

OVERVIEW OF ONCOLOGY RESIDENCIES AND THEIR CONTRIBUTIONS TO COMPETENCY- BASED TRAINING FOR PHARMACISTS

*Panorama das residências em oncologia e suas contribuições na
formação por competências de farmacêuticos*

*Panorama de las residencias en oncología y sus contribuciones a la
formación por competencias de farmacéuticos*

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ABSTRACT

Cancer is a major health problem linked to human development indices, demanding qualified professionals. In Brazil, oncology pharmacy practice is regulated, with residency as the gold standard for specialization. However, the absence of national curricular guidelines grants institutional autonomy, causing training inequalities. This cross-sectional, descriptive, and documentary study analyzed the availability of oncology residency positions for pharmacists, their territorial distribution, and the competencies in Political-Pedagogical Projects, using data collected in 2025. Thirty-nine programs were identified, totaling 77 annual positions, with heterogeneous distribution across the country. Qualitative documentary analysis identified 47 common competencies, grouped into five areas, predominantly focusing on patient care. The results indicate a baseline set of competencies but highlight gaps in pedagogical standardization and access to curricular information. This reinforces the urgent need for national benchmarks to align professional training in the field.

Keywords: Competency-based Education. Pharmacy. Oncology.

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RESUMO

O câncer constitui relevante problema de saúde, com incidência e mortalidade associadas aos índices regionais de desenvolvimento humano, demandando assistência por profissionais qualificados. No Brasil, a atuação do farmacêutico oncologista é regulamentada, sendo a residência considerada padrão-ouro para especialização. Entretanto, a ausência de diretrizes curriculares nacionais confere autonomia às instituições, resultando em desigualdades formativas. Este estudo objetiva analisar a oferta de vagas em programas de residência em Oncologia para farmacêuticos, sua distribuição territorial e análise das competências descritas nos Projetos Político-Pedagógicos. Trata-se de estudo transversal, descritivo e documental, com dados coletados em 2025. Foram identificados 39 programas, totalizando 77 vagas anuais, com distribuição heterogênea no país. A análise qualitativa documental identificou 47 competências comuns, agrupadas em cinco áreas, com predominância do cuidado ao paciente. Os resultados indicam um painel mínimo de competências, mas evidenciam lacunas na padronização pedagógica e no acesso às informações curriculares, reforçando a necessidade de referenciais nacionais.

Palavras-chave: Educação Baseada em Competências. Farmácia. Oncologia.

RESUMEN

El cáncer constituye un importante problema de salud pública, con incidencia y mortalidad asociadas a los niveles regionales de desarrollo humano, lo que requiere atención por parte de profesionales calificados. En Brasil, el ejercicio de la farmacia oncológica está regulado, y la residencia se considera el estándar de oro para la especialización. Sin embargo, la ausencia de directrices curriculares nacionales otorga autonomía a las instituciones, lo que genera desigualdades en la formación. Este estudio tiene como objetivo analizar la oferta de plazas en programas de residencia en Oncología para farmacéuticos, su distribución territorial y las competencias descritas en los Proyectos Político-Pedagógicos. Se trata de un estudio transversal, descriptivo y documental, con datos recolectados en 2025. Se identificaron 39 programas, que ofrecen un total de 77 plazas anuales, con una distribución heterogénea en el país. El análisis cualitativo documental identificó 47 competencias comunes, agrupadas en cinco áreas, predominantemente relacionadas con la atención al paciente. Los resultados indican un conjunto mínimo de competencias, pero evidencian vacíos en la estandarización pedagógica y en el acceso a la información curricular, lo que refuerza la necesidad de marcos de referencia nacionales.

Palabras clave: Educación Basada en Competencias. Farmacia. Oncología.

INTRODUCTION

Cancer is a serious public health problem worldwide, ranking among the leading causes of death before the age of 70¹. The National Cancer Institute (NCI) estimates more than 780,000 new cases in Brazil for the biennium 2026-2028² and the projection of global cancer cases could reach 35 million per year by 2050³.

