Patients With Breast Cancer: Report From a National Hospital–Based Cancer Registry in Argentina, 2012 to 2016

Purpose To describe sociodemographic, epidemiologic, and clinical characteristics of patients who were diagnosed with breast cancer and registered in the Institutional Tumor Registry of Argentina (RITA) as of April 2016.

Methods This was an observational, descriptive case study in patients who were diagnosed with breast cancer between April 2012 and April 2016 and registered in RITA. Quantitative and qualitative analyses were done, including delay from symptoms to first consultation, delay from diagnosis to treatment (opportunities), as well as patients' survival (Kaplan-Meier and log-rank tests).

Results There were 4,883 identified patients and 4,950 tumors. The mean age of patients was 57.6 years (median, 56 years); 60% of patients had completed elementary studies, 46.8% had some health coverage, and 85.4% of diagnoses were made by tumor histology (TNM stage: T2 19%, N0 20%, M0 29.1%; clinical stages II and III: 34.7%). In terms of morphology, 89.6% of primary tumors had malignant behavior (76% ductal, 8% lobular); and for immunohistochemistry, 34.3% were estrogen receptor positive/progesterone receptor positive/human epidermal growth factor receptor 2 negative. The longest delays analyzed were from diagnosis date to the beginning of first treatment. Survival rates were 96% for up to 24 months and 84.7% for up to 36 months.

Conclusion For the first time in Argentina, there is systematized information on the care of oncology patients at public health institutions, which is useful for improving patients' care. We found that RITA collects important information for the identification of groups with similar sociodemographic and clinical characteristics that could show different vulnerabilities along the disease process.

INTRODUCTION

Breast cancer is the most frequent malignant tumor among women worldwide. In 2012, there were an estimated > 1.5 million new cases, slightly increasing in less developed regions, with incidence rates between 27 per 100,000 women in middle Africa and 92 per 100,000 women in northern America, ie, Canada and the United States.[1,2]

In relation to mortality, breast cancer represents the most frequent cause of death among women in less developed regions and the second most frequent cause in most developed ones, with mortality rates between six (East Asia) and 20 deaths (western Africa) per 100,000 women.[2]

In the Americas, the situation among countries is variable. If the countries with the highest and lowest rates in the region are compared, Guatemala presents an incidence rate of 11.9 per 100,000 women and a mortality rate of 5 per 100,000 women, whereas the Bahamas presents a 98.9 per 100,000 women incidence rate and a 26.3 per 100,000 mortality rate in women. In North America, the country with the highest incidence and mortality rates in 2012 was the United States (92.9 and 14.9 per 100,000 women, respectively) and in South America, it was Uruguay (69.8 and 22.7 per 100,000 women, respectively). There is a clear difference in patients' survival among countries.[2]

Argentina has an incidence and mortality pattern similar to that of developed countries. It had an estimated incidence in 2012 of 71.2 per 100,000 women[2] and a mortality rate in 2014 of 19.9 per 100,000 women. However, within the country, there are varied mortality patterns, with rates between 11.1 and 22.4 per 100,000 women (Jujuy and La Pampa provinces, respectively). It is important to mention that Jujuy is one of the provinces with the highest percentage of population with unsatisfied basic needs, whereas La Pampa is one of the provinces with a lower percentage of population with unsatisfied basic needs.[3] Furthermore, according to breast cancer characteristics, it is common to find higher rates in developed areas.

María Graciela Abriata

Guillermo Raúl Macías

Author affiliations appear at the end of this article.

Corresponding author: María Graciela Abriata, MD, MEpidem, Instituto Nacional del Cáncer, Av Julio A. Roca 781, Piso 9° C1067ABO – CABA, Argentina; e-mail: gracielaabriata.inc@gmail.com.

Mortality trends in Argentina are declining. From 2000 to 2014, mortality trends in the country as a whole declined, with an estimated percentage of annual change of negative 2.1% in the last years of the period (data elaborated by the Cancer Epidemiological Surveillance and Report System of the National Cancer Institute on the basis of data from the Division of Health Statistics and Information of the Ministry of Health of Argentina).[1] This trend is different if each province is considered: between 1997 and 2011, nine provinces presented declining trends, 11 had increasing trends, and there were four with almost no change.[4]

In 2010, the Cancer Epidemiologic Surveillance and Report System, part of the National Cancer Institute of the Ministry of Health, was established (SIVER-Ca–INC). One of the components of the system is the Institutional Cancer Registry of Argentina (RITA). This is a hospital-based registry developed on an online platform centralized at INC, with restricted access to users. It collects information on patients, tumors, diagnoses, and oncologic treatment processes. The information provided by this registry contributes to health services planning, improving oncology patient health care and follow-up, and comparing results. Furthermore, it is essential information for population-based cancer registries and future epidemiologic research, and it also contributes to rational management decisions for the diminution of inequities in cancer burden.

