



REVIEW


Early detection of cancer in rural workers: a scoping review

Detecção precoce de câncer em trabalhadores rurais: revisão de escopo  
Detección temprana del cáncer en trabajadores rurales: revisión de alcance


Natália Murai Guedes<sup>1</sup>

 <https://orcid.org/0000-0003-0596-9964>

Luciana Puchalski Kalinke<sup>1</sup>

 <https://orcid.org/0000-0003-4868-8193>


Mariana Nunes da Silva<sup>2</sup>

 <https://orcid.org/0000-0002-8610-2889>

Luciana de Alcantara Nogueira<sup>1</sup>

 <https://orcid.org/0000-0002-5985-7418>

Rafaela Gessner Lourenço<sup>1</sup>

 <https://orcid.org/0000-0002-3855-0003>

<sup>1</sup>Universidade Federal do Paraná (UFPR). Paraná, Brasil; <sup>2</sup>Faculdade de Medicina da Universidade de São Paulo (FMUSP). São Paulo, Brasil.

ABSTRACT

**Objective:** to synthesize the current knowledge in the literature on measures for early detection of cancer aimed at rural workers. **Methods:** this is a scoping review carried out in April 2021 on the National Library of Medicine, Cumulative Index to Nursing and Allied Health Literature, Scopus and *Biblioteca Virtual em Saúde* data search platforms. Full-text articles in English, Portuguese or Spanish were included, focusing on early detection of the types of cancer related to rural workers, as well as randomized and non-randomized controlled studies, case, cohort, qualitative or descriptive research, and case-control studies. **Results:** the review included 21 studies published between 2012 and 2019. From the analysis, barriers faced by these workers in accessing the detection programs were identified, namely: limited resources in health institutions, place of residence, limited knowledge in relation to cancer, and financial issues. The main early detection measures indicated for rural areas are as follows: use of rapid tests, such as fecal occult blood test, self-examination, visual inspection by a professional, Teledermatology, training of community members, and use of mobile clinics. **Conclusion:** the current study enables health professionals, especially nurses, to update their knowledge about early detection of cancer, aiming at more assertive care in rural areas.

**Descriptors:** Early Detection of Cancer. Farmers. Oncology Nursing. Early Diagnosis. Mass Screening.

RESUMO

**Objetivo:** sintetizar o conhecimento existente na literatura sobre as medidas de detecção precoce do câncer voltadas aos trabalhadores rurais. **Métodos:** trata-se de uma *scoping review* realizada em abril de 2021, nas plataformas de busca de dados *National Library of Medicine*, *Cumulative Index to Nursing and Allied Health Literature*, *Scopus* e *Biblioteca Virtual em Saúde*. Incluíram-se artigos na íntegra em inglês, português ou espanhol, com enfoque na detecção precoce dos cânceres relacionados aos trabalhadores rurais, estudos controlados randomizados e não randomizados, de caso, coorte, pesquisa qualitativa ou descritiva, e caso-controle. **Resultados:** a revisão incluiu 21 estudos publicados entre 2012 e 2019. Da análise, foram identificadas barreiras que esses trabalhadores enfrentam no acesso aos programas de detecção: recursos limitados nas instituições de saúde, localização da residência, pouco conhecimento relacionado ao câncer e questões financeiras. As principais medidas de detecção precoce indicadas para o meio rural são: uso de testes rápidos, como teste de sangue oculto nas fezes, autoexame, inspeção visual do profissional, teledermatologia, treinamento de membros da comunidade e uso de clínicas móveis. **Conclusão:** o presente estudo possibilita que profissionais de saúde, principalmente enfermeiros, atualizem seus conhecimentos sobre a detecção precoce do câncer, visando ao cuidado mais assertivo no meio rural.

**Descritores:** Detecção precoce de câncer. Trabalhadores rurais. Enfermagem oncológica. Diagnóstico precoce. Programas de rastreamento.

RESUMÉN

**Objetivo:** sintetizar el conocimiento existente en la literatura sobre las medidas de detección temprana del cáncer dirigidas a los trabajadores rurales. **Método:** revisión de alcance realizada en abril de 2021 en las plataformas de búsqueda de datos *National Library of Medicine*, *Cumulative Index to Nursing and Allied Health Literature*, *Scopus* y *Biblioteca Virtual em Saúde*. Se incluyeron artículos completos en inglés, portugués o español, con enfoque en la detección temprana de los tipos de cáncer relacionados con los trabajadores rurales, estudios controlados aleatorizados y no aleatorizados, de caso, cohorte, investigación cualitativa o descriptiva, y de caso-control. **Resultados:** la revisión incluyó 21 estudios publicados entre 2012 y 2019. A partir del análisis se identificaron obstáculos que afrontan estos trabajadores para acceder a los programas de detección: recursos limitados en los establecimientos sanitarios, lugar de residencia, escaso conocimiento relacionado con el cáncer y cuestiones de índole financiero. Las principales medidas de detección temprana indicadas para el medio rural son las siguientes: uso de pruebas rápidas, como la de sangre oculta en las materia fecal, autoexamen, inspección visual a cargo de un profesional, Teledermatología, capacitación de miembros de la comunidad y utilización de clínicas móviles. **Conclusión:** este estudio permite que diversos profesionales de la salud, principalmente enfermeros, actualicen sus conocimientos sobre detección temprana del cáncer, con vistas a brindar una atención más firme en el medio rural.

**Descriptor:** Detección Precoz del Cáncer. Trabajadores Rurales. Enfermería Oncológica. Diagnóstico Precoz. Tamizaje Masivo.

