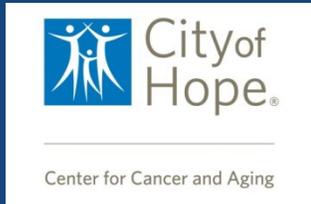


# Geriatric Assessment-driven Intervention (GAIN) on chemotherapy toxicity in older adults with cancer: a randomized controlled trial

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**City of Hope, Duarte, CA**

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# Background

- **60% of all cancers and 70% of cancer mortality occur in older adults (age  $\geq 65$ )**
- **Geriatric assessment (GA) can predict chemotherapy toxicity in older adults with cancer**
- **National & international organizations have endorsed inclusion of a GA in clinical practice and clinical trials**
- **Evidence regarding implementing geriatric assessment-driven interventions to decrease chemotherapy toxicity has been limited**

*SEER Cancer Statistics Review, 1975-2017*  
*Hurria et al. J Clin Oncol 2011*  
*Hurria et al. J Clin Oncol 2016*  
*Mohile et al. J Clin Oncol 2018*  
*Hurria et al. J Clin Oncol 2015*

*Levit et al. J Natl Cancer Inst. 2018*  
*Hurria et al. JNCCN 2012*  
*Hurria et al. JAMA 2013*  
*Wildiers et al. J Natl Cancer Inst. 2018*

*Dale et al. Cancer 2016*  
*Mohile et al. JNCCN 2016*  
*Lund et al. BMC Cancer 2017*  
*Magnuson et al. Support Care Cancer. 2018*

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Here we report results from GAIN, a randomized controlled trial to assess the effect of GA-driven interventions vs. standard of care among older adults starting a new chemotherapy regimen.

# Study Design

## City of Hope

### Eligibility

- Age  $\geq 65$
- Solid tumor
- All stages
- Starting a new chemotherapy
- English, Spanish or Chinese speakers



### Baseline

Geriatric Assessment  
(Pre-Chemotherapy)

RANDOMIZATION (2:1)

n = 600



## GAIN ARM

Usual Care



Geriatric Assessment-Driven Interventions

n = 398

## SOC ARM

Standard of Care

n = 202



Followed until End of Chemotherapy or  
6 mo Post Initiation of Chemotherapy  
(whichever comes first)



Geriatric Assessment

### • Primary endpoints:

- Incidence of grade 3-5 chemo toxicity (NCI CTCAE 4.0)

### • Secondary endpoints:

- Advance directive completion
- Unplanned hospitalizations
- Emergency room visits
- Average length of stay (ALOS)

NCT02517034

# Statistical Analysis

- **Study Endpoints:**

- Primary:

- Incidence of grade 3-5 chemotherapy-related toxicities (NCI CTCAE v. 4.0)

- Secondary:

- Advance directive (AD) completion
    - Emergency room (ER) visits
    - Unplanned hospitalizations
    - Average length of stay (ALOS)

- **Statistical Analysis:**

- Chi-square and Fisher's exact tests: compare the categorical outcomes
  - Kruskal-Wallis test was used to compare the ALOS between arms

# Geriatric Assessment Tool

GA Domains	Measures
Functional Status	Activities of Daily Living; Instrumental Activities of Daily Living; Karnofsky Performance Rating Scale; Timed Up & Go; Falls in Last 6 Months
Comorbidity	OARS Physical Health Section
Cognition	Blessed Orientation-Memory-Concentration Test
Psychological Status	Mental Health Index-17; Anxiety and Depression Questions
Social Functioning	MOS Social Activity Limitations Measure
Social Support	MOS Social Support Survey: Emotional & Tangible Subscales
Nutrition	Body Mass Index; % Unintentional Weight Loss in the Last 6 Months
Spiritual Well-Being	Duke Spiritual Scale
Quality of Life	Functional Assessment of Cancer Therapy - General