The aim of this article is to describe the sociodemographic, epidemiologic, and clinical characteristics of women with breast cancer registered in RITA between April 2012 and April 2016.

METHODS

This was an observational study analyzing cases with a diagnosis of breast cancer (C50*) registered in RITA between April 2012 and April 2016.

The case definition in RITA includes any person of any sex, age, and place of residence diagnosed (in or out of institution) with malignant neoplasm; CNS neoplasm with uncertain or benign behavior; or neoplasm in situ of breast, cervix, bladder, or melanoma, who contacted the institution and whose diagnosis had been made from a defined date. This definition includes all cases with a diagnosis of malignant tumor that, according to the International Classification of Diseases for Oncology,[5] present a code of primary malignancy behavior (/ 3). The cases diagnosed from a metastasis, in which the primary tumor was not found, are recorded as "Topography

(C80.9) - Unknown primary site"; "Behavior: malignant, primary site."

Frequency analyses of selected variables were performed. For the numerical variables, centralization and dispersion measures and simple frequencies by groups/strata were calculated.

The variables analyzed were age, education level, health coverage, tumor size, lymph node involvement, presence of metastases, clinical and pathologic stage (TNM),[6] differentiation degree,[7] presence of multiple primary and other tumors, hormone receptors (estrogen receptor [ER] and progesterone receptor [PR]), and human epidermal growth factor receptor 2 (HER2) overexpression.

An analysis of the time in months between the onset of symptoms and the first appointment at the institution was performed, as well as time between the first medical consultation and the diagnosis, and time between the diagnosis and the beginning of the first treatment (called delays). Because the results showed non-normal distributions, the median and quartiles 1 and 3 were calculated and presented in box plots for better interpretation.

Finally, the survival probability was calculated using the Kaplan-Meier technique. Comparisons between groups were made on the basis of different immunohistochemical profiles, patient age younger or older than 40 years, according to tumor morphology with more frequent malignant behavior, between clinical stages (I and II v III and IV), and in the presence or absence of axillar nodes, to evaluate whether the differences between groups were significant using the log-rank test (establishing a significance level of 5%). The STATA SE 12.0 program was used.

Data in RITA are protected under the Law 25.326 and the Decree 1558/2001 of Personal Data Protection.

RESULTS

Total usable records in RITA between June 2012 and April 2016 included 27,504 tumors, of which 16,004 were in women. A total of 4,883 patients and 4,950 tumors were identified with breast cancer, representing 18% of all tumors (31% among women). These data were registered by 40 hospitals distributed in 20 of the country's 24 provinces.

The group of patients 55 to 59 years of age had the most cases (14.4%), and 50% of the cases recorded were in patients between 50 and 69 years old. Women younger than 40 years accounted for 8.9% of the cases, and those older than 74 years

Table 1. Sociodemographic Characteristics of Patients With Breast Cancer (N = 4,883) From Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016

Variable	No. of Patients	(%)
Age group, years		
< 30	59	1.2
30-34	118	2.4
35-39	258	5.3
40-44	425	8.7
45-49	632	12.9
50-54	666	13.6
55-59	703	14.4
60-64	623	12.8
65-69	421	8.6
70-74	350	7.2
75-79	253	5.2
≥ 80	327	6.7
Unknown	48	1.0
Education level		
Initial	9	0.2
Primary	1,505	30.8
Secondary	740	15.2
Tertiary/university	245	5.0
Other	4	0.1
Unknown	2,380	48.7
Health coverage		
OOSS and PAMI	73	1.5
Only OOSS	1,139	23.3
Only PAMI	1,075	22.0
Only public sector	1,987	40.7
Unknown	609	12.5

Abbreviations: OOSS, health care services managed by trade unions; PAMI, National Institute of Social Services for Retirees and Pensioners.
Source: SIVER-Ca on the basis of records in the Institutional Tumor Registry of Argentina. INC, April 2016.

Approximately 85% of tumors (n = 4,228) were diagnosed by primary tumor histology, of which 1.8% were described as multiple primaries and 3.4% presented tumors other than breast cancer.

