

Characterization of The Oncogeriatric Population Attended at The Arturo López Perez Foundation (Falp) Cancer Institute

Soto Ruben¹, Quilodran Rocio^{1,*}, Najera Manuel², Ferrer Pedro²

¹Geriatricians, Arturo Lopez Perez Foundation, Chile

²Methodologist, Arturo Lopez Perez Foundation, Chile

Corresponding author:

Quilodran Rocio, Geriatricians, Arturo Lopez Perez Foundation, Chile

Keywords:

Non-communicable diseases, cardiovascular diseases, cancer

Received: Oct 13, 2022

Accepted: Oct 22, 2022

Published: Nov 16, 2022

Editor:

Krzysztof Roszkowski, Department of Oncology, Nicolaus Copernicus University, Romanowskiej 2, Bydgoszcz 85-796, Poland.

Introduction

A general look at the demographic changes that have occurred in the Chilean population over recent years shows an increase in the older population and their age-associated diseases. When in 1950 40% of the population was under 15 years of age and only 4% was over 64 years of age, in 2017 these percentages were 21 and 11% respectively, with an estimated reversed ratio of 17% and 22%. by 2050 [1]. These shows that Chile has undergone a significant change in its population structure, which, added to unhealthy behaviors and life habits, has resulted in increasing morbimortality

from non-communicable diseases. Among these, cardiovascular diseases and cancer are identified as the first and second causes of death, respectively. It is estimated that by the year 2023, cancer will be the first cause of death in the country [2].

The relationship between aging and cancer is very clear and was described by Armitage et al. in 1961. As a person's age increases, the risk of developing cancer also increases [3]. According to data from the National Cancer Institute (data from *Surveillance, Epidemiology and End Results*, SEER), currently people aged ≥ 65 years have 11 times the risk of developing cancer than people between 25 and 44 year old and 2- 3 times more risk than those between 45 and 64 years of age[4].

Older cancer patients have traditionally been excluded from clinical trials and are often underrepresented in routine-management protocols. In many cases, treatment regimens for older cancer patients consist of ad hoc adaptations from those offered to younger patients. For this reason, there are limited data on the tolerance of the various available treatments in this age group. Moreover, the frequent association with multiple comorbidities and geriatric syndromes, added to the need to weigh values and preferences of the elderly patient, which often differ from what is expected in other age groups, make these evaluation more complex [5].

The International Society of Oncogeriatrics (SIOG) therefore recommends Comprehensive Geriatric Assessment (CCA) as an essential element in the evaluation of older people with cancer. The ideal goal is for all patients over 70 years of age to undergo some type of evaluation by the specialty before starting cancer treatment or even before undergoing screening for the most common types of cancer [6]. It even allows to plan non-oncological interventions, in 26-70% of cases [7]. The benefits of these interventions include the prevention and early screening of geriatric syndromes, the prevention of hospitalization and institutionalization, as well as an improvement in the patient's quality of life [8].

It is internationally known that cancer patients have a higher prevalence of geriatric syndromes. Mohile et al describe a mean-geriatric syndrome rate of 1.16 in cancer patients compared to 0.98 in patients without cancer. Furthermore, 60.3% of cancer patients have 1 or more geriatric syndromes compared to 53.2% of non-cancer patients. Depression, falls, urinary incontinence and auditory sensory deficit are among the most prevalent geriatric syndromes in cancer patients [9].

In our country, the prevalence of some geriatric syndromes has been described, such as polypharmacy prior to chemotherapy in adult patients over 65 with solid tumors: 63% of the sample used multiple drugs and 61% of them used potentially inappropriate medications [10].

The aim of the presented study was to describe the occurrence of geriatric syndromes in elderly people diagnosed with cancer, treated at the Oncological Institute of the Arturo López Pérez Foundation (FALP).