*Medical Outcomes Study (MOS): Stewart & Ware. Duke University Press. 1992*

*Older Adults Resources and Services (OARS) Multidimensional Functional Assessment: Fillenbaum & Smyer. J Gerontol. 1981*

*Podsiadlo & Richardson. JAGS 1991*

*Kawas et al. J Geriatr Psych Neur. 1995*

*Mahoney et al. JAGS 1994*

*Locke et al. J Pain Symptom Manage. 2007*

*Sherbourne & Stewart. Soc Sci Med. 1991*

*Koenig et al. Am J Psychiatry. 1997*

*Cella et al. J Clin Oncol. 1993*

# Methods: GAIN Arm vs. Standard of Care (SOC) Arm

## GAIN<sub>ARM</sub>

Completion Baseline GA

GA reviewed by multidisciplinary (MDT) study team

Interventions and referrals finalized by MDT study team based on pre-defined GA triggers

GA and intervention plan reviewed with treating oncologist and patient

Chemotherapy treatment proceeded at discretion of oncologist

Ongoing care coordination by study NP with the patient & oncologist to implement recommendations from the intervention plan

Completion of End of Study GA

### MDT Study Team

- Oncologist
- Geriatric NP
- Pharmacist
- Physical Therapist
- Occupational Therapist
- Social Worker
- Nutritionist

## SOC<sub>ARM</sub>

Completion Baseline GA

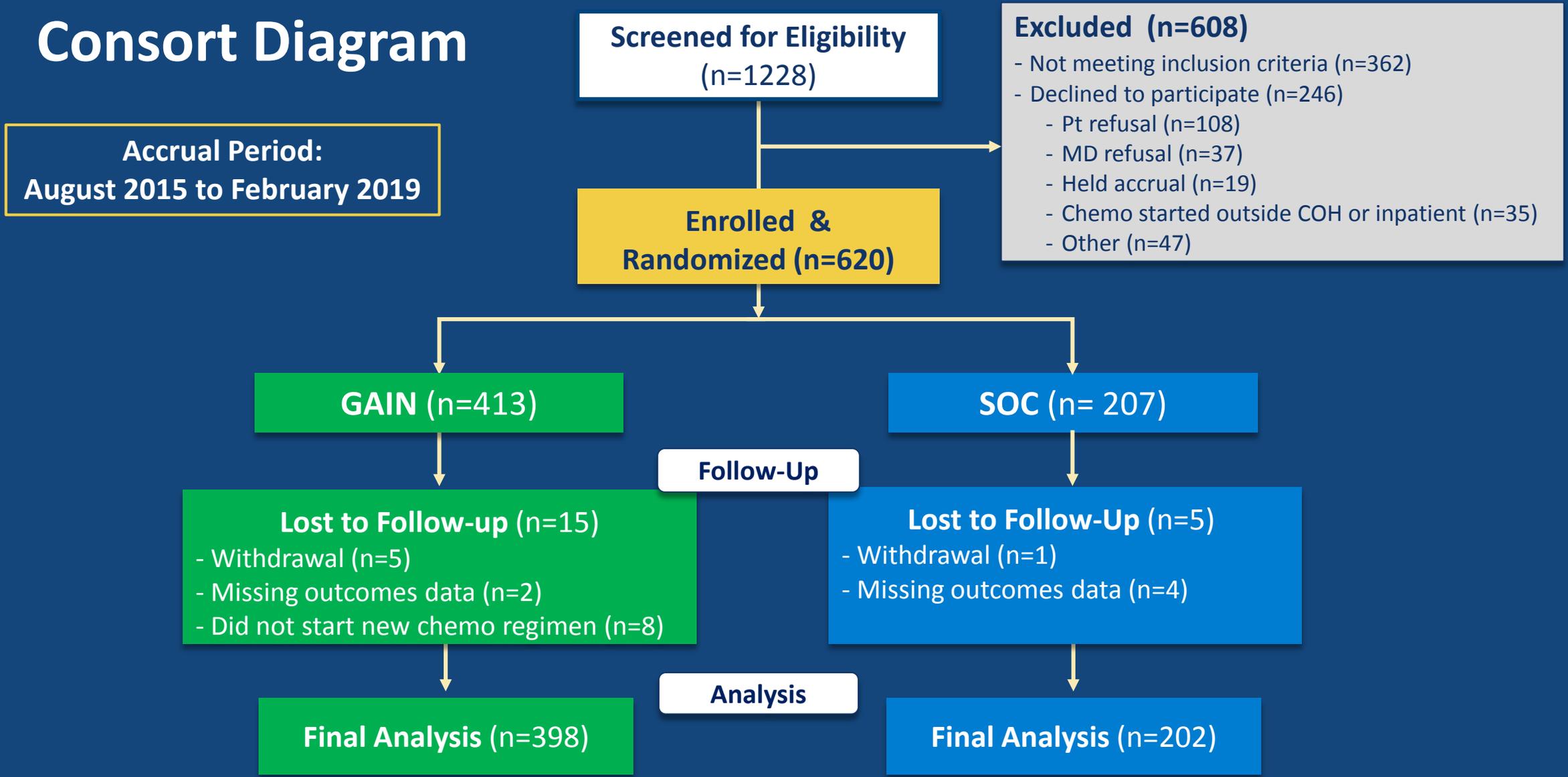
GA sent to treating oncologist for review