With regard to the clinical stage and TNM stage, 19% were T2, 20% had no palpable lymphadenopathy (N0), and only 4.2% of the cases reported distorted metastases. It can be observed that more of the registered tumors presented clinical stage II (18.6%) than III (16.1%; Table 2). Seventy-six percent of the registered breast cancer tumors were reported as ductal carcinomas, and 8% were reported as lobular (with 2.3% as unknown histologic variant).

Table 2. Clinical Features of Breast Tumors (N = 4,950) From Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016

Variable	No. of Tumors	(%)
Tumor size		
TX	114	2.3
T0	7	0.1
Tis	53	1.1
T1	615	12.4
T2	945	19.1
T3	386	7.8
T4	343	6.9
Unknown	2,487	50.2
Nodal involvement		
NX	223	4.5
N0	990	20.0
N1	763	15.4
N2	372	7.5
N3	95	1.9
Unknown	2,507	50.6
Metastasis		
MX	774	15.6
M0	1,442	29.1
M1	210	4.2
Unknown	2,524	51.0
TNM clinical stage		
0	51	1.0
I	423	8.5
II	922	18.6
III	796	16.1
IV	316	6.4
Unknown	2,442	49.3

Source: SIVER-Ca on the basis of records in the Institutional Tumor Registry of Argentina. INC, April 2016.

accounted for 11.9% (Table 1). The mean age was 57.6 years; median, 56 years; and mode, 59 years; with an interquartile range of 19 years (quartile 1 = 47, quartile 3 = 66) and a standard deviation of 14.9 years.

Information on education level was obtained in 51.3% of the women (Table 1), of whom approximately 60% were enrolled or had completed the primary level, and approximately 30% had completed the secondary level.

At the time of registration, 2,287 women (46.8%) had some type of health coverage (Table 1). The rest of the patients only had public health system coverage or their situation was unknown. No patient reported paying for prepaid or private insurance.

Information on diagnostic procedure was obtained in 97.7% of cases; 91% of the tumors were diagnosed by histologic analysis, and only in 0.2% was the diagnosis made by death certificate.

A moderate or poor degree of differentiation was found in 60.9% of tumors, predominantly in grade 2 (moderately differentiated; Table 3). The presence of hormone receptors was observed in 50.1% of tumors for estrogen and in 45.2% for progesterone. Regarding the molecular profile, the ER-positive/PR-positive/HER2-negative combination was observed in 1,696 tumors (34.3%).

Patients who had received surgical treatment represented 24.5% of the cases (1,215 tumors); 28%

of them were classified as stage II, and approximately 15% each as stage I and III (Table 3).

Analyzing the diagnostic and therapeutic opportunities (Fig 1), the median delay between the first medical consultation and the diagnosis was 0.9 months (quartile 1 = 0.3 and quartile 3 = 2.2 months; mean, 2.2 months) and between diagnosis and the first treatment was 1.4 months (quartile 1 = 0.3 and quartile 3 = 2.7 months; mean, 2.9 months).

The overall survival rate at 12 months was 96% (95% CI, 94.8% to 97.0%) and 84.7% at 36 months (95% CI, 80.1% to 88.3%). A significant difference in survival was observed between the immunohistochemical profiles ER positive/PR positive/HER2 negative versus ER negative/PR negative/HER2 positive; P = .0179), between patients with axillary-negative versus axillary-positive nodes (P = .0054), and between grouped clinical stages (P = .0054; Fig 2). No significant differences were found when comparing survival between patients younger or older than 40 years (P = .1506). The values are listed in Table 4.

DISCUSSION

The results of this study show that breast tumors were the most frequently registered by the 40 institutions included in RITA during the analyzed period (95% were public health institutions; only five of them had > 3 years of registry activity, and 62% had begun the registry with cases diagnosed in 2014). This frequency could be a result of the incidence and prevalence of breast cancer in Argentina, similar to what is found in more developed regions. Frequencies similar to or greater than those found in this study have been reported in studies done on the basis of hospital records from the United States;[8] Thailand;[9] San Luis, Argentina;[10] Turkey;[11] or Nigeria.[12] However, lower values have also been reported,[13-16] probably as a result of differences in socioeconomic contexts and health processes (higher-lower screening, for example).