## INTRODUCTION

Occupational cancer, which is developed due to exposure to carcinogens in the work environment, is an important public health problem. It represents from 5.3% to 8.4% of all cancer cases and causes more than 600,000 deaths a year worldwide.<sup>(1)</sup> Among the various work environments, rural work, associated with agriculture, fishing and forestry, is considered one of the occupations with the greatest risk of exposure to carcinogens.<sup>(2)</sup> A study carried out in Australia showed that 67% of the rural workers had possible exposure to at least one product considered carcinogenic, such as ultraviolet radiation or diesel engine exhaust.<sup>(3)</sup>

Given the contact with harmful substances during daily work, rural workers are more likely to develop certain types of cancer, such as skin and hematological.<sup>(4)</sup> In view of the possible illness of these workers, there must be early detection of these cases, through screening and early diagnosis actions, which can improve the quality of life and survival of cancer patients.<sup>(5)</sup>

Screening is an attempt to identify pathologies in supposedly healthy individuals, performed through rapid application tests, before the manifestation of signs and symptoms.<sup>(6-7)</sup> It is noteworthy that screening is associated with a better prognosis, in which the patient tends to respond better to the treatment.<sup>(8)</sup>

Early cancer diagnosis is aimed at patients with early signs and symptoms of the disease<sup>(6)</sup> and includes two main components: awareness raising about the early signs of cancer and better accessibility to diagnostic and treatment services.<sup>(7)</sup> A number of studies show that early diagnosis contributes to increased survival for five years or more in cancer patients.<sup>(9-10)</sup>

Professional nurses are relevant in this process, as they actively participate in the implementation of measures for early detection of cancer, given that they have the necessary skills and technical-scientific knowledge to guide the patients, carry out referrals and clinical examinations<sup>(11-12)</sup> and, therefore, must be in a constant care improvement process. In the Primary Health Care context, nurses are expected to create a bond with the population, to the point of providing an integrated model that meets the interest of the community, which, in this case, refers to the detection of occupational cancer.<sup>(13)</sup>

In view of the data pointing to the illness of rural workers and the need for updated professional nurses to work with this population segment, the absence of adequate training stands out, capable of preparing health professionals to work in rural areas in order to meet the specific demands of these groups.<sup>(13)</sup> Linked to this, it was observed that there is limited evidence in the literature on measures for early detection of occupational cancer, especially those aimed at rural workers, despite being one of the professional categories most likely to be exposed to carcinogens. Therefore, the objective of this study was to synthesize the current knowledge in the literature on measures for early detection of cancer aimed at rural workers.

## METHODS

This is a scoping review, prepared in accordance with the recommendations set forth by the Joanna Briggs Institute (JBI). This type of review aims at mapping the available evidence on a particular research area.<sup>(14)</sup> Its conduction comprised the following stages: 1) definition of the research objective and question; 2) definition and alignment of the inclusion criteria; 3) description of the approach to the search, selection and presentation of evidence; 4) search in the literature; 5) data selection, analysis and presentation, included in the “Results” topic of this review; and 7) summary of the diverse evidence in relation to the review objective, conclusions and implications of the findings, described in the “Conclusion” section.<sup>(15)</sup>

The objective of this study was limited to synthesizing the current knowledge in the literature on measures for early detection of cancer aimed at rural workers. To elaborate the research question, the PCC acronym was used, where P (Population) - Rural workers, C (Concept) - Early detection programs, and C (Context) - Types of cancer associated with farming; giving rise to the following question: “Which is the scientific evidence on early detection of the types of cancer that affect rural workers?”.

The search took place on the following online platforms: National Library of Medicine (PubMed), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus and *Biblioteca Virtual em Saúde* (BVS). The following eligibility criteria were used: studies made available in full and with free access; in the time frame from 2011 to 2021, to obtain more up-to-date studies; in English, Portuguese or Spanish, considering these languages with predominance of publications in the national and international context; having as subjects of interest adults and aged individuals ( $\geq 18$  years old) working in rural areas; focus on early detection of the types of cancer related to this work activity; randomized and non-randomized controlled studies, case, cohort, qualitative or descriptive research, and case-control studies. The following exclusion criteria were delimited: duplicate studies, editorials, letters to the editor, free communications, reflections or review studies, and theses or dissertations.

For the initial search, which took place in April 2021, the strategy that best suited each search platform was used (Chart 1), associated with the language (English, Portuguese and Spanish) and year of publication (from 2011 to 2021) filters. After removing the duplicates, the titles and abstracts of the articles were read and analyzed in order to identify potential publications eligible for the study. Subsequently, the studies were read in full, and those in line with the criteria of this review were selected. This flow sought to respect the stages set forth in the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA).<sup>(16)</sup> All the phases corresponding to selection of the articles were carried out independently by two researchers, with inclusion of a

debate with a third reviewer in case of disagreement.

In order to identify the types of studies carried out in the articles selected, as well as their level of evidence, seven classifications were used as reference bases: I - Systematic reviews or meta-analyses, II - Randomized controlled studies, III - Controlled studies without randomization, IV - Cohort or case-control studies, V - Systematic reviews of qualitative or descriptive studies, VI - Qualitative or descriptive studies, and VII - Expert opinion or consensus.<sup>(17)</sup>

Early detection of cancer in rural workers.. In the evidence presentation stage, the publications were grouped into an instrument developed by the researchers to characterize the articles: author(s), name of journal, year, title, country of origin and level of evidence, with the most relevant data being described throughout the text. A second instrument was designed to describe the studies, with the type of cancer addressed and the main results, which served as basis for the discussion.

**Chart 1.** Search strategies used in the online search platforms (BVS, PubMed, CINAHL and Scopus). Curitiba, Paraná, Brazil.