Methods

We carried out a descriptive study of the population over 65 years of age with cancer treated between June 2018 and June 2019 at the Oncogeriatrics Unit of the FALP Cancer Institute in Santiago, Chile. Four hundred and two patients evaluated by a geriatrician prior to the start of their cancer treatment were included, regardless of the type treatment (surgery, chemotherapy

and/or radiotherapy). At enrollment, we collected information on demographic data (sex, age), cancer diagnosis, medical history (comorbidities, number of drugs in use) and anthropometric measurements (weight, height and body mass index (BMI)). At the same time, questionnaires and scales were applied to assess the presence of the following geriatric syndromes: Functionality (Barthel scale of basic daily activities and Lawton and Brody scale for instrumental activities of daily living); Memory (Memory Impairment Screening scale, MIS) ; suspected depression (Geriatric Depression Scale, GDS-5); Frailty (FRAIL scale); Falls over the last 6 months; Polypharmacy; inappropriate prescription of drugs (based on BEERS and Stop/Start criteria); Visual and auditory sensory deficits, sphincter alteration, sleep disorders and weight loss. All afore mentioned scales and questionnaires were applied during geriatric examination. Quantitative data were expressed as mean value \pm standard deviation. The ratio between measured variables was evaluated using Fisher's exact test or chi square test for variables depending on data distribution. A p-value less than 0.05 was considered significant. Statistical analyzes were performed with the R program version 3.2.1 (R Core Team, 2018. Vienna, Austria)

The study was approved by the Ethics-Scientific Committee of the Arturo López Pérez Foundation.

Results

Data were collected from 402 patients (Table 1), 191 (47.5%) females and 211 (52.5%) males. Mean age was 76.9 years (range 65-96); 37.6% were between 65-74 year old, and 62.9% were 75 year old and over. In the assessed population, mean age was 77.06 years for women and 76.82 years for men.

A median of 3 comorbidities (range 0-10) and a median consumption of 4 drugs per patient (range 0-20) were obtained, finding polypharmacy, defined as the use of 5 or more drugs, in 47.3% of the total sample (190 patients).

Table 1. Characterization of study patients	
Variable	N (%)
Sex (N (%))	
Female	191 (47.5%)
Male	211 (52.5%)
Age (Mean, Range)	76.94 (65 - 96)
Age	
65 to 74	149 (37.6%)
75 or over	253 (62.9%)
Type of cancer	
Digestive	116 (29.5%)
Prostate	62 (15.8%)
Breast	43 (10.9%)
Nephro-urinary	38 (9.7%)
Lung	30 (7.6%)
Skin	27 (6.9%)
Hematological	25 (6.4%)
Head and neck	19 (4.8%)
Gynecological	9 (2.3%)
Melanoma	9 (2.3%)
Sarcoma	8 (2.0%)
Others	5 (1.3%)

The most frequent diagnoses were digestive (mainly gastric, colon and rectum) and prostate cancers, 29.5% and 15.8% respectively. All this results are shown in Table 1.

Functionality

Based on the Barthel scale, which measures functionality in basic daily activities, and the Lawton-Brody scale, which measures instrumental activities, the following results were obtained: 90.5% of the total sample was independent in basic activities and 86.4% obtained a score between 6 and 8 in instrumental activities of daily living, as detailed in Table 2 and Table 3.

Geriatric Syndromes

The geriatric syndromes evaluated were cognitive impairment, depression, frailty, falls, polypharmacy,

sensory deficit, sleep disorders, and malnutrition. General information on these syndromes in the study population is reported in Table 3.

Possible cognitive impairment was observed in 14.4% of patients, with patients over 75 years of age at higher risk (17.2% vs 9.6%, $p = 0.037$, Table 5). Depression was suspected in 50 patients (14.9%), with a higher suspicion occurring in women than men (20.4% vs 10.3%, $p = 0.010$, Table 4).

Frailty was prevalent in 15.8% of all patients, and 56.1% were pre-frail. Women and patients over 75 years of age appear to be more fragile than men (Table 4) and patients under 75 respectively (Table 5).