Human Development Index (HDI) are directly related to cancer incidence and mortality rates, as well as to the effectiveness of actions aimed at combating the disease, including prevention, early detection, and treatment. In regions with lower HDI, the main challenge is to optimize available financial resources and efforts in order to make cancer control more efficient, while also promoting equity in access to specialized care^{2,4-5}.

Considering the complexity of this specialized care, which goes beyond physical issues, it is necessary to have a multidisciplinary team to implement actions from prevention to rehabilitation, promote health education, manage and optimize resources, linked to innovation⁶. For professionals in this specialty, where pharmaceutical practice is highlighted, it becomes imperative to ensure robust training in different competencies.

The responsibilities of oncology pharmacists vary according to national policies and regulations, but the complexity of care for patients with neoplasms supports the recommendation for specialized training of these professionals in some countries, such as the United States, Argentina, Italy, the United Kingdom, Japan, Thailand, Singapore, among others⁷⁻⁹.



In Brazil, Resolution 640/2017¹⁰ of the Federal Council of Pharmacy (FCF) establishes the necessary qualifications for pharmacists to practice in oncology, which can be obtained by demonstrating a minimum of three years of experience in the field (this criterion remained valid for 36 months from the publication of the resolution), holding a specialist title issued by the Brazilian Society of Oncology Pharmacists (BSOP), being a graduate of a *lato sensu* postgraduate course recognized by the Ministry of Education (ME) in the area of oncology pharmacy, or holding a residency certificate in oncology.

Health Professionals Residency Programs, established in 2005 and regulated as *lato sensu* postgraduate programs, are forms of in-service training modalities for health professions, except for medicine. Responsible for the collective and interdisciplinary training of professionals, they are organized, regulated, supervised, and evaluated by the Ministry of Education and the Ministry of Health, offering training with 5760 hours of practical and theoretical training¹¹⁻¹².

Given the different ways of qualification pathways, the distinct educational institutions that provide training, and the varied social and political contexts in which they are embedded, it is essential to understand the structure of residency programs offered in Brazil. Furthermore, there is a regulatory and bibliographical gap regarding the learning requirements necessary for the training of oncology pharmacists. Thus, evaluating the political-pedagogical projects (PPPs) or teaching plans of residency institutions can help describe the competencies necessary for this professional training and guide the curricular planning of different specialization modalities, adjusting professional training to technical, managerial, and pedagogical needs. This research aims to characterize the residency programs in oncology and hematology that train specialist pharmacists and contextualize their distribution throughout the national territory. In addition, it analyzes the competencies necessary for the training of specialist pharmacists as described in the political-pedagogical projects of the residency programs.

METHOD

This is a descriptive, cross-sectional, and documentary study with a quantitative-qualitative approach, with the data collected in the year 2025.

To gather information on the availability of places for specialization courses in the multi-professional residency model for pharmaceutical professionals – in the areas of specialization in Oncology and Hematology, Cancerology or related fields in Brazil – the data sources were found on the Federal Council of Pharmacy website, and also on the National Residency Examination (NRE).

Human Development Index (HDI) scores were obtained by consulting the website of the Institute for Applied Economic Research for the year 2025.

After gathering information on available residency positions, a search was conducted for academic documents—such as course syllabi and Political Pedagogical Projects (PPPs)—from these institutions. This was done by consulting the residency program websites or by requesting these documents via email from the program coordinators. These electronic requests were made in duplicate at different times in 2025, with a 15-day interval between submissions, and with read receipts requested. All information obtained was archived and quantitatively analyzed using *Microsoft Excel*®.

Based on the compiled pedagogical projects, competencies were analyzed, understood as the integration of knowledge, skills, and attitudes necessary for the specialist's training, according to the concept proposed by Perrenoud¹³. The term "minimum" or "common" competencies was adopted because it is considered that these can constitute the basis of the residents' training, and can be expanded by additional competencies according to the pedagogical proposal of each institution. Common minimum competencies were considered those identified in at least half of the analyzed documents, according to a criterion defined by the research team as an indicator of greater recurrence. Based on Bloom's taxonomy¹⁴, the nomenclature of competencies was also standardized and classified, according to the proposal of Holle et al.⁹, organizing them into five

categories: Pharmacy Practice; Patient Care; Management; Research and Quality; and Education and Training. The qualitative content analysis of the competencies was conducted with the aid of Nvivo¹⁵ software.