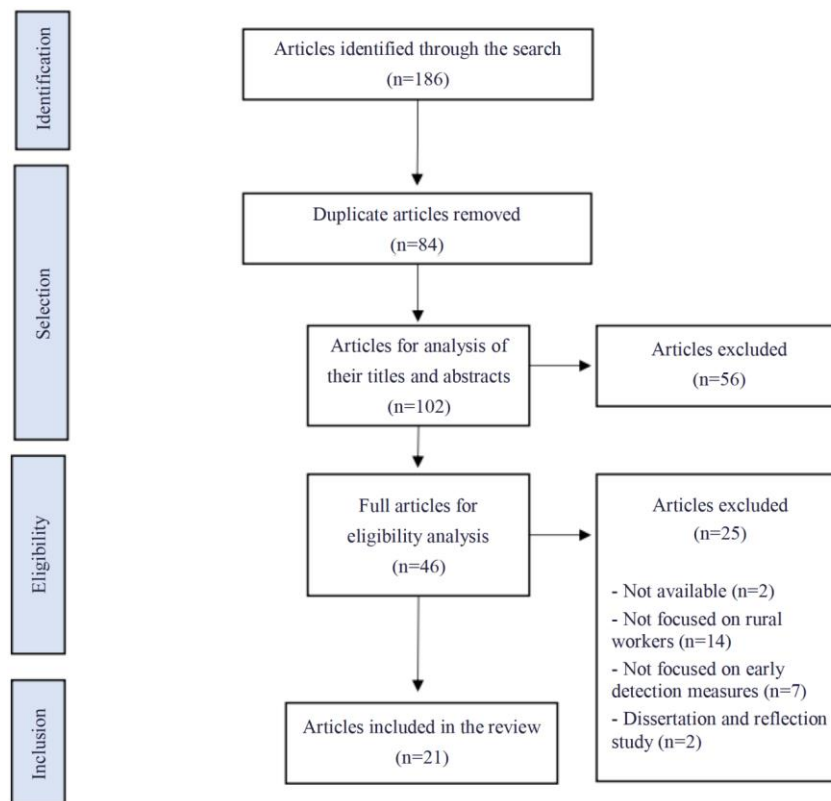
Search platform	Search strategy
BVS	("Detecção Precoce de Câncer" OR "Early Detection of Cancer" OR "Detección Precoz del Cáncer" OR "Diagnóstico Precoce do Câncer" OR "Cancer Early Detection" OR "Cancer Early Diagnosis" OR "Cancer Screening" OR "Cancer Screening Test" OR "Early Diagnosis of Cancer" OR "Diagnóstico Precoz del Cáncer") AND ("Trabalhadores Rurais" OR "Rural Workers" OR "Trabajadores Rurales" OR "Trabalhador Rural" OR "Rural Worker" OR "Trabajador Rural" OR "Fazendeiros" OR "Farmers" OR "Agricultores" OR "Agricultor" OR "Fazendeiro" OR "Agricultural Worker" OR "Agricultural Workers" OR "Farm Worker" OR "Farm Workers" OR "Farmer" OR "Farmworker" OR "Farmworkers" OR "Worker, Agricultural" OR "Worker, Farm" OR "Workers, Agricultural" OR "Workers, Farm")
PubMed, CINAHL, Scopus	("Early Detection of Cancer" OR "Cancer Early Detection" OR "Cancer Early Diagnosis" OR "Cancer Screening" OR "Cancer Screening Test" OR "Early Diagnosis of Cancer") AND ("Rural Workers" OR "Rural Worker" OR "Farmers" OR "Agricultural Worker" OR "Agricultural Workers" OR "Farm Worker" OR "Farm Workers" OR "Farmer" OR "Farmworker" OR "Farmworkers" OR "Worker, Agricultural" OR "Worker, Farm" OR "Workers, Agricultural" OR "Workers, Farm")

Source: Prepared by the authors (2022).

## RESULTS

The initial search yielded 186 publications. After analyzing the titles and abstracts, 46 were read in full, resulting in a sample of 21 studies, according to PRISMA in **Figure 1**.

**Figure 1.** PRISMA flowchart corresponding to selection of the articles obtained from the online search platforms. Curitiba, Paraná, Brazil.



Source: Prepared by the authors (2022).

In relation to the data characterization, described in **Chart 2**, publications were identified between 2012 and 2019, with 2015 as the year with the highest number of publications (six). As for language, there was predominance of English (n=20).

**Chart 2.** Characterization of the samples from the studies included in the review, obtained from the online search platforms. Curitiba, Paraná, Brazil.

Study	Author(s)	Journal, year	Title	Locus	Level of evidence
A1	Abuidris <i>et al.</i> <sup>(18)</sup>	<i>Lancet Oncol</i> , 2013	<i>Breast-cancer screening with trained volunteers in a rural area of Sudan: a pilot study</i>	Sudan	III
A2	Carley; Stratman <sup>(19)</sup>	<i>Journal of Agromedicine</i> , 2015	<i>Skin Cancer Beliefs, Knowledge, and Prevention Practices: A Comparison of Farmers and Nonfarmers in a Midwestern Population</i>	USA	IV
A3	Feng <i>et al.</i> <sup>(20)</sup>	<i>BMC Cancer</i> , 2015	<i>Assessment and model guided cancer screening promotion by village doctors in China: a randomized controlled trial protocol</i>	China	II
A4	Hue <i>et al.</i> <sup>(21)</sup>	<i>JEADV</i> , 2016	<i>Real-time mobile teledermoscopy for skin cancer screening targeting an agricultural population: an experiment on 289 patients in France</i>	France	VI
A5	Ilgal; Gözüüm <sup>(22)</sup>	<i>Cancer Nursing</i> , 2017	<i>Determination of Colorectal Cancer Risk Levels, Colorectal Cancer Screening Rates, and Factors Affecting Screening Participation of Individuals Working in Agriculture in Turkey</i>	Turkey	VI
A6	Aboagye; Kaiser; Hayanga <sup>(23)</sup>	<i>JAMA Surg</i> , 2014	<i>Rural-Urban Differences in Access to Specialist Providers of Colorectal Cancer Care in the United States</i>	USA	VI
A7	Carmichael <i>et al.</i> <sup>(24)</sup>	<i>Am J Surg</i> , 2019	<i>Disparities in colorectal cancer mortality for rural populations in the United States: Does screening matter?</i>	USA	VI
A8	Cartaxo <i>et al.</i> <sup>(25)</sup>	<i>Rev Ciênc Plur</i> , 2017	<i>Conhecimento de trabalhadores rurais de um município do Nordeste brasileiro acerca da prevenção e diagnóstico precoce do câncer de boca</i>	Brazil	VI
A9	Chatterjee; Gupta; Bose <sup>(26)</sup>	<i>Oral Health Prev Dent</i> , 2015	<i>Oral screening for pre-cancerous lesions among areca-nut chewing population from rural India</i>	India	IV
A10	Cole; Jackson; Doescher <sup>(27)</sup>	<i>J Prim Care Community Health</i> , 2012	<i>Colorectal Cancer Screening Disparities for Rural Minorities in the United States</i>	USA	VI

Continuation...

