symptom awareness, primary care consultations, and urgent suspected cancer referrals provides a more immediate and practically relevant assessment of intervention impact. These measures are also more adaptable to real-time public health decision-making, allowing for quicker adjustments to campaign strategies based on observed effectiveness.

Cancer Specific Considerations

For breast cancer, interventions have benefited from well-established screening programmes, which facilitate earlier detection. However, lung cancer awareness efforts face additional challenges due to

stigma, symptom ambiguity, and healthcare access barriers. Future strategies should focus on normalising discussions around lung cancer symptoms, particularly among high-risk populations such as smokers and lower-income groups, where delayed presentation is more common. Digital awareness campaigns, targeted primary care engagement, and integrating symptom awareness with early detection initiatives may improve effectiveness.

For gastrointestinal and urological cancers, many campaigns successfully increased symptom recognition but failed to achieve stage shifts, suggesting that diagnostic delays and referral inefficiencies remain key barriers. In these cases, public awareness efforts must be accompanied by strengthened diagnostic pathways, ensuring that healthcare capacity aligns with increased symptom recognition.

For testicular and skin cancers, awareness interventions have often focused on self-examination behaviours, but the evidence on whether these efforts lead to earlier diagnosis or improved outcomes remains inconclusive. Ensuring that public awareness messages are paired with accessible clinical validation opportunities, such as dermatologist-led screenings for skin cancer or targeted testicular examination guidance, may help bridge this gap.

For head and neck cancers, the strongest evidence supports healthcare professional education initiatives, particularly in primary care and dental settings, where these cancers are often first detected. Public awareness efforts have increased symptom recognition and primary care consultations, but their impact on diagnostic timelines and outcomes remains uncertain. Similarly, for gynaecological cancers, awareness campaigns have improved screening uptake for cervical cancer, yet low awareness of ovarian cancer symptoms persists. Strengthening GP training and clinical symptom recognition pathways may enhance early detection, particularly for cancers without established population-based screening programmes.

Recommendations for Future Research

Future studies must adopt more rigorous methodologies to address current limitations. There is a need for high-quality, controlled studies with long-term follow-up to assess the sustained impact of awareness interventions. Research should prioritise objective healthcare metrics, such as referral patterns, diagnostic stage shifts, and confirmed early-stage diagnoses, rather than relying on self-reported behaviour changes.

Cost-effectiveness analyses should be incorporated into campaign evaluations, as few studies have assessed whether increased healthcare engagement justifies intervention costs. Given finite public health resources, understanding which awareness strategies offer the greatest return on investment is essential for optimising future interventions.

Finally, there is an urgent need for research that focuses on underrepresented populations. Many awareness campaigns are designed for high-literacy, majority populations, yet socioeconomically disadvantaged and minority groups often experience the greatest delays in cancer diagnosis. Tailoring interventions to meet the needs of diverse populations is crucial for ensuring equitable access to early cancer detection.

Conclusion

This review highlights the potential of well-designed public awareness campaigns to increase cancer symptom recognition and encourage healthcare-seeking behaviour. However, the evidence does not demonstrate a clear association between awareness campaigns and improved clinical outcomes, such as earlier-stage diagnosis or reduced mortality. Raising awareness is only one component of an effective early detection strategy; meaningful impact requires targeted, multi-modal interventions that align with strengthened diagnostic pathways and healthcare system capacity.

Future public health strategies should prioritise tailored messaging, robust evaluation frameworks, and long-term monitoring to ensure that awareness efforts translate into meaningful improvements in cancer outcomes. By addressing existing gaps in evidence and focusing on high-risk populations, awareness campaigns can serve as catalysts for real improvements in early cancer detection and patient survival.

4. Infographic

Effectiveness of Direct Engagement

Interventions involving direct engagement (e.g., small group education, one-on-one sessions) demonstrated stronger behavioural impacts compared to broader, less interactive campaigns.

Evidence

- **Budukh et al. (2022), India**
  Educational presentations improved understanding of cancer symptoms and preventive measures among school students.
- **Yurt et al. (2019), Turkey**
  Peer education sessions significantly increased self-efficacy for breast self-examinations and reduced perceived barriers to mammography.
- **Budukh et al. (2022), India**
  Educational sessions resulted in significant improvements in knowledge and intent related to breast cancer screening.

Recommendation

Prioritise community and educational initiatives that involve direct, interactive engagement to maximise behaviour change.

Impact on Knowledge and Behaviour

Awareness campaigns improved symptom knowledge and the importance of early detection, with a greater impact seen when interventions included actionable, practical messages.

Evidence

- **McCutchan et al. (2020), UK**
  A multimedia campaign led to significant increases in symptom knowledge and healthcare-seeking behaviour.
- **Puckett et al. (2018), USA**
  Educational sessions improved confidence in discussing symptoms with healthcare providers and increased knowledge of risk factors for gynaecological cancers.
- **Troy et al. (2022), USA**
  Statistically significant improvements in prostate cancer knowledge were observed post-intervention.