A fall syndrome was diagnosed in 21.9% of patients, being much higher in those over 75 (28.1% vs

Table 2. Description of functional dependency in basic (Barthel) and instrumental (Lawton & Brody) activities of daily life by sex. (n = 402)

Functionality	Females	Males	Total	p-value
Dependency (Barthel)				0.488
Independent	170 (90.0%)	190 (90.9%)	360 (90.5%)	
Mild dependency	13 (6.9%)	17 (8.13%)	30 (7.5%)	
Moderate dependency	3 (1.6%)	2 (1.0%)	5 (1.3%)	
Severe dependency	2 (1.1%)	0 (0.0%)	2 (0.5%)	
Total dependency	1 (0.5%)	0 (0.0%)	1 (0.3%)	
Instrumental dependency (Lawton)				0.026
0	7 (2.7%)	3 (1.4%)	10 (2.5%)	
1	5 (2.7%)	3 (1.4%)	8 (2.0%)	
2	0 (0.0%)	2 (1.0%)	2 (0.5%)	
3	2 (1.1%)	2 (1.0%)	4 (1.0%)	
4	1 (0.5%)	7 (3.4%)	8 (2.0%)	
5	12 (6.4%)	10 (4.8%)	22 (5.5%)	
6	19 (10.1%)	40 (19.1%)	59 (14.8%)	
7	8 (4.2%)	4 (1.9%)	12 (3.0%)	
8	135 (71.4%)	138 (66.0%)	273 (68.6%)	

Table 3. Description of functional dependency in basic (Barthel) and instrumental (Lawton & Brody) activities of daily life by age. (n = 402)

Functionality	60-74	75 or over	p-value
Dependency (Barthel)			0.330
Independent	136 (92.2%)	224 (88.9%)	
Mild dependency	8 (5.5%)	22 (8.7%)	
Moderate dependency	1 (0.7%)	4 (1.6%)	
Severe dependency	0 (0.0%)	2 (0.8%)	
Total dependency	1 (0.7%)	0 (0.0%)	
Instrumental dependency (Lawton)			0.117
0	3 (2.1%)	7 (2.8%)	
1	2 (1.4%)	6 (2.4%)	
2	2 (1.4%)	0 (0.0%)	
3	3 (2.1%)	1 (0.4%)	
4	2 (1.4%)	6 (2.4%)	
5	6 (4.1%)	16 (6.4%)	
6	20 (13.7%)	39 (15.5%)	
7	1 (0.7%)	11 (4.4%)	
8	107 (73.3%)	166 (56.9%)	

Table 4. Geriatric syndromes by sex in the study population (N = 402)

Geriatric Syndrome	Females	Males	Total	p-value
Possible cognitive impairment (MIS)	31 (16.5%)	26 (12.5%)	57 (14.4%)	0.259
Suspected depression (GDS)	31 (20.4%)	19 (10.3%)	50 (14.9%)	0.010
Frailty (FRAIL)				0.003
Strong	43 (23.0%)	67 (32.7%)	110 (28.1%)	
Pre fragile	103 (55.1%)	117 (57.1%)	220 (56.1%)	
Fragile	41 (21.9%)	21 (10.2%)	62 (15.8%)	
Falls	43 (22.6%)	44 (21.3%)	87 (21.9%)	0.741
Polypharmacy	101 (52.9%)	89 (42.2%)	212 (47.3%)	0.032
Sensory deficit	172 (90.1%)	195 (93.3%)	367 (91.8%)	0.238
Sleep disorders	97 (51.1%)	83 (39.7%)	180 (45.1%)	0.023
BMI				0.032
Underweight	38 (21.5%)	23 (11.8%)	61 (16.4%)	
Normal	78 (44.1%)	101 (52.1%)	179 (48.3%)	
Overweight	25 (14.1%)	38 (19.6%)	63 (17.0%)	
Obese	36 (20.3%)	32 (16.5%)	68 (18.3%)	

Table 5. Geriatric syndromes by sex in the study population (N=402)