It was observed that the frequency of patients registered in RITA increased from 45 years of age; in Argentina, the frequency of incident cases increased after 50 years of age, which would explain the occurrence mentioned in the last paragraph. A varied range of ages was observed in the consulted literature. Some hospital records from Asia and Africa[9,12,13,17-20] show higher frequencies in younger patients; records from San Luis (Argentina), the United States, and Spain[8,10,14] report older patients. Only Brazil[21] reported similar values. This difference indicates that in

Table 3. Frequency of Breast Tumors According to Histologic Characteristics (N = 4,950) From Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016

Variable	No. of Tumors	(%)
Histologic grade		
Well differentiated (grade 1)	428	8.6
Moderately differentiated (grade 2)	1,992	40.2
Poorly differentiated (grade 3)	1,023	20.7
Undifferentiated (grade 4)	47	0.9
Unknown	1,460	29.5
ERs		
Yes	2,479	50.1
No	616	12.4
Unknown	1,855	37.5
PRs		
Yes	2,236	45.2
No	854	17.2
Unknown	1,860	37.6
Molecular profile		
ER positive/PR positive/HER2 negative	1,696	34.3
ER negative/PR negative/HER2 positive	208	4.2
Triple positive	284	5.7
Triple negative	285	5.8
Other	650	13.1
Unknown	1,827	36.9
TNM pathologic stage		
0	20	1.7
I	180	14.8
II	339	27.9
III	185	15.2
IV	34	2.8
Unknown	457	37.6

Abbreviations: ER, estrogen receptor; HER2, human epidermal growth factor receptor 2; PR, progesterone receptor.
Source: SIVER-Ca on the basis of records in the Institutional Tumor Registry of Argentina. INC, April 2016.
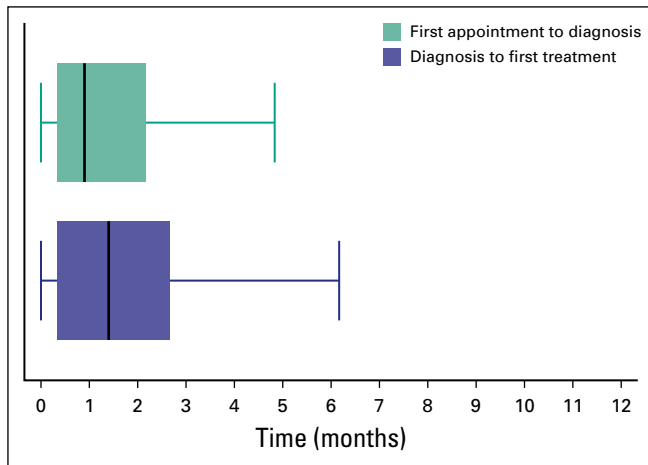
Fig 1. Diagnostic and treatment delays in patients with breast cancer. Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016.

Fig 2. Survival probability of patients with breast cancer at 12 and 36 months, according to clinical stages. Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016.

less-developed regions, breast cancer occurs in younger women, a fact that has already been described in the literature.[22,23]

Information about education level was stated only in 51% of the recorded patients with breast cancer. More than half of these patients were attending or had completed primary education (90% of cases are reached when adding those with a secondary level). This information is critical because, although the association between high education level (as an approximation of socioeconomic level) and increased risk of breast cancer is well documented,[24,25] several articles have also reported on the relationship between higher education level and lower mortality and better survival rates, probably mediated by better knowledge of and attitudes toward pathology.[26-30]

Regarding health coverage, excluding the public sector, this study shows that almost half of the patients had some kind of health insurance (National Institute of Social Services for Retirees and Pensioners, health care services managed by trade unions). In some countries, the absence
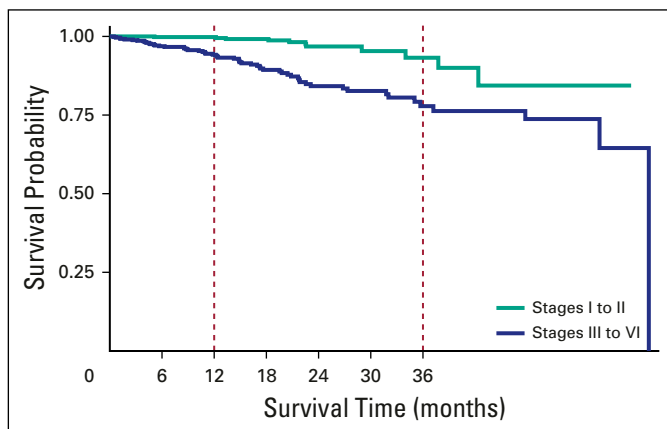
of health insurance is related to worse outcomes.[31] In others, public health systems have specific programs to cover women.[32] The health system in Argentina is composed of a subsector of universal access (the public sector), the private subsector (prepaid), and health care services managed by trade unions/National Institute of Social Services for Retirees and Pensioners. Paradoxically, Piñeros et al[26] point out that in Colombia, there are greater delays in treatment for patients with state-subsidized medical care, even greater than for women without any coverage. Unfortunately, in our study, we could not analyze diagnostic and treatment delays stratified according to health coverage, because of the low percentage of cases with complete data (15%).