Study	Author(s)	Journal, year	Title	Locus	Level of evidence
A11	Faruque et al. (28)	BMC Res Notes, 2015	The impact of preventive screening resource distribution on geographic and population-based disparities in colorectal cancer in Mississippi	USA	VI
A12	Moyo(29)	Eur J Cancer Care, 2016	Men's knowledge about prostate cancer: a case study of rural Mhondoro-Ngezi, Kadoma District, Zimbabwe	Zimbabwe	VI
A13	Ngoma; Mandeli; Holland(30)	Int J Cancer, 2015	Downstaging cancer in rural Africa	Tanzania	II
A14	Preston et al. (31)	Am J Surg, 2017	Colorectal cancer screening in rural and poor-resourced communities	USA	II
A15	Castañeda, et al. (32)	J Prim Care Community Health, 2012	Breast and Cervical Cancer Screening Among Rural Midwestern Latina Migrant and Seasonal Farmworkers	USA	VI
A16	Knoff et al. (33)	J Prim Care Community Health, 2013	Cervical Cancer Screening Practice and Knowledge Among Hispanic Migrant and Seasonal Farmworkers of Michigan	USA	VI
A17	Luque et al. (34)	J Canc Educ, 2016	Salud es Vida: a Cervical Cancer Screening Intervention for Rural Latina Immigrant Women	USA	III
A18	Hughes et al. (35)	Aust NZ J Public Health, 2014	Is Step Down Assessment of screen-detected lesions as safe as workup at a Metropolitan Assessment Centre?	Australia	IV
A19	Husaiyin et al. (36)	BMC Cancer, 2018	Factors associated with high-risk HPV infection and cervical cancer screening methods among rural Uyghur women aged > 30 years in Xinjiang	China	VI
A20	Zong et al. (37)	Asian Pac J Cancer Prev, 2015	Evaluation of Several Screening Approaches for Detection of Cervical Lesions in Rural Shandong, China	China	VI
A21	Lieber et al. (38)	Ann Glob Health, 2019	Cervical Cancer Screening in HIV-Positive Farmers in South Africa: Mixed-Method Assessment	South Africa	IV and VI

Source: Prepared by the authors (2022).

As for the journals, it is noted that most studies were published in international journals, especially *J. Prim. Care Community Health* (three). Eight articles were published in Oncology journals, with *BMC Cancer* standing out (two). In relation to the country of origin of the research studies, United States of America (USA) stands out with nine. In the analysis of the level of evidence, there was predominance of level VI (n=13), with most of the studies being descriptive, in which the authors provide diverse information on incidence and

prevalence, associating it with social, ethnic and regional characteristics.<sup>(17)</sup>

After analyzing the articles (**Chart 3**), it is noticed that, among the types of cancer that rural workers can develop, colorectal (CRC)<sup>(22-24,27-28,31)</sup> and cervical<sup>(32-34,36-38)</sup> cancer stand out in this review, with six articles each; followed by breast cancer, with three publications.<sup>(18,32,35)</sup> Mouth<sup>(25-26)</sup> and skin<sup>(19,21)</sup> neoplasms were also mentioned. One study dealt with prostate cancer.<sup>(29)</sup>

**Chart 3.** Analysis of the studies included in the review, obtained from the online search platforms. Curitiba, Paraná, Brazil.

Study	Type of cancer addressed	Main notes
A1	Breast	Screening program with local volunteers can increase detection of breast cancer in asymptomatic women, and is feasible in low-income rural communities.
A2	Skin	There are differences in knowledge and practices about protection against cancer between the rural and urban population, which must be considered in order to provide targeted preventive counseling.
A3	General	A risk assessment tool can help with targeted referrals, in order to develop personalized strategies to deal with the potential barriers.
A4	Skin	Teledermatology targeted at agricultural populations is feasible, and can be useful to improve skin cancer screening in populations at increased risk.
A5	CRC	Using iFOBT, participation rate in CRC screening increased from 7% to 89%.
A6	CRC	There is a significantly higher density of physicians more predisposed to offering screening and treatment services for CRC in urban states than in rural ones.
A7	CRC	At the county level, rural people experience 4.5 more deaths due to CRC per 100,000 inhabitants.
A8	Mouth	97% of the interviewees reported that they had never received an explanation about mouth cancer.
A9	Mouth	In rural areas with limited health resources, oral-visual examination screening can be helpful in reducing mortality due to oral cancer.
A10	CRC	Rural African-Americans, black-skinned individuals, Hispanics and Latinos were less likely to report CRC screening when compared to their respective ethnicities in the urban setting.
A11	CRC	Effective control of CRC in rural states with high poverty rates requires adequate a preventive treatment capable of addressing the causes of health care disparities.
A12	Prostate	86% of the participants asserts that they did not know about cancer screening. It is noted that lack of knowledge compromises care, early diagnosis and treatment.
A13	General	The greatest downstaging occurred in breast and cervical cancer.
A14	CRC	The proposed project reduced barriers to accessing early detection of cancer by providing relatively inexpensive iFOBT kits and education in health.
A15	Breast and cervical	Breast self-examination, language acculturation, and having health insurance were the main correlates for recent cervical cancer screening.
A16	Cervical	Although the reported screening rates were high (88%), low level of knowledge about the cervical cancer risk factors was detected. Therefore, interventions aimed at education in health should be sought.
A17	Cervical	There was a significant increase in the number of women seeking screening after the intervention, but the result was not statistically significant due to the increase in adherence that also occurred in the control group.
A18	Breast	The use of mobile clinics is an effective way to perform breast cancer screening and evaluation in rural areas, without the need for women to travel long distances for the evaluation.
A19	Cervical	Colposcopy was considered more effective than the HR-HPV test in screening for precancerous cervical lesions.

A20	Cervical	The HR-HPV DNA test may be appropriate for cervical cancer screening in under-resourced rural areas.
A21	Cervical	HPV screening, together with visual inspection with acetic acid, allows expanding screening coverage and treating patients promptly.

Key: CRC: Colorectal Cancer; iFOBT: Immunochemical Fecal Occult Blood Test; HR-HPV: High-Risk Human Papillomavirus.

Source: Prepared by the authors (2022).

The barriers to accessing the early detection measures found in this review can be divided into difficulties related to the health system and those associated with rural workers. The obstacles related to the health system refer to limited resources, concerning the infrastructure of the health institution and provision of care with specialized professionals.<sup>(21,23-24,27,37-38)</sup>

With regard to rural workers, the main barriers include the following: distance between their home and the health institutions;<sup>(18,34-35)</sup> limited knowledge about cancer issues;<sup>(18-19,22,24-25,29,34)</sup> and financial issues, as some tests for early detection of cancer are not free or require expenses to travel to health centers.<sup>(18,24,27,33)</sup> In addition, rural work is an activity that often requires long working hours, which can represent a barrier to seeking health care.<sup>(33)</sup>

Therefore, the following stand out as the main early detection measures in rural areas: use of rapid tests, such as FOBT and HR-HPV DNA; visual inspection by a health professional, using technologies such as Teledermatology; self-examination; training of community members; and use of mobile clinics.

## DISCUSSION

Screening programs generally require considerable investments in equipment, technology and training of professionals, confirming the reason why a developed country has stood out in publication of studies.<sup>(40)</sup> On the other hand, Brazil is among the countries that least invest in cancer prevention and treatment, when compared to the other Latin American countries.<sup>(41)</sup> This situation is perceived in the clinical practice, as Brazil has technology delays in relation to countries that already perform screening tests for other types of cancer, such as lung.<sup>(42)</sup> Therefore, it is clear that this theme is still incipient in research in the country, confirming the scarcity of Brazilian publications in this review.