Geriatric Syndrome	60-74	75 o más	p-value
Possible cognitive impairment (MIS)	14 (9.6%)	43 (17.2%)	0.037
Suspected depression (GDS-5)	14 (11.3%)	36 (17.0%)	0.157
Frailty (FRAIL)			0.002
Strong	54 (38.0%)	56 (22.4%)	
Pre frailty	73 (51.4%)	147 (58.8%)	
Frailty	15 (10.6%)	47 (18.8%)	
Falls	16 (11.1%)	71 (28.1%)	<0.001
Polypharmacy	67 (45.0%)	123 (48.6)	0.479
Sensory deficit	136 (92.5%)	231 (91.3%)	0.671
Sleep disorders	58 (39.7%)	122 (48.2%)	0.100
BMI			0.028
Underweight	16 (12.0%)	45 (18.9%)	
Normal	58 (43.6%)	121 (50.8%)	
Overweight	31 (23.3%)	32 (13.5%)	
Obese	28 (21.1%)	40 (16.8%)	

11.1%, $p < 0.001$, Table V). In addition, women registered a higher polypharmacy rate than men (52.9% vs 42.2%, $p = 0.032$, Table 4).

There were no differences in sensory deficits by age or sex, but women have more sleep disorders than men (51.1% vs 39.7%, $p = 0.023$, Table 4).

Patients were under weight in 16.4% of the total sample while 35.3% of them were overweight or obese. When analyzing by sex, there are significant differences in the distribution (Table 4) where it can be seen that 41.8% of women are underweight or obese compared to 18.3% of men. Patients over 75 years of age would have a higher proportion of underweight patients and a lower proportion of obese patients (Table 5).

Discussion

When analyzing the characteristics of the patients studied, it is worth noting the high proportion (62.9%) of people over 75, which makes ours a particularly relevant sample given the low representation of these patients in previously published studies [11], with a homogeneous distribution by sex.

Regarding the use of drugs, 47.3% of our series used 5 or more drugs at the time of evaluation. When comparing these data with the older non-oncological population in our country, where the presence of polypharmacy is described in 36.9% of them [12], we find a higher-than-average use of drugs in our patients even before starting chemotherapy. This is consistent with international literature where cancer patients take an average of 4 drugs per day [13] and even those undergoing chemotherapy concomitantly use 3 or more drugs in 77.6% of cases [14].

In relation to functionality, international series show that over 60% of people with cancer aged between 65 and 74 have some degree of disability, which increases to 65% and 76% in patients aged 75-79 and those over 79 respectively [15]. This is discordant with the data obtained in our series.

The good functionality observed in the study is higher than described nationally with reported disability

in almost a quarter of the elderly population [16]. This could be explained by the preselection of patients referred for geriatric evaluation by their oncologists. It can be assumed that patients with decreased functionalities are not referred for geriatric evaluation or are directly referred to palliative care. In addition, it is also possible that the patient and his/her family report a higher functionality than the real one during the clinical interview, in order to be considered a better candidate for any cancer therapies.

With regard to screening for cognitive impairment, international studies have estimated a prevalence of dementia in cancer patients aged 65 or over between 3.8% and 7%, a figure that is probably underestimated given the lack of routine active screening for cognitive impairment. In our series, we observed possible memory-like cognitive impairment in 14.4% of patients, with patients over 75 years of age at higher risk (17.2% vs 9.6% respectively).

Concerning the emotional sphere, the international prevalence of depressive disorder in older people with cancer ranges from 1.8 to 10%, up to 28%, which is much higher than the 1-5% rates described for elderly people without cancer diagnosis. [17]. In elderly people without cancer diagnosis, the national incidence of depression over the last 12 months was 6.2% for the age group 65-74 and 3.2% for those over 75 [18], while screening for depression in cancer patients showed a positive result in 14.9% of patients, being significantly higher, which is consistent with the international data presented.

International studies on older cancer patients with solid or hematological tumors have estimated a prevalence of frailty and pre-frailty of 42 and 43%, respectively [19]. In our series, we found a 15.8% prevalence of frailty, 21.9% in women and 10.2% in men. Our data are lower than those reported internationally. As indicated for functionality, this could be related to a selection bias in the patients evaluated. Despite the above, frailty in our study turned out to be a strong predictor of dependency in this group of patients. Moreover, 10.8% of

independent patients presented some degree of frailty, which stresses the importance of performing a geriatric evaluation in all cancer patients over 65 years of age.