RESULTS

The data will be described in two sections: the first related to the characterization and distribution of residency programs, and the second according to the competencies found in the PPPs.

Overview of Residency Programs in Oncology Pharmacy

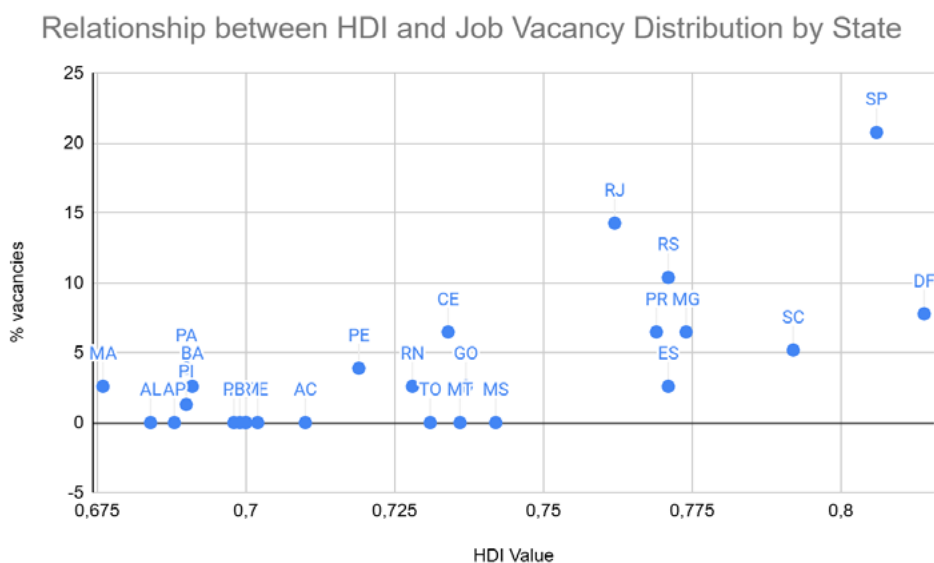
The search for educational institutions that train oncology specialists in the multi-professional residency modality found 39 institutions with active programs, offering approximately 77 annual positions for pharmaceutical professionals, with a median of two positions per year per educational institution.

Among Brazilian states, 16 have residency programs focused on training pharmacists in the areas of Oncology and Hematology. In the South and Southeast regions, all states offer positions in this specialization modality.

In the Central-West region, the state of Goiás and the Federal District offer specialization opportunities for pharmaceutical professionals. In the Northeast, the states of Alagoas, Aracaju, and Paraíba do not offer residency programs for this training. In the North of the country, only the state of Pará offers residency for the training of oncology pharmacists. Regarding admission to specialization programs, 43.58% conduct their selection process through the National Residency Examination (NRE) system, while the others adopt their own selection processes, conducted by the offering institutions.

When the availability of residency positions for training oncology pharmacists is linked to the HDI, states with low HDI values¹⁶ also have fewer or no opportunities for specialization through residency programs, as shown in Graph 1 below.

Graph 1 - Relationship between the Human Development Index of Brazilian states and the availability of residency positions for pharmacists in the field of Oncology.



Source: The authors, 2026

Of the 39 active residency programs, 10 made their pedagogical or teaching projects available via the institution's website or in response to an electronic request. Four of these are from educational institutions

in the South region of Brazil, three from the Southeast, one from the North, one from the Northeast, and one from the Federal District. All the programs that responded offer multi-professional training, that is, with other health professions.

Analysis of the Competencies described in the Political-Pedagogical Projects

The PPPs (Political Pedagogical Projects) of the training institutions did not have a standardized model; however, they presented information and textual organization as recommended in the current regulations¹⁷, such as: data from the training institutions, workloads (practical and theoretical-practical), learning axes, values and sources of scholarships, names and curricula of coordinators and preceptors. There is also a description of the course syllabi, evaluation systems and modalities, internships, description of physical infrastructure for the teaching-learning process and practice scenarios.