When discussing early detection measures, it is necessary to remember that, for the implementation of these programs, it is crucial to analyze the context in which the target population is inserted in order to develop personalized intervention actions.<sup>(13,20)</sup> The predominance of descriptive articles in this review is highlighted, which can be related to the need to explore urban-rural disparities and to understand the increase in cancer incidence and mortality among rural workers, and thus develop strategies focused on rural areas.<sup>(39)</sup>

The early detection actions found in the current study discussed some types of cancer, especially CRC and cervical cancer. This result can be associated with the fact that they present high incidence and

mortality rates in the world.<sup>(43)</sup> In addition, they present well-established screening and early diagnosis protocols.<sup>(41,44)</sup>

Regarding CRC, the articles in this review indicated the possibility of using colonoscopy, sigmoidoscopy, CT colonography and the Fecal Occult Blood Test (FOBT) for early detection of cancer.<sup>(22,24,27-28,31)</sup> Although colonoscopy is considered the gold standard in the diagnosis of CRC, the use of FOBT can be an effective measure in rural areas, given that it is more accessible, requires a simplified physical structure and is more accepted by the community.<sup>(22,31)</sup>

FOBT can detect fecal occult blood through a chemical reaction with guaiac (gFOBT) or with the aid of antibodies (iFOBT).<sup>(45)</sup> One of the articles suggests the implementation of programs that offer FOBT kits, together with health education actions in the community.<sup>(31)</sup>

A barrier listed about early detection of CRC is the lack of specialized professionals in rural areas, in which the following is suggested: using itinerant endoscopists, increasing funding for residency programs with an emphasis on training rural surgeons and financial incentives for professionals who agree to work in rural areas.<sup>(23)</sup> However, these suggestions can be adapted for other types of cancer. The literature even discusses another possibility for attracting and retaining professionals to the rural context: hiring through public tenders.<sup>(46)</sup>

Cervical cancer, which also stood out in this review, can be detected by a cytopathological examination of the cervix.<sup>(32-34,36-38)</sup> Although it is the most used method, it requires investment in physical infrastructure and good quality training of professionals, which hinders its implementation in rural areas.<sup>(37,44)</sup> Therefore, the most recommended early detection measures for rural workers are as follows: the High-Risk Human Papillomavirus (HR-HPV) DNA test through *careHPV*, and visual inspection with acetic acid (VIA) or Lugol's iodine (VILI).<sup>(24,34,36-37)</sup> These measures require a simple and lower-cost infrastructure, with faster results.<sup>(37-38,47)</sup> Furthermore, it is recommended to perform the VIA/VILI technique, associated with cryotherapy, used for the treatment of pre-malignant cervical lesions.<sup>(38,48)</sup>

As well as detection of cervical cancer, which is a widely used method, breast cancer also has established protocols, with mammography and breast self-examination as the most common techniques.<sup>(32)</sup> One of the articles recommends training community volunteers so that they are able to carry out the clinical examination and referrals in case of suspected abnormalities.<sup>(18)</sup> This measure favors early detection, as women in the region feel more

comfortable undergoing the exam with a person they know, in addition to reducing the distance barrier, given that rural workers do not need to travel to a health institution. In addition, it is suggested to offer mammography exams in stationary clinics in the metropolitan area and mobile clinics, which visit rural areas of the country every two years.<sup>(35)</sup>

Self-examination is an early detection action not restricted to breast cancer, as early diagnosis is also recommended for mouth and skin neoplasms.<sup>(49-50)</sup> With regard to oral cancer, self-examination stands out because it is a non-invasive and low-cost method, effective in the rural environment.<sup>(25)</sup> Even so, an oral-visual evaluation performed by a dental surgeon annually is recommended.<sup>(26)</sup>

In relation to skin cancer, it is indicated that Teledermatology can be useful in early detection,<sup>(21)</sup> as it allows specialists to analyze each case from a distance, which can facilitate diagnosis in rural areas. This factor contributes to care continuity between primary health care and specialized care services, favoring qualification of the referrals, with the potential for improving care coordination.<sup>(51)</sup>

On the other hand, prostate cancer, mentioned in this review, combines early diagnosis and screening actions, such as digital rectal examination and blood tests to detect prostate antigens.<sup>(29)</sup> These tests can detect cancer at an early stage, but should not be routinely recommended in asymptomatic patients, as there is no evidence that the benefits of the test outweigh its risks.<sup>(41,44)</sup> Therefore, there is a need to stimulate more research studies on the theme.

It is noted that, regardless of the type of cancer mentioned, education in health was reported in the articles as an ally of early detection.<sup>(19,22,25-26,28,30-31,33-34)</sup> The literature states that educational interventions are effective in preventing and controlling diseases.<sup>(52)</sup> The review showed that debates in schools and agricultural meetings, publications in rural journals and enhanced patient-professional dialog during clinical consultations facilitate bonding and communication with rural workers. In addition, the articles in this review discuss the need for continuing education among health professionals.<sup>(23,28,30)</sup> It is noted that one of the roles that Nursing plays in cancer care is that of educator, whether by training community members or other professionals to assist in early detection, or by directly guiding the patients.<sup>(53)</sup>

Nursing can act, either directly or indirectly, in all areas of the aforementioned early detection measures; it is worth highlighting the importance of Nursing consultations, which allow nurses to work in health education, perform clinical examinations and carry out the respective referrals.<sup>(54)</sup> In this way, it can be seen that nurses are able to act in cancer prevention and diagnosis, contributing to reduce the risk rates of the different types of cancer.<sup>(22)</sup>

The importance of the role of this professional category was found in three articles in this review, which portrayed the role of Nursing, even though this was not the main focus of the studies.<sup>(18,22,38)</sup> The scarcity of articles on the role of nurses in the rural context of early detection possibly denotes health care based on the hegemonic medical model, and

Early detection of cancer in rural workers.. this may be more present and evident in rural areas.<sup>(55)</sup>

It is worth highlighting the need for further studies on the theme, given that some types of cancer associated with agricultural work, such as hematological and brain neoplasms, were not found in this review. As limitations of this research, we highlight the time and language filters used in the search, the low number of studies related to Nursing and the difficulty finding articles that discuss measures for early detection of cancer with a focus on rural workers.