An important evaluation measure of diagnostic quality, performed by the health care services, is the method by which the diagnosis was obtained (percentage of cases diagnosed by primary tumor histology).[33] In our case, the percentage (91%) is acceptable for the International Agency for Research on Cancer quality criteria (between 60% and 70% of cases).[34] Other records also refer to frequencies between 80% and 100%.[12,14,17,21]

Tumor stage at time of diagnosis contributes to the definition of prognosis and treatment in each case and subsequent evolution. Among patients registered in RITA, one-third acceded to the diagnosis in stages II and III, as in Brazil.[21] In the United States and Malaysia-Singapore (middle-to-high and high-income countries), 64% to 66% of women are diagnosed in stages I and II,[8,18] and in Indonesia and Thailand, 40% to 45% in stages III and IV.[9,13] These findings are consistent with studies that recognize socioeconomic status as a prognostic factor of tumor stage at the time of diagnosis and its evolution.[27-29,35-37]

The most frequent morphologic type of tumor observed in patients included in RITA was ductal carcinoma (histologic differentiation grade 2), coinciding with consulted literature[38] and various hospital records (although in different proportions).[8,9,12-14,16,19-21] Also, regarding the immunohistochemical profile, one-third of patients presented with the ER-positive/PR-positive/HER2-negative subtype, the most frequent and least aggressive.[39,40]

The greatest delays were observed for initiation of treatment. Fifty percent of women were delayed between 9 and 66 days to access the diagnosis after the first appointment, and between 9 and

Table 4. Survival Probability of Patients With Breast Cancer at 12 and 36 Months, According to Several Categories From Records in the Institutional Tumor Registry of Argentina, April 2012 to April 2016

Categories	Time (months)	No. of Cases	No. of Deaths	Survival Probability (%)	95% CI
Global					
	0.03	1,600	1	99.9	99.6 to100.0
	12	835	49	96.0	94.8 to 97.0
	36	102	42	84.7	80.1 to 88.3
Immunohistochemical profile					
ER positive/PR positive/HER2 negative	0.07	645	0	100.0	—
	12	395	5	99.0	97.7 to 99.6
	36	57	12	92.4	86.8 to 95.7
ER negative/PR negative/HER2 positive	0.6	94	0	100.0	—
	12	67	3	96.4	89.1 to 98.8
	36	10	5	73.3	47.8 to 87.7
Triple positive	1.2	95	0	100.0	—
	12	60	1	98.6	90.6 to 99.8
	36	8	4	88.7	73.4 to 95.5
Triple negative	0.5	129	0	100.0	—
	12	79	3	96.8	90.3 to 99.0
	36	10	4	84.2	58.3 to 94.7
Other	0.8	183	0	100.0	—
	12	109	6	95.8	90.7 to 98.1
	36	10	8	72.7	49.6 to 86.6
Unknown	0.0	457	1	99.8	98.5 to100.0
	12	131	31	89.5	84.9 to 92.7
	36	16	9	78.2	68.8 to 85.1
Clinical stage					
Stages I and II	0.03	567	0	100.0	—
	12	330	1	99.8	98.5 to 100.0
	36	36	2	93.2	84.9 to 97.0
Stages III and IV	0.07	520	0	100.0	—
	12	308	25	94.2	91.5 to 96.1
	36	54	6	77.8	70.4 to 83.6
Axillary nodes					
Negative	0.03	404	0	100.0	—
	12	250	1	99.7	98.0 to 100.0
	36	26	3	95.5	81.8 to 98.9
Positive	0.03	436	1	99.3	95.4 to 99.9
	12	293	9	97.6	95.5 to 98.8
	36	60	13	88.5	81.7 to 92.9

Abbreviations: ER, estrogen receptor; HER2, human epidermal growth factor receptor 2; PR, progesterone receptor.
Source: SIVER-Ca on the basis of records in the Institutional Tumor Registry of Argentina. INC, April 2016.

81 days to begin the first oncologic treatment after diagnosis. These times are longer compared with those found in other studies and registries,[14,41] although lower than those reported in other investigations.[21,26,42] Diagnostic delay would generally be related to factors dependent on the health system, such as unequal supply of mammography diagnostic equipment and trained radiologists in breast imaging, as well as cultural issues inherent to patients (eg, education

level).[26] Delays in treatment may be the result of an increase in the number of women requiring treatment, with a likely decrease in treatment resources,[43] as well as in personal situations (education level, socioeconomic level) or affiliation with a health coverage system.[26] The correction of these delays is fundamental to attenuating their consequences, especially considering the stage in which patients arrive at the first medical appointment.