The minimum competencies required for the training of a specialist pharmacist were identified from descriptions of the knowledge, skills, and attitudes expected of graduates. These competencies were present in different elements of the analyzed documents, such as: competency descriptions; curriculum matrix; graduate profile; training objectives; professional responsibilities; course syllabi; activities in practice settings; program content; among others.

The common competencies among oncology pharmacists present in all PPPs were: working with multidisciplinary teams; understanding cancer epidemiology; coordinating actions with health services in accordance with public health policies; developing management skills; and understanding the principles of clinical and scientific research in the health field.

In addition to these, another 42 common competencies were listed, distributed according to frequency and categorization, and arranged in Table 1. Patient Care competencies were the most frequent (14), followed by Education and Training (11), Pharmacy Practice (6) and Management (6), Research and Quality (5).

Table 1 - Classification, description and frequency of competencies found in Political-Pedagogical Projects of Residency Programs.

Classification of Competencies	Description of Competencies and Frequency
Pharmacy Practice	Manipulate chemotherapeutic, cytotoxic, mutagenic, teratogenic, and reproductively hazardous agents using aseptic technique (80%); Understand the logistics of supplying medications and hospital and oncology supplies (80%); Demonstrate knowledge of structural requirements for mixing centers/clean areas (70%); Apply good practices in antineoplastic therapy services (70%); Perform dose, stability, and dilution calculations for antineoplastics (60%); demonstrate knowledge of clean area certifications, equipment, and process validation (50%).
Patient Care	Perform diagnosis and management of oncology patients (90%); Review prescribed pharmacotherapy (80%); Carry out activities for prevention, promotion, recovery and rehabilitation of health (80%); Perform pharmacotherapeutic follow-up (70%); Perform clinical pharmaceutical services (70%); Prevent, recognize and manage adverse drug reactions related to cancer treatment (70%); Know the principles of palliative care (70%); Act with principles of humanization in health (60%); Discuss interdisciplinary clinical cases (60%); Perform pharmaceutical interventions (60%); Interpret laboratory tests (60%); Implement and identify care pathways (50%); Identify medication-related problems and medication errors (50%); Assist patients in high-complexity units such as those for Hematopoietic Stem Cell Transplantation (50%).
Research and Quality	Apply ethical principles in health matters (90%); Conduct health surveillance and pharmacovigilance (80%); Develop activities for patient safety (70%); Apply biosafety and occupational health standards (60%); Perform quality control of chemotherapies and compounded parenteral solutions (50%).

Education and Training	Understanding the fundamentals of scientific methodology (90%); Knowing clinical protocols and therapeutic guidelines in oncology and hematology (90%); Participating in seminars (90%); Promoting health education activities (90%); Demonstrate knowledge of pharmacology and antineoplastic pharmacotherapy (80%); Understanding the genetic and molecular basis of cancer (60%); Knowing supportive therapies for cancer treatment (60%); Understanding the different types of oncological and hematological tumors (50%); Knowing oncological emergencies (50%); Knowing the main drug interactions in oncology (50%); Knowing the main pediatric tumors (50%).
Management	To know the legislation and guidelines governing oncology services (90%); To have knowledge of pharmacoeconomic (80%); To know the oncology care networks (80%); To know data on oncology indicators and health determinants (70%); To promote the rational use of medicines (60%); To monitor access demands for the supply of medicines for patients with neoplasms, including high-cost ones (50%).

Source: The authors, 2026

DISCUSSION

Health residency programs constitute a fundamental strategy for training qualified professionals for the Unified Health System, as they promote the integration of teaching, service, and community. They represent one of the most structured forms of specialization, as they combine intensive practice, interdisciplinarity, social commitment, and the development of teamwork. However, despite their advances, these programs face structural and organizational challenges, such as regional inequalities in supply and other weaknesses¹⁸.

Although other forms of specialization in oncology exist, the availability of approximately 77 residency positions per year, heterogeneously distributed throughout the country, may be insufficient to meet the demands of cancer treatment, especially in regions with lower human development indices. This study showed that there are marked regional inequalities in the availability of residency programs in oncology pharmacy: in the South and Southeast regions, all states offer positions in this modality; in the Northeast, about two-thirds of the states have programs; in the Central-West, only half of the state's offer them; and in the North region, only the state of Pará offers residency programs for the training of specialists.