This review aims at valuing the role of nurses in rural areas and the theoretical construction of knowledge about tools for early detection of cancer, targeted at rural workers and aiming at evidence-based care, in order to fill the scientific gap on this theme, geared towards rural areas.

## CONCLUSION

The current study synthesized the current knowledge in the scientific literature about early detection measures aimed at rural workers. The barriers faced by the patients in accessing the measures were highlighted, such as distance between their home and health institutions. Use of the FOBT test, visual inspection with VIA/VILI or HR-HPV DNA test, oral self-examination and annual assessment by a professional, Teledermatology, training of community members and use of mobile clinics were evidenced as the main early detection measures in rural areas, aiming to cope with the barriers listed.

Nurses can work in early detection programs in rural areas, providing comprehensive care based on science, capable of meeting the specific needs of the community. Therefore, it is expected that health professionals be in constant search to improve their knowledge, in order to intervene assertively.

## REFERENCES

1. Instituto Nacional de Câncer José Alencar Gomes da Silva (BR). Ambiente, trabalho e câncer: aspectos epidemiológicos, toxicológicos e regulatórios. Rio de Janeiro: INCA; 2021 [Internet]. Available from: [https://www.inca.gov.br/sites/ufu.sti.inca.local/file\\_s//media/document//ambiente\\_trabalho\\_e\\_cancer\\_-\\_aspectos\\_epidemiologicos\\_toxicologicos\\_e\\_regulatorios.pdf](https://www.inca.gov.br/sites/ufu.sti.inca.local/file_s//media/document//ambiente_trabalho_e_cancer_-_aspectos_epidemiologicos_toxicologicos_e_regulatorios.pdf).
2. Cancer Research UK [Internet]. Cancer risks in the workplace [c2020; accessed 21 mar. 2021]. Available from: <https://www.cancerresearchuk.org/about-cancer/causes-of-cancer/cancer-risks-in-the-workplace>.
3. Darcey E, Carey R, Reid A, Fritschi L. The Australian Work Exposures Study (AWES): Carcinogen Exposures in the Agricultural Industry. Canberra: Safe Work Australia, 2016 [Internet]. Available from: [https://www.safeworkaustralia.gov.au/system/files/documents/1702/awes\\_-\\_carcinogen\\_exposure\\_in\\_the\\_manufacturing\\_industry.pdf](https://www.safeworkaustralia.gov.au/system/files/documents/1702/awes_-_carcinogen_exposure_in_the_manufacturing_industry.pdf).



4. Lopes CVA, Albuquerque GSC. Agrochemicals and their impacts on human and environmental health: a systematic review. *Saúde debate* [Internet]. 2018;42(117):518-34. Doi: <https://doi.org/10.1590/0103-1104201811714>
5. Ministério da Saúde (BR). Portaria nº 874, de 16 de maio de 2013. Institui a Política Nacional para a Prevenção e Controle do Câncer na Rede de Atenção à Saúde das Pessoas com Doenças Crônicas no âmbito do Sistema Único de Saúde (SUS). *Diário Oficial da União*. 16 mai. 2013. [Internet]. Available from: [http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0874\\_16\\_05\\_2013.html](http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0874_16_05_2013.html)
6. World Health Organization [Internet]. Promoting Cancer Early Diagnosis [c2021; accessed 03 mar. 2021]. Available from: <https://www.who.int/activities/promoting-cancer-early-diagnosis>
7. World Health Organization [Internet]. Screening and early detection [c2021; accessed 14 jan. 2021]. Available from: <https://www.euro.who.int/en/health-topics/noncommunicable-diseases/cancer/policy/screening-and-early-detection>
8. Cancer Research UK [Internet]. What is cancer screening? [c2020; accessed 07 jan. 2021]. Available from: <https://www.cancerresearchuk.org/about-cancer/cancer-symptoms/spot-cancer-early/screening/what-is-cancer-screening>
9. Cancer Research UK [Internet]. Why is early diagnosis important? [c2021; accessed 14 jan. 2021]. Available from: <https://www.cancerresearchuk.org/about-cancer/cancer-symptoms/why-is-early-diagnosis-important>
10. Hawkes N. Cancer survival data emphasise importance of early diagnosis *BMJ* [Internet]. 2019;364:l408. Doi: <https://doi.org/10.1136/bmj.l408>
11. Alves GK de O, Silva GA, Silva MA, Lago KS, Andrade SN, Santos RC. Health education and breast cancer prevention in the city of Itaúna, Minas Gerais. *Nursing* [Internet]. 2020;23(267):4442-6. Doi: <https://doi.org/10.36489/nursing.2020v23i267p4442-4451>
12. Cordeiro LM, Santos DG, Orlandi FS. Qualidade de vida, ansiedade e depressão em pacientes oncológicos em quimioterapia e familiares. *Enferm. foco* [Internet]. 2021;12(3):489-95. Doi: <https://doi.org/10.21675/2357-707X.2021.v12.n3.3801>
13. Silva EM da, Portela RA, Medeiros ALF, Cavalcante MCW, Costa RTA. Family health strategy in rural area: integrative review. *Hygeia* [Internet]. 2018;14(28):1-12. Doi: <https://doi.org/10.14393/Hygeia142801>
14. Peters MDJ, Godfrey C, Mclnerney P, Munn Z, Tricco AC, Khalil, H, editors. Scoping Reviews. In: Aromataris E, Munn Z, editors. *JBI Manual for Evidence Synthesis*. JBI, 2020 [Internet]. Available from: <https://jbi-global-wiki.refined.site/space/MANUAL/4687342/Chapter+11%3A+Scoping+reviews>

