Impact Of Age, Comorbidities And Polypharmacy On Receipt Of Systemic Therapy In Advanced Cancers

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Background

- Age is the most significant risk factor for developing cancer and is non-modifiable, with 80% of new cancer diagnosis occurring in patients ≥55[1].
- Cancer incidence, comorbidity and polypharmacy all increase with aging[2].
- Advanced age is an important consideration in the treatment of cancer due to the complex interplay of increasing comorbidity, drug metabolism and polypharmacy, frailty and competing mortality[3,4].
- The impact of the interplay between these factors on receipt of systemic therapy (ST) in advanced malignancy has rarely been studied and is the focus of this study.

Methods

- A retrospective cohort study was undertaken evaluating Manitoba patients diagnosed with advanced stage or incurable cancer between January 1, 2004 and December 31, 2015.
- Cancer types evaluated included: multiple myeloma (MM) (all stages), non-Hodgkin's lymphoma (NHL) (diffuse large B-cell and Burkitt's lymphoma only, stage III-IV), breast (stage III-IV), lung (stage IV), colorectal (stage III-IV), prostate (stage III-IV) or ovarian cancer (stage IV).
- The Manitoba Cancer Registry was used to define the cohort.
- Cancer stages were only included if standard care included ST.
- Clinical and administrative health data were used to determine demographic characteristics, cancer characteristics, treatment history, comorbidity (Charlson Comorbidity Index (CCI) and Resource Utilization Band (RUB)) and polypharmacy (≥6 medications).
- ST was defined as intravenous or oral chemotherapy, hormonal therapy, or targeted therapy. Chemotherapy was defined as intravenous or oral cytotoxic therapy.
- Multivariable logistic regression was used to evaluate the association of variables with receipt of ST and interactions with age.

References:
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Results

- 17,228 patients were diagnosed with advanced or incurable cancer.
- Males made up 52% of the population and 54% had stage IV disease.
- Cohort distribution by cancer type was: 29% for colorectal, 28% for lung cancer, 13% for prostate cancer, 12% for breast cancer, 10% for NHL, 5% for MM and 4% for ovarian cancer.
- 24% of patients were <60 years, 26% between 60-69, 26% between 70-79, 19% between 80-89 and 5% were ≥90 years.
- Frequency of malignancy diagnosed varied by age cohort with breast cancer being the most common cancer in patients <50 years of age, colorectal cancer most common in patients of age 50-59 and ≥80 years and lung cancer most common in patients 60-69 and 70-79 years.
- Stage III disease was diagnosed in 45% of patients <60 and 25% of patients ≥70 years.
- ST therapy was administered to 50% of patients (n=8,641).
- Breast cancer was the most likely and lung cancer was the least likely to receive ST. CCI of 0 and RUB of 2 were the most likely to receive ST. As seen in Table 1.

Table 1: Percentage of patients by age group that received systemic treatment.

	Total (n=8641)	<50 (n=1087)	50-59 (n=1892)	60-69 (n=2638)	70-79 (n=2091)	≥80 (n=933)	P-value
Sex (%)							
Male	47%	77%	62%	53%	46%	25%	
Female	53%	89%	76%	65%	47%	20%	<0.001
Cancer Site (%)							
Breast	77%	95%	91%	85%	74%	41%	
Colorectal	55%	88%	82%	72%	54%	14%	
Lung	24%	58%	45%	35%	18%	4%	
MM	65%	76%	77%	76%	68%	43%	
NHL	66%	88%	82%	81%	66%	35%	
Ovarian	74%	85%	94%	87%	75%	33%	
Prostate	52%	48%	41%	48%	68%	49%	<0.001
Stage (%)							
III	67%	93%	79%	68%	67%	30%	
IV	44%	78%	63%	53%	38%	22%	<0.001
Polypharmacy(%)							
Yes	42%	82%	66%	56%	44%	20%	
No	56%	86%	71%	60%	50%	26%	<0.001
CCI (%)							
0	56%	85%	70%	60%	52%	27%	
1	45%	87%	71%	55%	44%	19%	
2	42%	89%	68%	58%	43%	21%	
≥3	33%	57%	55%	52%	36%	17%	<0.001
RUB (%)							
0	56%	85%	65%	54%	42%	20%	
1	57%	88%	68%	56%	43%	22%	
2	60%	88%	73%	62%	49%	24%	
3	51%	86%	71%	59%	50%	25%	
4	38%	78%	62%	53%	42%	19%	
5	30%	57%	52%	52%	32%	17%	<0.001

- Increasing age, higher RUB and CCI, unknown stage cancer, and higher medication count each independently decreased the odds of ST (each p<0.01).
- Significant interaction effects were found between age at diagnosis with stage of cancer and cancer type (both p<0.001), Figure 1.

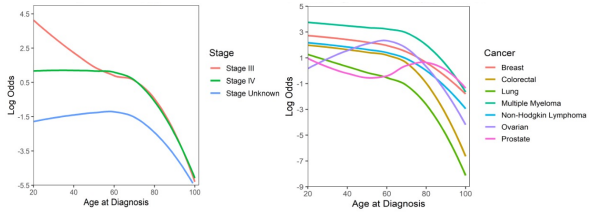

Figure 1: Interaction between age of diagnosis and receipt of ST with cancer stage and cancer type.

- There was substantial variation in the likelihood of ST receipt depending on the underlying malignancy, with MM being the most likely and lung cancer the least. Stage IV had a lower probability of ST than stage III at younger ages, with similar rates at increased ages.

Conclusion

- Our large, population-based analysis found that increased age, polypharmacy and comorbidity each independently decreased the likelihood of receiving ST for advanced cancers.
- There is substantial variation in likelihood of receipt of therapy based on the underlying malignancy with MM being, by far, the most likely to receive ST, while lung cancer was the least likely.
- Age interacted with stage of cancer and cancer type.
- CCI and RUB did not correlate, indicating that increased level of comorbidity does not necessarily correlate with increased usage of the health care system.

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