Recommendation

Design campaigns with clear, action-oriented messaging to effectively prompt healthcare-seeking behaviour, tailored to the audience's context.

Importance of Repeated Follow-Ups

Interventions with multiple follow-up points showed better retention of knowledge and sustained changes in attitudes and behaviour compared to single-contact initiatives.

Evidence

- **McCutchan et al. (2020), UK**
  Sustained symptom awareness was observed with follow-up assessments post-campaign.
- **Baumann et al. (2019), Germany**
  Follow-up campaigns on oral cancer increased early detection and sustained public engagement.

Recommendation

Implement multiple follow-up points in campaign evaluations to enhance long-term knowledge retention and reinforce behaviour change.

Tailored Messaging for Specific Demographics

Targeted messaging, adapted to the needs of specific groups (e.g., age, gender, high-risk populations), was more effective in prompting healthcare engagement.

Evidence

- **Sethi et al. (2016), UK**
  Multimedia campaigns tailored to throat cancer symptoms increased awareness and engagement within the target population.
- **Puckett et al. (2018), USA**
  Specific interventions for high-risk demographics improved symptom recognition and healthcare engagement.

Recommendation

Develop targeted messaging strategies tailored to specific demographic needs to increase relevance and impact.

Multi-Modality Approaches

Combining mass media with local, interactive sessions enhanced the reach and effectiveness of interventions.

Evidence

- **Mistry et al. (2017), UK**
  Multi-modal campaigns using TV, radio, and posters expanded reach and engagement but showed limited impact on sustained behavior change.
- **Saleh et al. (2012), Malaysia**
  Mass media campaigns improved symptom awareness and reached broader audiences.

Recommendation

Invest in multi-modal strategies that integrate media campaigns with community education efforts to create a comprehensive approach to raising awareness.

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6. Appendices

6.1: PRISMA Checklist

Section and Topic	Item #	Checklist item
TITLE		
Title	1	Identify the report as a systematic review.
ABSTRACT		
Abstract	2	See the PRISMA 2020 for Abstracts checklist.
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of existing knowledge.
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.
METHODS		
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.

Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.
RESULTS		
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.
Study characteristics	17	Cite each included study and present its characteristics.
Risk of bias in studies	18	Present assessments of risk of bias for each included study.
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.

	20c	Present results of all investigations of possible causes of heterogeneity among study results.
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.
DISCUSSION		
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.
	23b	Discuss any limitations of the evidence included in the review.
	23c	Discuss any limitations of the review processes used.
	23d	Discuss implications of the results for practice, policy, and future research.
OTHER INFORMATION		
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.
	24c	Describe and explain any amendments to information provided at registration or in the protocol.
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.
Competing interests	26	Declare any competing interests of review authors.
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.

6.2: Search Strategy

Theme	Narrow	Broad (Austoker)
Cancer	(neoplasms[mesh] OR cancer*[tiab] OR neoplas*[tiab] OR malignan*[tiab] OR tumo*[tiab] OR adenocarcinoma*[tiab] OR carcinoma*[tiab] OR sarcoma*[tiab])	(((neoplasm*[tw] or cancer* [tw] or tumor[tw] or tumour [tw] or malignan*[tw])
	AND	AND
Symptoms	(Signs and Symptoms[mesh] OR symptom*[tiab] OR sign*[tiab] OR indication*[tiab] OR manifes*[tiab] OR chang*[tiab] OR lump*[tiab] OR symptom assessment[mesh] OR "self examination"[tiab] OR "Self-Examination"[mesh] OR "Skin Neoplasms/diagnosis"[Mesh] OR "Skin Neoplasms/prevention and control"[Mesh])	((symptom*[tw] and (detect*[tw] or duration[tw] or onset*[tw]) OR (delay* [tw] or late [tw] or later [tw] or early [tw] or earlier [tw] or postpone* [tw] or wait* [tw] or deny [tw] or denial [tw] or promot* [tw]) AND (helpseeking [tw] or diagnos* [tw] or present* [tw] or detect* [tw] or present* [tw] or attend* [tw] or consult* [tw] or seek [tw] or sought [tw] or refer [tw] or treatment [tw] or care [tw]))))
	AND	OR
Presentation / Early Detection	(("Early Detection of Cancer"[mesh] OR ("Early diagnosis"[mesh] AND neoplasms[mesh]) OR ("prevention and control" [Subheading] AND neoplasms[mesh])) OR ("Help-Seeking Behavior"[mesh] OR helpseeking[tiab] OR "help seeking"[tiab] OR attend*[tiab] or consult*[tiab] OR visit*[tiab] OR "postpone*"[tiab] OR wait[tiab]) OR ("early present*"[tiab] OR "early diagnos*"[tiab] OR "early detect*"[tiab] OR "earlier present*"[tiab] OR "earlier diagnos*"[tiab] OR "earlier detect*"[tiab] OR "late present*"[tiab] OR "late diagnos*"[tiab] OR "late detect*"[tiab] OR "later present*"[tiab] OR "later	(("Patient Education as Topic"[mesh] OR "Health education"[tw]) AND (neoplasm*[tw] or cancer* [tw] or tumor[tw] or tumour [tw] or malignan*[tw])))