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15. Peters MDJ, Godfrey C, Mclnerney P, Munn Z, Tricco AC, Khalil, H, editors. Scoping Reviews: The scoping review framework. In: Aromataris E, Munn Z, editors. *JBI Manual for Evidence Synthesis*. JBI, 2020 [Internet]. Available from: <https://jbi-global-wiki.refined.site/space/MANUAL/4687752/11.1.3+The+scoping+review+framework>
16. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA ScR): checklist and explanation. *Ann Intern Med* [Internet]. 2018;169(7):467-73. Doi: <https://doi.org/10.7326/M18-0850>
17. Stillwell SB, Fineout-Overholt E, Melnyk BM, Williamson KM. Evidence-based practice, step by step: searching for the evidence. *Am J Nurs*. [Internet]. 2010;110(5):41-7. Available from: <https://pubmed.ncbi.nlm.nih.gov/20520115/>
18. Abuidris DO, Elsheikh A, Ali M, Musa H, Elgaili E, Ahmed AO, et al. Breast-cancer screening with trained volunteers in a rural area of Sudan: a pilot study. *Lancet Oncol* [Internet]. 2013;14(4):363-70. Doi: [https://doi.org/10.1016/S1470-2045\(12\)70583-1](https://doi.org/10.1016/S1470-2045(12)70583-1)
19. Carley A, Stratman E. Skin Cancer Beliefs, Knowledge, and Prevention Practices: A Comparison of Farmers and Nonfarmers in a Midwestern Population. *J Agromedicine* [Internet]. 2015;20(2):85-94. Doi: <https://doi.org/10.1080/1059924X.2015.1010059>
20. Feng R, Shen X, Chai J, Chen P, Cheng J, Liang H, et al. Assessment and model guided cancer screening promotion by village doctors in China: a randomized controlled trial protocol. *BMC Cancer* [Internet]. 2015;15(1). Doi: <https://doi.org/10.1186/s12885-015-1688-9>
21. Hue L, Makhoulfi S, N'Diaye PS, Blanchet-Bardon C, Sulimovic L, Pomykala F, et al. Real-time mobile teledermoscopy for skin cancer screening targeting an agricultural population: an experiment on 289 patients in France. *J Eur Acad Dermatol Venereol* [Internet]. 2016;30(1):20-4. Doi: <https://doi.org/10.1111/jdv.13404>
22. Ilgaz A, Gözümlü S. Determination of Colorectal Cancer Risk Levels, Colorectal Cancer Screening Rates, and Factors Affecting Screening Participation of Individuals Working in Agriculture in Turkey. *Cancer Nurs* [Internet]. 2017;41(4):46-54. Available from: <https://pubmed.ncbi.nlm.nih.gov/28731884/>
23. Aboagye JK, Kaiser HE, Hayanga AJ. Rural-Urban Differences in Access to Specialist Providers of Colorectal Cancer Care in the United States. *JAMA Surg* [Internet]. 2014;149(6):537-43. Available from: <https://jamanetwork.com/journals/jamasurgery/full-article/1859987>
24. Carmichael H, Cowan M, McIntyre R, Velopoulos C. Disparities in colorectal cancer mortality for rural populations in the United States: Does screening matter? *Am J Surg* [Internet]. 2019;219(6):988-92. Doi: <https://doi.org/10.1016/j.amjsurg.2019.09.027>
25. Cartaxo AC, Silva DN de A, Costa KCAD, Souza GCA, Martins, ARLA. Rural workers's knowledge about early diagnosis and oral cancer prevention in a Brazilian northeast municipality. *Rev. Ciênc. Plur*. [Internet]. 2017;3(1):51-62. Doi: <https://doi.org/10.21680/2446-7286.2017v3n1ID11696>

26. Chatterjee R, Gupta B, Bose S. Oral Screening for Pre-cancerous Lesions Among Areca-nut Chewing Population from Rural India. *Oral Health Prev Dent* [Internet]. 2015;13(6):509-14. Available from: <https://pubmed.ncbi.nlm.nih.gov/25884042/>
27. Cole AM, Jackson JE, Doescher M. Colorectal Cancer Screening Disparities for Rural Minorities in the United States. *J Prim Care Community Health* [Internet]. 2012;4(2):106-11. Doi: <https://doi.org/10.1177/2150131912463244>
28. Faruque FS, Zhang X, Nichols EN, Bradley DL, Reeves-Darby R, Reeves-Darby V, et al. The impact of preventive screening resource distribution on geographic and population-based disparities in colorectal cancer in Mississippi. *BMC Res Notes* [Internet]. 2015;8:423. Doi: <https://doi.org/10.1186/s13104-015-1352-0>
29. Moyo S. Men's knowledge about prostate cancer: a case study of rural Mhondoro-Ngezi, Kadoma District, Zimbabwe. *Eur J Cancer Care (Engl)* [Internet]. 2016;26(1):e12493. Doi: <https://doi.org/10.1111/ecc.12493>
30. Ngoma T, Mandeli J, Holland JF. Downstaging cancer in rural Africa. *Int J Cancer* [Internet]. 2015;136(12):2875-9. Doi: <https://doi.org/10.1002/ijc.29348>
31. Preston MA, Glover-Collins K, Ross L, Porter A, Bursac Z, Woods D, et al. Colorectal cancer screening in rural and poor-resourced communities. *Am J Surg* [Internet]. 2017;216(2):245-50. Doi: <https://doi.org/10.1016/j.amjsurg.2017.08.004>
32. Castañeda SF, Rosenbaum RP, Gonzalez P, Holscher JT. Breast and cervical cancer screening among rural midwestern latina migrant and seasonal farmworkers. *J Prim Care Community Health* [Internet]. 2012;3(2):104-10. Doi: <https://doi.org/10.1177/2150131911422913>
33. Knoff JS, Harlow SD, Yassine M, Soliman AS. Cervical cancer screening practice and knowledge among Hispanic migrant and seasonal farmworkers of Michigan. *J Prim Care Community Health* [Internet]. 2013;4(3):209-15. Doi: <https://doi.org/10.1177/2150131913476303>
34. Luque JS, Tarasenko YN, Reyes-Garcia C, Alfonso ML, Suazo N, Rebing L, et al. Salud es Vida: a Cervical Cancer Screening Intervention for Rural Latina Immigrant Women. *J Cancer Educ* [Internet]. 2017;32(4):690-9. Doi: <https://doi.org/10.1007/s13187-015-0978-x>
35. Hughes JP, Jose DC, Tuch GH, Fritschi L, Tresham J, Wylie E. Is Step Down Assessment of screen-detected lesions as safe as workup at a metropolitan assessment centre? *Aust N Z J Public Health* [Internet]. 2014;38(1):44-8. Available from: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/1753-6405.12129>
36. Husaiyin S, Han L, Wang L, Ma C, Ainiwaer Z, Rouzi N, et al. Factors associated with high-risk HPV infection and cervical cancer screening methods among rural Uyghur women aged > 30 years in Xinjiang. *BMC Cancer* [Internet]. 2018;18(1):1162. Doi: <https://doi.org/10.1186/s12885-018-5083-1>
37. Zong LJ, Zhang YZ, Yang XS, Jiang J, Cui BX, Qiao YB, et al. Evaluation of several screening approaches Early detection of cancer in rural workers.. for detection of cervical lesions in rural Shandong, China. *Asian Pac J Cancer Prev* [Internet]. 2015;16(5):1907-12. Doi: <https://doi.org/10.7314/APJCP.2015.16.5.1907>
38. Lieber M, Afzal O, Shaia K, Mandelberger A, Du Preez C, Beddoe AM. Cervical Cancer Screening in HIV-Positive Farmers in South Africa: Mixed-Method Assessment. *Ann Glob Health* [Internet]. 2019;85(1):58. Doi: <http://doi.org/10.5334/aogh.37>
39. Zahnd WE, James AS, Jenkins WD, Izadi SR, Fogleman AJ, Steward DE, et al. Rural-Urban Differences in Cancer Incidence and Trends in the United States. *Cancer Epidemiol Biomarkers Prev* [Internet]. 2018;27(11):1265-74. Doi: <https://doi.org/10.1158/1055-9965.EPI-17-0430>
40. World Health Organization. Screening programmes: a short guide. Copenhagen: WHO Regional Office for Europe; 2020. [Internet]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/330829/9789289054782-eng.pdf>
41. National Cancer Institute. National Institutes of Health [Internet]. Screening tests [c2021; accessed 09 jun. 2021]. Available from: <https://www.cancer.gov/about-cancer/screening/screening-tests>
42. Sociedade Brasileira de Oncologia Clínica [Internet]. Notícias [dez. 2019; accessed 09 jun. 2021]. Available from: <https://www.sboc.org.br/noticias/item/1733-brasil-apresenta-piores-indicadores-no-investimento-em-cancer-se-comparado-a-pares-da-america-latina-revela-pesquisa>
43. Global Cancer Observatory [Internet]. International Agency for Research on Cancer [c2021; accessed 06 jul. 2021]. Available from: [https://gco.iarc.fr/today/online-analysis-pie?v=2020&mode=cancer&mode\\_population=continents&population=900&populations=900&key=total&sex=0&cancer=39&type=0&statistic=5&prevalence=0&population\\_group=0&ages\\_group%5B%5D=0&ages\\_group%5B%5D=17&nb\\_items=7&group\\_cancer=1&include\\_nmsc=1&include\\_nmsc\\_other=1&half\\_pie=0&donut=0](https://gco.iarc.fr/today/online-analysis-pie?v=2020&mode=cancer&mode_population=continents&population=900&populations=900&key=total&sex=0&cancer=39&type=0&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&nb_items=7&group_cancer=1&include_nmsc=1&include_nmsc_other=1&half_pie=0&donut=0)
44. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Rastreamento - Cadernos de Atenção Primária n. 29. Brasília: Ministério da Saúde, 2013. [Internet]. Available from: [https://bvsms.saude.gov.br/bvs/publicacoes/cadernoo\\_atencao\\_primaria\\_29\\_rastreamento.pdf](https://bvsms.saude.gov.br/bvs/publicacoes/cadernoo_atencao_primaria_29_rastreamento.pdf)
45. Kupper BEC, Aguiar Junior S, Nakagawa WT, Takahashi RM, Batista RMSS, Bezerra ST, et al. Comparison between an immunochemical fecal occult blood test and a Guaiac based fecal occult blood test in detection of adenomas and colorectal câncer. *Appl Cancer Res* [Internet]. 2018; 38:5. Doi: <https://doi.org/10.1186/s41241-018-0056-x>
46. Soares CSA. Atração e retenção de profissionais de saúde na Estratégia de Saúde da Família: Um estudo na Região Oeste de Minas Gerais. Belo Horizonte. Dissertação [Mestrado em Administração] - Universidade Federal de Minas Gerais; 2020. [Internet]. Available from: <https://repositorio.ufmg.br/handle/1843/34078>
47. Kelly H, Mayaud P, Segondy M, Pai NP, Peeling RW. A systematic review and meta-analysis of studies