In the RITA database, there are few cases that were old enough to reach 5 years of follow up; therefore, survival was described at the first and third years. The first-year survival rate was high (96.0%), similar to that of the United Kingdom, although at 36 months it was 7% lower,[44] which would indicate a worse long-term evolution of the disease among our patients, probably as the result of accessibility issues. Without data on 5-year survival, results show an intermediate position among countries such as the United States, the United Kingdom, Canada, Central and Southern Europe, and nations such as Brazil, Eastern Europe, some of Asia, and Oceania.[45,46] Comparisons between countries should be interpreted with care, because there are many factors that vary in investigations (period analyzed, included population, quality of data, statistical methodology, and biases because of the presence or absence of screening).[47] Another issue is that most of the patients could not reach the 5-year follow-up. Therefore, time analyzed (1 and 3 years) may be insufficient to have a clear idea of the trend in patient survival, which is another reason comparisons should be made with caution.

Regarding survival in different profiles and stages, the differences found between immunohistochemical profiles, presence or absence of axillary nodes, and clinical stages are also observed in the literature consulted.[18,40]

The percentage of unknown data for certain variables (TNM/stages, hormone receptors, dates for survival) and the geographic coverage of RITA (40 institutions in 20 of the 24 Argentine provinces) are the main limiting factors of the study results, because they could lead to biased results. However, the findings do not contradict those presented in the various studies surveyed, so it could be thought that loss of information would not have much influence on results. The future goal is to improve the quality of the registers and increase the geographical coverage of RITA.

In conclusion, to our knowledge this is the first time in Argentina that systematized data are available on process of care in public health institutions for patients with cancer, which can be used to improve the quality of care. We have observed that RITA reveals important information that allows the identification of subgroups of patients who, as a result of their sociodemographic and clinical characteristics, could present different vulnerabilities in the evolution of their disease. For example, in our view, this is the first time that data on diagnosis and treatment delays and survival of patients with breast cancer from hospital-based registries have been published in Argentina.

However, data collected have high percentages of unknown data for several variables, and too short of follow-up. Therefore, information obtained must be considered as a baseline that needs to be contrasted in the future with higher-quality data and longer observation periods.

Even recognizing the limitations of the registry, we can say that the potential of the information provided by RITA allows us to have approximate national and regional profiles of patients diagnosed with breast cancer, in addition to identifying critical points in the continuum of care, which can be optimized for the best care of patients. There is also the possibility, in the future, to monitor the evolution of survival and opportunities in the different subgroups of identified patients.

We must not forget that RITA is a young registry, and that is one of the main reasons for short follow-up. As a solution to this issue, the authorities of the National Cancer Institute agreed to establish a program of patient navigators[48] to ensure the follow-up of patients registered in RITA and to improve their rates of survival. Undoubtedly, RITA presents itself as a significant tool for the management of care organizations, and as a facilitator of control and evaluation actions for the treatment of patients with breast cancer. The improvement of these care processes will surely have a positive impact on the survival observed to date. From this work, we will prioritize actions in RITA that tend to improve the follow-up of patients. This may result in an apparent decrease in the survival of these patients in future analyses as a result of the higher quality of follow-up data and longer observation periods.

Affiliations

María Graciela Abriata and **Guillermo Raúl Macías**, Instituto Nacional del Cáncer, Buenos Aires, Argentina

REFERENCES

1. International Agency for Research on Cancer: Cancer Incidence in Five Continents Volume X. Lyon, France: International Agency for Research on Cancer, 2014. https://www.iarc.fr/en/publications/pdfs-online/epi/sp164/CI5volX_Full.pdf

2. International Agency for Research on Cancer: Cancer Fact Sheets. GLOBOCAN 2012. http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx

3. Instituto Nacional de Estadística y Censos: Porcentaje de hogares y de población con Necesidades Básicas Insa-tisfechas (NBI), según provincia - Total del país - Años 2001 y 2010. www.indec.gov.ar/ftp/cuadros/sociedad/sesd_09a01.xls

4. Abriata G, Roques L, Macías G, et al. Atlas de Mortalidad por Cáncer en Argentina 2007-2011. Instituto Nacional del Cáncer - Ministerio de Salud de la Nación, Buenos Aires. http://www.msal.gov.ar/inc/images/stories/downloads/publicaciones/29-Atlas-de-mortalidadopt.pdf