Chemotherapy treatment proceeded at discretion of oncologist

Completion of End of Study GA

# Results

# Consort Diagram



# Results: Patient Characteristics

Demographics	Overall % (n)	GAIN % (n)	SOC % (n)
Age (median, range)	71 (65-91)	71 (65-91)	72 (65-88)
Female	59% (355)	59% (233)	60% (122)
Race			
Caucasian	79% (471)	78% (312)	79% (159)
Asian	15% (90)	15% (58)	16% (32)
African American	6% (36)	7% (27)	5% (9)
Ethnicity			
Hispanic	20% (117)	19% (74)	21% (43)
Non-Hispanic	80% (480)	81% (323)	78% (157)

Disease Characteristics	Overall % (n)	GAIN % (n)	SOC % (n)
Cancer Type			
GI	34% (201)	34% (134)	33% (67)
Breast	23% (135)	23% (92)	21% (43)
Lung	16% (95)	14% (59)	18% (36)
GU	15% (90)	15% (63)	13% (27)
Other	13% (79)	13% (50)	14% (29)
Cancer Stage IV	71% (428)	71% (284)	71% (144)

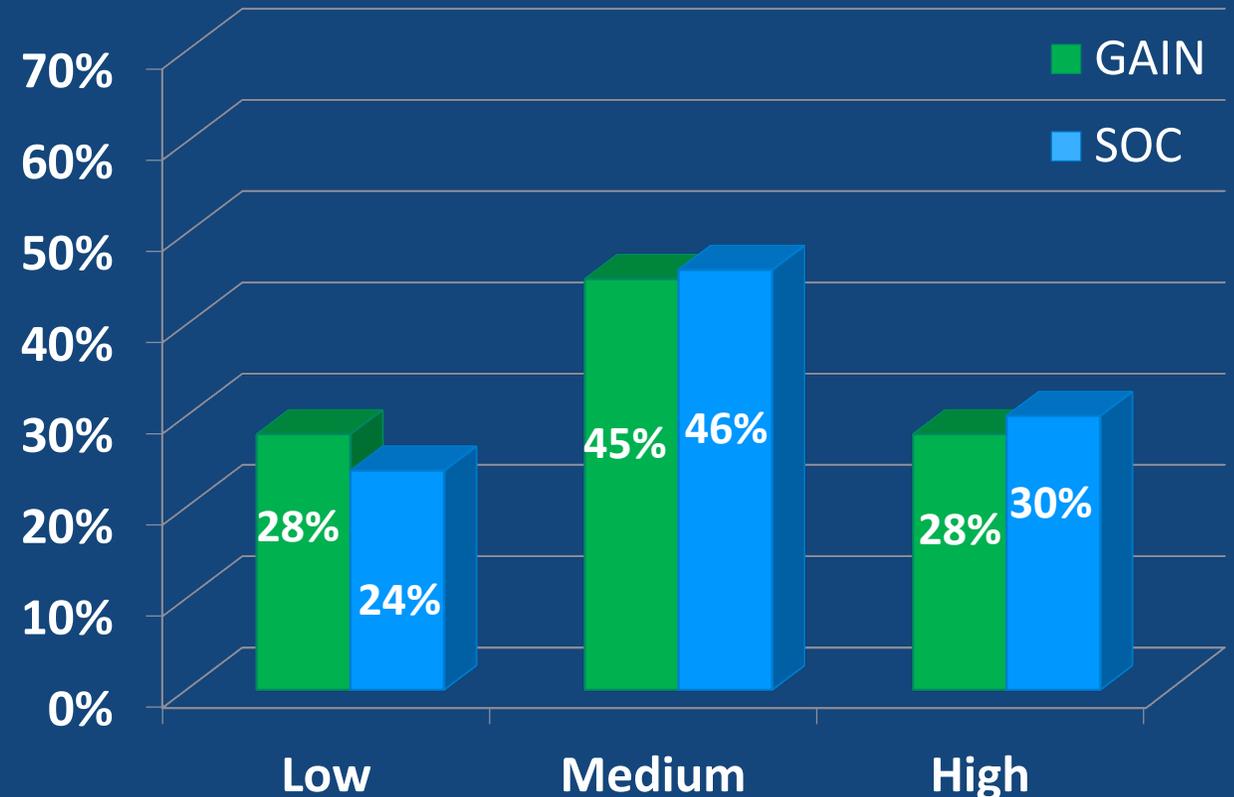
There were no significant differences in patient characteristics between arms.

# Results: Geriatric Assessment

There were no significant differences in GA results and CARG toxicity score between arms

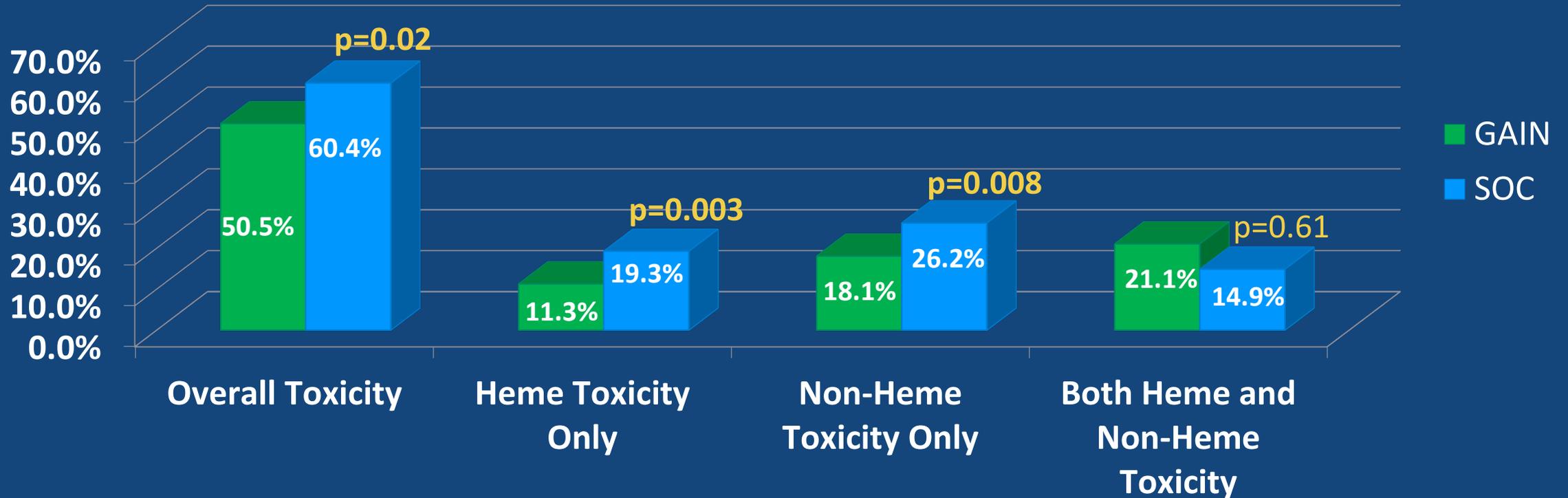
GA Results	GAIN	SOC	P value
Reported weight loss	57%	53%	0.36
Reported KPS <100%	79%	81%	0.71
Fall in Last 6 Months	18%	21%	0.46
Assistance with ADLs (<70)	51%	59%	0.06
Assistance with IADLs (<14)	49%	57%	0.07
≥ 2 Comorbidities	63%	65%	0.75
Abnormal BOMC score	6%	7%	0.92
Limitations in:			
Social Activity (<60)	76%	78%	0.63
Social Support (<100)	67%	70%	0.69