It was identified that the five states with the highest HDI values hold more than half of the residency positions in Pharmacy in the Oncology area. Albuquerque et al.¹⁹ analyzed the distribution of professionals trained through residency and socioeconomic indicators, pointing to positive correlations between the number of specialists and the HDI. Ryan et al.²⁰ also correlated HDI indices and levels of pharmaceutical care in oncology, where regions with lower HDI values have a lower supply of oncology pharmacy services at strategic or highly specialized levels. National studies indicate that participation in health residency programs frequently implies geographical displacement between states and regions of the country, highlighting internal migration as a phenomenon associated with specialization²¹. This national supply scenario may foster internal mobility forced by the need for training and concentration of specialists in large urban centers.

The review conducted by Lima et al.²², which evaluated 32 qualitative studies related to the training of professionals through residency programs, pointed to heterogeneity in the selection processes, a strategic step for the functioning and sustainability of the programs. The coexistence, in Brazil, of distinct selection models such as National Residency Examination (NRE). and institutional selection processes reinforces the diversity in admission formats, potentially influencing the profile of selected candidates, territorial mobility, and the adaptation conditions of residents. The adherence of more than 40% of institutions to selection through National Residency Examination (NRE) suggests a movement towards the progressive normalization of admission processes, with a potential impact on transparency and equitable access to residency programs.

The return of the requested PPP (Pedagogical Project Plan) documentation to institutions offering specialization through Pharmacy Residency in Oncology and Hematology was limited to only 25% of the identified programs, but with representation from all Brazilian regions. This highlights a gap in transparency

and access to this information, which should be publicized and accessible, especially to candidates and incoming residents.

Although the PPPs are guided by the organization proposed by the National Commission for Multiprofessional Health Residency (NCMHR), the information described was not uniform and standardized among the different documents, with terminological divergences and a lack of clarity in the determination of formative competencies. Miranda Neto et al.²³ analyzed the PPPs of Multiprofessional Health Residency programs and also found important weaknesses, such as: incomplete information, conceptual heterogeneity, gaps in the definition of competencies, and inconsistencies between formative objectives and proposed pedagogical practices.

Within the scope of undergraduate studies, the publication of the National Curriculum Guidelines (NCG) for health professions has aided in the curricular development of health training programs, overcoming the academic limitations of undergraduate studies through interprofessional development and... approaching the needs of the Health System²⁴. In the context of health residencies, NCMHR Resolution 2/2012¹⁷ provides general guidelines that govern the programs, stating that these should adopt pedagogical strategies capable of using and providing learning scenarios aligned with the itinerary of care lines in health care networks.

They also point to the need to adopt methodologies and devices for the management of expanded clinical practice, with a view to training based on comprehensive, multi-professional and interdisciplinary care, which allow the building of shared competencies in a dynamic way. Thus, the programs are responsible for organizing their own Pedagogical Projects and have autonomy for internal organization according to their human and structural resources. However, the absence of specific and detailed National Curriculum Guidelines for these programs may contribute to the heterogeneity observed in the review of teaching plans and pedagogical difficulties with management, coordination and preceptorship, reported in studies²²⁻²³.

Several international guides and references address the development of expert competency panels that support practice in Oncology Pharmacy, such as the documents produced by the *International Society of Oncology Pharmacy Practitioners* (ISOPP)²⁰, the *Pharmaceutical Society of Ireland* (PSI)²⁵, the *International Pharmaceutical Federation* (IPF)²⁶, the *Pharmaceutical Society of Australia* (PSA)²⁷, the *British Oncology Pharmacy Association* (BOPA)²⁸, the *Canadian Association of Pharmacy in Oncology* (CAPHO)²⁹, the *American Society of Health-System Pharmacists* (ASPH)³⁰, the *European Society of Oncology Pharmacy* (ESOP)³¹, among others.

In the Brazilian context, it is necessary to list the minimum knowledge, skills and attitudes required for professional training, and the content taught in residency programs – the gold standard for specialist training – can constitute essential indicators for the competency panel^{18,22}.