5. Fritz A, Percy C, Jack A, et al (eds): Clasificación Internacional de Enfermedades para Oncología: CIE-0, 3rd Ed. Organización Panamericana de la Salud, Washington, DC, 2003

6. Sobin L, Gospodarowicz M, Wittekind C (eds): TNM classification of malignant tumours, 7th Ed. John Wiley & Sons, New York, 2011

7. Frederick L, Page DL, Fleming ID, et al (eds): AJCC cancer staging manual, 7th Ed. Vol. 1. Springer Science & Business Media, New York, 2010

8. American College of Surgeons: National Cancer Data Base (NCDB) - Commission on Cancer (CoC). http://oliver.facs.org/BMPub/index.cfm

9. Hospital Based Cancer Registry: Annual Report 2013. Bangkok, Thailand: National Cancer Institute. http://www.nci.go.th/th/File_download/Nci Cancer Registry/HOSPITAL-BASED 2013 All (Online) (1).pdf

10. Romero Guiñazú D, Suárez L. Registro Hospitalario de Tumores en la Provincia de San Luis. Período 2004-2007. Centro Integral Modelo de Oncología Clínica San Luis, San Luis, Argentina. http://www.oncologiasanluis.com.ar/archivos/registro2009.pdf

11. Kutluk T, Mutlu Hayran K, Kilickap S, et al: Increasing performance of a hospital-based cancer registry: Hacettepe University hospitals experience. J BUON 18:1088-1096, 2013

12. Afolayan A, Olaoye O, Adesina M, et al: Breast cancer trends in a Nigerian population: An analysis of cancer registry data. Int J Life Sci Pharma Rev 2:29-34, 2012.

13. Sibuea WH, Mangunkusumo RR, Akbar N, et al: Hospital based cancer registry in Cipto Mangunkusumo hospital Jakarta. Med J Indones 9:181-203, 2009

14. Registro Hospitalario de Tumores del Servicio de Salud del Principado de Asturias. Oviedo: Conserjería de Sanidad del Principado de Asturias, Dirección de Salud Pública. https://www.asturias.es/Astursalud/Ficheros/AS_SESPA/Memoria ReHoTu_2015.pdf

15. Puri S, Ashat M, Pandey A, et al: Socio-demographic characteristics of cancer patients: Hospital based cancer registry in a tertiary care hospital of India. Indian J Cancer 51:1-4, 2014

16. Consolidated Report of Hospital Based Cancer Registries 2012-2014. An Assessment of the Burden and Care of Cancer Patients. Bengaluru, India: Indian Council of Medical Research (ICMR-NCDIR-NCRP). http://www.icmr.nic.in/ncrp/hbcr_2012-14/ALL_CONTENT/PDF_Printed_Version/Preliminary_Pages.pdf

17. Sriamporn S, Black RJ, Sankaranarayanan R, et al: Cancer survival in Khon Kaen Province, Thailand. Int J Cancer 61: 296-300, 1995

18. Pathy NB, Yip CH, Taib NA, et al: Breast cancer in a multi-ethnic Asian setting: Results from the Singapore-Malaysia hospital-based breast cancer registry. Breast 20 Suppl 2:S75-S80, 2011

19. Mehrabani D, Almasi A, Farahmand M, et al: Incidence of breast cancer in Fars province, southern Iran: A hospital-based study. WJPS 1:16-21, 2012

20. Hospital Based Cancer Registry: Regional Cancer Centre Thiruvananthapuram. Annual Report 2011. Thiruvananthapuram, India: Regional Cancer Centre, 2014. http://www.rcctvm.org/HBCR report 2011 - Final (29-04-2015).pdf

21. Informação dos registros hospitalares de câncer como estratégia de transformação: Perfil do Instituto Nacional de Câncer José Alencar Gomes da Silva em 25 anos. Rio de Janeiro: Instituto Nacional de Câncer José Alencar Gomes da Silva, 2012. www1.inca.gov.br/inca/Arquivos/rhc.pdf

22. Boyle P, Autier P, Adebamowo C, et al: (eds). World Breast Cancer Report 2012. International Prevention Research Institute, Lyon, France, 2012

23. Leong SPL, Shen Z-Z, Liu T-J, et al: Is breast cancer the same disease in Asian and Western countries? World J Surg 34:2308-2324, 2010

24. Braaten T, Weiderpass E, Kumle M, et al: Education and risk of breast cancer in the Norwegian-Swedish women's lifestyle and health cohort study. Int J Cancer 110:579-583, 2004