## Cancer and Aging Research Group (CARG) Toxicity Score



# Results: Primary Endpoint

## Incidence of Grade 3-5 Chemotherapy-Related Toxicity



The GAIN arm had a statistically significant reduction of 9.9% (95% CI: 1.6-18.2%,  $p=0.02$ ) in chemo-related toxicity compared to the SOC arm

# Results: Type of Grade 3-5 Chemo-Related Toxicities

Most Common Grade 3-5 Toxicities	Entire Cohort (n=600)	
	n	%
<b>Hematologic and Non-Hematologic</b>	<b>323</b>	<b>53.8</b>
<b>Hematologic</b>	<b>194</b>	<b>32.3</b>
Hemoglobin	112	18.7
ANC	95	15.8
WBC	56	9.3
Infection with abnormal ANC	15	2.5
<b>Non-Hematologic</b>	<b>246</b>	<b>41.0</b>
Infection with normal ANC	102	17.0
Fatigue	74	12.3
Hyponatremia	41	6.8
Nausea	27	4.5
Hypokalemia	27	4.5
Dehydration	26	4.3

# Results: Secondary Endpoints

	GAIN Arm N (%)	SOC Arm N (%)	P-value
Advanced directive completion	278 (70%)	119 (59%)	<0.01
ER visits due to chemo tox	109 (27%)	62 (31%)	0.40
Hospitalizations due to grade 3+ chemo tox	88 (22%)	39 (19%)	0.43
Hospitalizations due to grade 4+ chemo tox	19 (22%)	14 (36%)	0.09
Average Length of Stay [median (range)]	4.8 (1-23)	5 (1.7-26)	0.60

At the end of study, AD completion increased in the GAIN arm vs. the SOC arm (24.1% vs. 10.4% ↑,  $p < 0.001$ ).

No significant differences between arms were observed in ER visits, hospitalizations, or ALOS.

# Conclusions

- **Geriatric Assessment-driven Interventions (GAIN) led to a statistically significant reduction in grade 3-5 chemotherapy related toxicity**
- **GAIN led to a significant improvement in advanced directive completion**
- **Geriatric assessment-driven interventions should be implemented as a part of routine care among older adults with cancer**

# Acknowledgements

The Patients Who Participated and Their Families

Their Doctors

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City of Hope's Center for Cancer and Aging

Our Multidisciplinary Team and Research Staff



# Acknowledgements

**Dr. Arti Hurria**

**Our Fearless Leader and Mentor**



## Our Dream

“One day, all older adults with cancer will receive personalized tailored care, utilizing evidence-based medicine with a multidisciplinary approach”

- Dr. Arti Hurria



Center for Cancer and Aging