The results highlight the existence of a common core of competencies present in all the analyzed PPPs, indicating minimal convergence regarding the expected profile of the oncology pharmacist trained through residency programs. Integrated work in multidisciplinary teams, knowledge of cancer epidemiology, coordination with health services according to current public policies, mastery of management fundamentals, and understanding of the principles of clinical and scientific research constitute cross-cutting competencies that reflect the complexity of oncological care and the strategic insertion of the pharmacist in health care⁹.

In the analysis of competencies present in the various didactic elements that make up the PPPs of the Oncology Pharmacy residency programs, and according to the classification of Holle et al.⁹, competencies related to Patient Care were the most prevalent and encompass several behaviors related to clinical pharmaceutical services³². This predominance may be associated with the need to complement clinical training after a generalist degree in Pharmacy, an aspect already evidenced by Souza et al.³³, who demonstrated the limited presence of pedagogical components focused on pharmaceutical care in the curricula of undergraduate courses. Thus, residency emerges as a privileged space for the development of advanced clinical competencies, especially in highly complex scenarios.

The competencies related to Education and Training cover pedagogical and scientific topics related to knowledge of the theoretical foundations of Oncology and Hematology, portraying cancer pathology, therapeutic protocols and guidelines, among others. Consistent with what is proposed in international competency guidelines^{27,28}, they are the basis of study for all specialist training and indicate attention to aligning training with the complexity of oncological care.

The competencies related to Pharmacy Practice listed specific knowledge and skills from the technical-operational axis, ranging from the structuring of clean areas and the operation of biological safety cabinets to the handling of chemotherapeutic agents using appropriate techniques. The ISOPP²⁰ also lists operational competencies such as the adoption of Good Manufacturing Practices. This balance between clinical and technical competencies reinforces the uniqueness of Oncology Pharmacy as a specialized practice area.

Research and Quality Competencies especially involved activities related to patient and occupational safety, such as pharmacovigilance, strategic dimensions of health systems. The American matrix ASHP³⁰ describes the need for adherence to safe practices to ensure quality and safety in the preparation process. The British BOPA²⁸ refers to the competence of knowledge of the risks of exposure to products and waste.

Management competencies relate to knowledge of legislation, pharmacoeconomic, indicators, and access, reflecting concrete challenges in the organization of oncological care in Brazil. A descriptive and exploratory study that evaluated managerial knowledge among undergraduate students in the health field showed that course coordinators have limited perception and experience on the subject, and students demonstrate insufficient preparation to act in management³⁴. Thus, residency programs can constitute a strategic space for acquiring initial management content after graduation. Management competencies related to leadership and effective communication were not found in the PPPs (Political Pedagogical Projects).

Defining minimum training competencies based on the wording of the PPPs that offer specialization under the Pharmacy residency modality, with a focus on Oncology and Hematology, can provide technical support to guide various educational institutions in adapting their proposals to training needs, including the use of innovative active learning methodologies³⁵.

Key limiting factors include the lack of curricular guidelines (DCBs) to guide the development of these projects; structural and human resource inequalities within the institutions; the absence of formal evaluation processes conducted by the Ministry of Education (ME) – such as the National Higher Education Evaluation System – applicable to residency programs that would allow for the correlation of training content with student performance; the limited documentary feedback available to approximately 25% of the programs contacted in this study; and the standardization of nomenclature carried out by the research team itself.

CONCLUSIONS

It is important that educational institutions ensure public access to PPPs (Political Pedagogical Projects) and teaching plans, in accordance with the principles of transparency and social control that guide public health and education policies in Brazil.

Similarly, these programs need methodological resources capable of promoting the effective acquisition of the skills required for professional practice, aligned with the guidelines for health education. Defining minimum competencies for specialist training contributes to ensuring robust and socially oriented training, given the ongoing need for review and updating.

Establishing these benchmarks can promote greater educational equity and coherence among residency programs, without compromising institutional autonomy, and can also serve as a reference for postgraduate specialization programs and complementary training. Furthermore, such benchmarks can assist in developing a competency framework for oncology pharmacists and guide quality assessment, accreditation, and certification systems.

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