25. Fujino Y, Mori M, Tamakoshi A, et al: A prospective study of educational background and breast cancer among Japanese women. Cancer Causes Control 19:931-937, 2008

26. Piñeros M, Sánchez R, Perry F, et al: Demoras en el diagnóstico y tratamiento de mujeres con cáncer de mama en Bogotá, Colombia. Salud Publica Mex 53:478-485, 2011

27. Rutqvist LE, Bern A; Stockholm Breast Cancer Study Group: Socioeconomic gradients in clinical stage at presentation and survival among breast cancer patients in the Stockholm area 1977-1997. Int J Cancer 119:1433-1439, 2006

28. Gürdal SÖ, Saraçoğlu GV, Oran EŞ, et al: The effects of educational level on breast cancer awareness: A cross-sectional study in Turkey. Asian Pac J Cancer Prev 13:295-300, 2012

29. Hussain SK, Altieri A, Sundquist J, et al: Influence of education level on breast cancer risk and survival in Sweden between 1990 and 2004. Int J Cancer 122:165-169, 2008

30. Albano JD, Ward E, Jemal A, et al: Cancer mortality in the United States by education level and race. J Natl Cancer Inst 99:1384-1394, 2007

31. Ayanian JZ, Kohler BA, Abe T, et al: The relation between health insurance coverage and clinical outcomes among women with breast cancer. N Engl J Med 329:326-331, 1993

32. Torres P, Guerra M, Galán Y, et al: Incidencia y mortalidad por cáncer en la mujer cubana: Trienio 2000-2002. Rev Cubana Med 46, 2007. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75232007000200007&lng=es&nrm=iso&tlng=es

33. Colina F: Control de calidad e información generada por los RHT. In: Puras A, García-Bragado F, de Miguel C, et al, editors. XX Congreso Nacional de la Sociedad Española de Anatomía Patológica. Pamplona: Sociedad Española de Anatomía Patológica, 2001, pp 211-215

34. Matilla Vicente A. Manual de procedimientos en los registros hospitalarios de tumores. Sociedad Española de Anatomía Patológica, Málaga, 2007

35. Bradley CJ, Given CW, Roberts C: Race, socioeconomic status, and breast cancer treatment and survival. J Natl Cancer Inst 94:490-496, 2002

36. Schwartz KL, Crossley-May H, Vigneau FD, et al: Race, socioeconomic status and stage at diagnosis for five common malignancies. Cancer Causes Control 14:761-766, 2003

37. Li CI, Malone KE, Daling JR. Differences in breast cancer stage, treatment, and survival by race and ethnicity. Arch Intern Med 163:49-56, 2003

38. Stewart BW, Wild CP, (eds). World Cancer Report 2014. International Agency for Research on Cancer, Lyon, 2014

39. Howlader N, Altekruse SF, Li CI, et al: US incidence of breast cancer subtypes defined by joint hormone receptor and HER2 status. J Natl Cancer Inst 106:dju055, 2014

40. Engstrøm MJ, Opdahl S, Hagen AI, et al: Molecular subtypes, histopathological grade and survival in a historic cohort of breast cancer patients. Breast Cancer Res Treat 140:463-473, 2013

41. Arndt V, Stürmer T, Stegmaier C, et al: Provider delay among patients with breast cancer in Germany: A population-based study. J Clin Oncol 21:1440-1446, 2003

42. Trufelli DC, Miranda Vda C, Santos MB, et al: Análise do atraso no diagnóstico e tratamento do câncer de mama em um hospital público. Rev Assoc Med Bras (1992) 54:72-76, 2008

43. Mayo NE, Scott SC, Shen N, et al: Waiting time for breast cancer surgery in Quebec. CMAJ 164:1133-1138, 2001

44. Cancer Research UK: Breast Cancer. Net Survival. 2015. http://www.cancerresearchuk.org/sites/default/files/cstream-node/surv_curve_breast.pdf

45. Hortobagyi GN, de la Garza Salazar J, Pritchard K, et al: The global breast cancer burden: Variations in epidemiology and survival. Clin Breast Cancer 6:391-401, 2005

46. Lee BL, Liedke PER, Barrios CH, et al: Breast cancer in Brazil: Present status and future goals. Lancet Oncol 13: e95-e102, 2012

47. Youlden DR, Cramb SM, Dunn NA, et al: The descriptive epidemiology of female breast cancer: An international comparison of screening, incidence, survival and mortality. Cancer Epidemiol 36:237-248, 2012

48. Hendren S, Fiscella K: Patient navigation improves the care experience for patients with newly diagnosed cancer. J Clin Oncol 32:3-4, 2014