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.
- Cancer incidence, comorbidity and polypharmacy all increase with aging.
- 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.
- 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-II, breast (stage III-IV), lung (stage III-IV), colorectal (stage III-IV), prostate (stage III-IV) or ovarian cancer (stage IV).
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- 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.

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, 16% between 70-79, 15% between 80-89 and 9% were ≥90 years.
- Frequency of malignancy diagnosed varied by age cohort with breast cancer being the most common in patients <50 years of age, colorectal cancer most common in patients of age 50-59 and 60-69 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. |
|--------------------------|---------|---------|---------|---------|---------|---------|
| Age Group | Cancer Type | ST (%) | Male (%) | Female (%) | p-value |
| <60 years | Breast | 62% | 65% | 58% | <0.001 |
| | Colorectal | 36% | 38% | 33% | <0.001 |
| | Lung | 37% | 39% | 35% | <0.001 |
| | Ovarian | 46% | 49% | 43% | <0.001 |
| | NHL | 40% | 42% | 38% | <0.001 |
| | MM | 44% | 46% | 42% | <0.001 |
| | Prostate | 51% | 54% | 48% | <0.001 |
| | Total | 56% | 59% | 53% | <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.

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 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.

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

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