evaluating the performance of point-of-care tests for human papillomavirus screening. *Sex Transm Infect* [Internet]. 2017; 93:36-45. Doi: <http://dx.doi.org/10.1136/sextrans-2016-053070>

48. Hurtado-Roca Y, Becerra-Chauca N, Malca M. Efficacy and safety of cryotherapy, cold cone or thermocoagulation compared to LEEP as a therapy for cervical intraepithelial neoplasia: Systematic review. *Rev. saúde pública* [Internet]. 2020; 54:27. Doi: <https://doi.org/10.11606/s1518-8787.2020054001750>

49. Ministério da Saúde (BR), Instituto Nacional de Câncer. [Internet]. Câncer de pele [abr. 2022; accessed 09 jun. 2021]. Available from: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-pele-melanoma>

50. Ministério da Saúde (BR), Instituto Nacional de Câncer. [Internet]. Câncer de boca [c2021; accessed 11 jun. 2021]. Available from: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-boca>

51. Ferreira IG, Godoi DF, Perugini ER, Lancini AB, Zonta R. Teledermatology: an interface among primary and specialized care in Florianópolis. *Rev. bras. med. fam. comunidade* [Internet]. 2019;14(41):2003. Doi: [https://doi.org/10.5712/rbmfc14\(41\)2003](https://doi.org/10.5712/rbmfc14(41)2003)

52. Del Carmen OJM, Emilia GRD, Mares BH, Marcela OJ. Educational interventions on breast cancer in men and women: a necessity in primary healthcare. *Ecancermedicalscience* [Internet]. 2021;15:1255. Doi: <https://doi.org/10.3332/ecancer.2021.1255>

53. Chaves AFL, Pereira UL, Silva AM, Caldini LN, Lima LC, Vasconcelos HCA. Perceptions of nurses of primary health care about the care of oncological patients. *Enferm. foco* [Internet]. 2020;11(2):91-7. Doi: <https://doi.org/10.21675/2357-707X.2020.v11.n2.2880>

54. Brasil. Lei nº 7498, de 25 de junho de 1986. Dispõe sobre a regulamentação do exercício da enfermagem, e dá outras providências. *Diário Oficial da União*. 25 jun. 1986. [Internet]. Available from: [http://www.planalto.gov.br/ccivil\\_03/leis/l7498.htm](http://www.planalto.gov.br/ccivil_03/leis/l7498.htm)

55. Lima ÂRA, González JS, Ruiz M del CS, Heck RM. Nursing interfaces in rural care: an integrative review. *Texto & contexto enferm.* [Internet]. 2020;29:e20180426. Doi: <https://doi.org/10.1590/1980-265X-TCE-2018-0426>

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**Corresponding author:**

Natália Murai Guedes

Email: [natalia.murai@ufpr.br](mailto:natalia.murai@ufpr.br)

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