Another geriatric syndrome is falls in cancer patients. It has been described to occur in 30-50% of elderly people diagnosed with malignancies and a history of current or previous cancer is reported to increase the risk of falls by 15-20% [20]. These figures are slightly higher than the 21.9% described in our cancer-patient sample. Falls in these patients occur more frequently due to multiple factors such as peripheral neuropathy and vestibular ototoxicity associated with some chemotherapies, presence of sedation due to the use of analgesics and antiemetics, as well as fatigue and pain associated with cancer diagnosis, among others. The number described in our series may be lower because we retrospectively asked whether there were any falls over the last six months prior to consultation; a higher rate is expected in the follow-up of these patients after the start of their treatments. The national report of falls in the elderly not diagnosed with cancer over the last six months varies between 23.5% and 11.6% [21], which is similar to our rates.

Sensory alterations are common in older people with cancer and an uncorrected deficit is described in more than a third of them. International studies report isolated hearing loss, isolated visual impairment, and combined impairment in 18%, 11% and 7% of cases respectively, figures much lower than the 91.8% reported in our sample. This can be explained by the question in the interview, asking only about the presence of sensory deficits, without regardless of corrections, such as the correct use of glasses or hearing aids. Our rates correlate with what described in the general population, where 82.1% of people over 65 wear glasses, 27.5% self-report cataracts and 7.4% glaucoma, and in turn 17.9% use hearing aids and 45.1% report hearing problems [18]. This is of great clinical importance, since sensory impairment has been shown to be associated with functional dependency (OR 2.8), anxiety (OR 2.3), depression (OR 2.6) and cognitive impairment (OR 3.3) in cancer patients. [22].

Ten to twenty per cent of deaths in cancer patients are attributed to malnutrition. In the cancer population over 70, weight loss occurred in 73.6% and malnutrition in 44.9% of patients who were mostly diagnosed over a year ago [23]. Malnutrition is defined as $\geq 5\%$ weight loss within one month or 10% within 6 months, and/or BMI ≤ 18.5 in patients younger than 70 or ≤ 21 in patients older than 70. In our series, with the isolated parameter of underweight BMI, patients were diagnosed with malnutrition in 16.4% of cases, increasing to 18.9% in the subgroup of those over 75 years of age. These percentages are obtained prior to the start of therapy, so an increase in the parameter is expected during follow-up. Poor appetite and anorexia are often associated with malnutrition. In our study, anorexia was the main reason for lower food intake reported by elderly patients, which was significantly higher than in younger patients (70.6% vs. 56.1%, $p = 0.00002$).

Other factors might also negatively impact the nutritional status in the elderly. The general decrease in taste and smell due to ageing may result in reduced appetite. Chemotherapy, radiation, and surgery (in particular oropharyngeal cancer surgeries) can also affect taste and smell, and can cause dysgeusia as well.

Even so, this is much higher than rates described in the elderly population without cancer, where only 1.5% of people over 65 in Chile are categorized as emaciated [21]. This is significant in the management of older patients with cancer, since malnutrition is a predictor of mortality and morbidity [24], as well as a marker of worse toxicity from cancer therapies [25].

Nationally, the results obtained can be compared with those described in the non-cancer population in our country. It is remarkable that while female sex and older age remain as risk factors for frailty, in cancer patients there is no correlation with higher weight as described in literature; on the contrary, it is the slim patient with cancer who presents the most chances of being fragile [26].

Other geriatric syndromes do not present greater differences between the cancer and non-cancer

populations, as is the case of sphincter disorder, such as urinary incontinence, which is described in 27% of all outpatients, very close to the 24% rate found in the sample with cancer.

Limitations

One limitation of this work is the lack of patient follow-up, which prevents establishing causal relationships. Furthermore, the high prevalence of functional patients in basic and instrumental activities of daily life could be a selection bias, as patients with better physical performance are referred to the detriment of less functional patients who are likely to go directly to palliative care.