	diagnos*"[tiab] OR "later detect*"[tiab] OR "delay present*"[tiab] OR "delay diagnos*"[tiab] OR "delay detect*"[tiab] OR "delayed present*"[tiab] OR "delayed diagnos*"[tiab] OR "delayed detect*"[tiab] OR "present* early"[tiab] OR "diagnosed early"[tiab] OR "detected early"[tiab] OR "detected early"[tiab] OR "diagnosed earlier"[tiab] OR "detected earlier"[tiab] OR "presents late"[tiab] OR "diagnosed late"[tiab] OR "diagnostic delay*"[tiab]))	
	AND	AND
Patient Awareness	(aware*[tiab] OR knowled*[tiab] OR attitude*[tiab] OR recogn*[tiab] OR “lay concept*”[tiab] OR “health belief*”[tiab] OR expectation[tiab] OR educat*[tiab] OR "health education"[mesh] OR Patient Education as Topic[mesh])	(aware*[tw] or knowledge* [tw] or attitude* [tw] or recogni* [tw] or lay concept* [tw] or health belief* [tw] or expectation [tw] or information* [tw] or education* [tw])
	AND	AND
Intervention	(interven*[tiab] OR educat*[tiab] OR program*[tiab] OR campaign*[tiab] OR guid*[tiab] OR promot*[tiab] OR clinicaltrial[Filter] OR randomizedcontrolledtrial[Filter] OR “controlled trial*”[tw])	(clinicaltrial[Filter] OR randomizedcontrolledtrial[Filter] OR “controlled trial*”[tw] OR "controlled stud*”[tw] OR interven*[tiab] OR “comparative stud*”[tw] OR "program evaluation”[tw] OR campaign[tw] OR “educational program”[tw] OR “before and after”[tw])
	AND	NOT
Filter	(2008:2024[pdat])	(in vitro[tiab] OR immun*[tiab] OR RNA[tiab] OR antigen[tiab] OR *operative[tiab] OR psychiatr*[tiab] or psychosocial[tiab] OR chemo*[tiab] OR inflamm*[tiab] OR surg*[tiab] OR dissection*[tiab] OR cell*[tiab] OR bacteria*[tiab])

6.3: PRISMA-P, PRISMA-Systematic Review

PRISMA-P	PRISMA-Systematic Review	Layout_Combined	Quote
1: Title 1a: Identification 1b: Update	1: Title	1: Title	
3: Authors 3a: Contact 3b: Contributions		2: Authors 2a: ORCID ID 2b: Affiliation ID	
4: Amendments		3: Front Matter 3a: Acknowledgements 3b: Word Count	
5: Support 5a: Sources 5b: Sponsor 5c: Role of Sponsor or Funder	25: Support	4: Funding	
	26: Competing interests	5a: Conflict of Interests 5b: Ethics	
	27: Availability of data, code and other materials	6: Data availability	
2: Registration	24 a, b, c: Registration and protocol	7: Registration	
	2: Abstract	8: Abstract 8a: Background 8b: Methodology 8c: Conclusion 8d: Keywords	
6: Rationale	3: Rationale	9: Rationale	
7: Objectives	4: Objectives	10: Objectives	
8: Eligibility Criteria	5: Eligibility Criteria	11: Eligibility Criteria	
9: Information Sources	6: Information Sources 7: Search Strategy	12: Search Strategy	

10: Search Strategy			
11: Study Records 11a: Data Management 11b: Selection Process 11c: Data Collection Process	8: Selection process 16 a, b: Study selection	13: Study Selection	
12: Data Items	9: Data collection process 10b: Data Items	14: Data Collection	
13: Outcomes and Prioritisation	10a: Data Items 12: Effect measures	15: Outcomes	
14: Risk of Bias in Individual Studies	11: Study risk of bias assessment 18: Risk of bias in studies 21: Reporting biases	16: Risk of bias assessment	
15 a, b, c, d: Data Synthesis	13a, b, c, d, e, f: Synthesis methods 17: Study characteristics 19: Results of individual studies 20 a, b, c, d: Results of syntheses	17: Data synthesis	
		18: Meta-analysis	
16: Meta-bias(es)	14: Reporting bias assessment	19: Meta-bias assessment	
17: Confidence in Cumulative Evidence	15: Certainty assessment 22: Certainty of evidence	20: Confidence in Cumulative Evidence	
	23 a, b, c, d: Discussion	21: Discussion	