Another limitation is the assessment for cognitive failures, as memory assessment test was performed only with the MIS (Memory Impairment Screening) scale, and a more complete assessment (such as MiniCog, MiniMental, MOCA, among others) was not carried out. Furthermore, the frailty screening was carried out with the FRAIL scale, which is a clinical scale that does not include objective variables such as dynamometry or gait speed, among others. With regard to falls, we only asked about the last 6 months before evaluation and no follow-up was done to see if chemotherapy, radiotherapy or surgery interfered with their prevalence.

Conclusions

Oncogeriatric patients have a higher burden of geriatric syndromes than the general population, a difference that is already observed at the time of diagnosis. Within this burden, it is worth noting the higher prevalence of frailty, depression, malnutrition and polypharmacy. It is important to know the prevalence of the main geriatric syndromes in the Chilean elderly population treated in a national cancer center, since no data have been previously published.

We believe that more studies are needed to determine whether these geriatric syndromes are independently associated with unfavorable outcomes in this particular population, which would allow us to carry out targeted interventions for their correction.

Conflict of Interest

The authors of this paper declare no conflict of interest.

Author's Contributions

All the authors contributed to the development of this investigation and reviewed the final manuscript.

Acknowledgment

Thanks to Marina Nordiana Baruzzi for the translation of this paper from Spanish to English.

References

1. Instituto Nacional de Estadísticas. *Estimaciones y Proyecciones de la Población de Chile 1992-2050 (Total País)*. (2017). www.censo2017.cl
2. Departamento de Manejo Integral del Cáncer y otros Tumores División de Prevención y Control de Enfermedades Subsecretaría de Salud Pública, Ministerio de Salud. *Plan Nacional de cáncer 2018-2028*. (2018) https://cdn.digital.gob.cl/filer_public/d3/0a/d30a1f5e-53d9-4a31-a4fe-e90d8d9a2348/documento_plan_nacional_de_cancer.pdf
3. Armitage P, Doll R. *A two-stage theory of carcinogenesis in relation to the age distribution of human cancer*. Br J Cancer 1961;11:161-9.
4. Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, et al. *SEER Cancer Statistics Review, 1975-2011, National Cancer Institute*. (2013) http://seer.cancer.gov/csr/1975_2011/
5. Li D, de Glas NA, Hurria A. *Cancer and aging: General principles, biology and geriatric assessment*. Clin Geriatr Med. 2016;32:1-15.
6. Wildiers H, Heeren P, Puts M, Topinkova E, Janssen-Heijnen MLG, Extermann M, et al. *International Society of Geriatric Oncology Consensus on Geriatric Assessment in older patients with cancer*. J Clin Oncol 2014;32(24):2595-603
7. Hamaker ME, Schiphorst AH, Huinink DTB, Schaar C, van Munster BC. *The effect of a geriatric evaluation on*

- treatment decisions for older cancer patients-a systematic review. *Acta Oncologica* 2014;53(3): 289-96.
8. Mohile SG, Velarde C, Hurria A, Magnuson A, Lowenstein L, Pandya C, et al. *Geriatric Assesment-guided care processes for older adults: a Delphi consensus of Geriatric Oncology experts*. *J Natl Compr Canc Netw* 2015;13(9):1120-30.
 9. Mohile, S. G., Fan, L., Reeve, E., Jean-Pierre, P., Mustian, K., Peppone, L., Janelins, M., Morrow, G., Hall, W., & Dale, W.. *Association of cancer with geriatric syndromes in older Medicare beneficiaries*. *Journal of clinical oncology*, 29(11), 1458–1464.
 10. Rojas V et al. *Problems associated with medications in older adults with solid cancer evaluated in 2 chilean cancer centers*. (2013). https://fiapam.org/wp-content/uploads/2013/11/LIBRO_RESUMEN_TL.pdf
 11. Stewart JH, Bertoni AG, Staten JL, Levine EA, Gross CP. *Participation in surgical oncology clinical trials: gender -, race/ethnicity-, and age-based disparities*. *Ann Surg Oncol*. 2007 Dec;14(12):3328-34
 12. Subsecretaría de Salud Pública División de Prevención y Control de Enfermedades Departamento Ciclo Vital, Ministerio de Salud, Chile. *Actualización Manual de Geriatria para Médicos* (2019). https://www.minsal.cl/wp-content/uploads/2019/08/2019.08.13_MANUAL-DE-GERIATRIA-PARA-MEDICOS.pdf
 13. Berg AS, Rostoft S. Frailty indicators in older cancer patients. *Tidsskrift for den Norske Laegeforening : Tidsskrift for Praktisk Medicin, ny Raekke*. 2019 Dec;139(18). DOI: 10.4045/tidsskr.18.0337
 14. Goh I, Lai O, Chew L. Prevalence and Risk of Polypharmacy Among Elderly Cancer Patients Receiving Chemotherapy in Ambulatory Oncology Setting. *Current Oncology Reports*. 2018 Mar;20(5):38. DOI: 10.1007/s11912-018-0686-x
 15. Given, B. and Given, C.W. (2008), Older adults and cancer treatment . *Cancer*, 113: 3505-3511. doi:10.1002/cncr.23939
 16. Servicio Nacional del Adulto Mayor. *National Study of dependence in the older chilean people*. (2009). <https://www.senama.gob.cl/storage/docs/Dependencia-Personas-Mayores-2009.pdf>
 17. Magnuson A, Sattar S, Nightingale G, Saracino R, Skonecki E, Trevino KM. *A Practical Guide to Geriatric Syndromes in Older Adults With Cancer: A Focus on Falls, Cognition, Polypharmacy, and Depression*. *Am Soc Clin Oncol Educ Book*. 2019 Jan;39:e96-e109.
 18. Departamento de Epidemiología División de Planificación Sanitaria Subsecretaría de Salud Pública Ministerio de Salud Santiago. *Encuesta Nacional de Salud 2016-2017*. (enero 2018). https://www.minsal.cl/wp-content/uploads/2018/01/2-Resultados-ENS_MINSAL_31_01_2018.pdf
 19. Handforth, C. et al. *The prevalence and outcomes of frailty in older cancer patients: a systematic review*. *Annals of Oncology*, Volume 26, Issue 6, 1091 – 1101
 20. Mohile SG, Fan L, Reeve E, et al. *Association of cancer with geriatric syndromes in older Medicare beneficiaries*. *J Clin Oncol*. 2011;29(11):1458-1464.
 21. Programa Adulto Mayor UC Centro UC Estudios de Vejez y Envejecimiento. *CHILE Y SUS MAYORES Resultados V Encuesta Nacional Calidad de Vida en la Vejez 2019 UC-Caja Los Andes* (2019). https://www.senama.gob.cl/storage/docs/QUIN-TA_ENCUESTA_NACIONAL_DE_CALIDAD_DE_VIDA_EN_LA_VEJEZ_2019._CHILE_Y_SUS_MAYORES_2019.pdf
 22. Soto-Perez-de-Celis E, Sun CL, Tew WP, et al. *Association between patient-reported hearing and visual impairments and functional, psychological, and cognitive status among older adults with cancer*. *Cancer*. 2018;124(15):3249-3256.
 23. Lacau St Guily, Jean et al. *NutriCancer: A French observational multicentre cross-sectional study of malnutrition in elderly patients with cancer*. *Journal of Geriatric Oncology*, Volume 9, Issue 1, 74 - 80
 24. Soubeyran P et al. *Predictors of early death risk in older patients treated with first-line chemotherapy for*

cancer. J Clin Oncol. 2012 May 20;30(15):1829-34.

25. Aaldriks AA, van der Geest LG, Giltay EJ, le Cessie S, Portielje JE, Tanis BC, Nortier JW, Maartense E. *Frailty and malnutrition predictive of mortality risk in older patients with advanced colorectal cancer receiving chemotherapy*. J Geriatr Oncol. 2013 Jul;4(3):218-26.
26. Tapia P, Catalina, Valdivia-Rojas, Yenny, Varela V, Héctor, Carmona G, Andrés, Iturra M, Verónica, & Jorquera C, Mónica. *Rates of frailty among older people ascribed to chilean primary care clinics*. Revista médica de Chile, 143(4), 459-466.