Predicting Chemotherapy Toxicity in Older Adults

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Muss et al., Journal of the American Medical Association 2005

Cassidy et al., Journal of Cancer Research and Clinical Oncology 2010

Rocha Lima et al., Cancer 2002

Argiris et al., Journal of Clinical Oncology 2004

Hurria et al., Journal of Clinical Oncology 2011

Hudes et al., New England Journal of Medicine 2007

Folprecht et al., Annals of Oncology 2011

Older adults are at risk for cancer therapy toxicity

Goldstone et al., Blood 2001

Muss et al., Journal of Clinical Oncology 2007

Zauderer et al., Journal of Geriatric Oncology 2013

Quoix et al., Lancet 2011

Schild et al., Journal of Clinical Oncology 2003

Machtay et al., Journal of Clinical Oncology 2008

Zhu et al., Journal of the American Medical Association 2012

Pinder et al., Journal of Clinical Oncology 2007

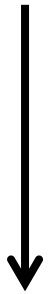
Crivellari et al., Journal of Clinical Oncology 2000

Rather than putting out fires…
Can we anticipate and prevent them?

The Past:
Risk Factors for Chemotherapy Toxicity

- Patient Factors
  - Age
  - ECOG PS/KPS
  - Labs
- Tumor and Treatment Factors
  - Cancer Type
  - Chemotherapy

We Can Anticipate Toxicity?



Moving Beyond Prediction:

Using Geriatric Assessment in Oncology Practice to Guide Practical Interventions

The Present: Geriatric Assessment Items Predictive of Chemotherapy Toxicity

Risk Factors	Aaldriks	Aparicio	Extermann	Freyer	Hurria	Kanesvaran	Soubeyran	Puts
Daily Activities (ADL & IADLs)		X	X	X	X	X	X	X
Hearing (Fair or Deaf)					X			X
Nutrition	X		X			X	X	X
Cognition	X	X	X			X	X	X
Psychological Status	X	X		X		X	X	X
Social Activities					X			X

Aaldriks et al, Crit Rev Oncol Hematol 2011
Aparicio et al, J Clin Oncol 2013
Extermann et al, Cancer 2012
Freyer et al, Annals of Oncology 2005
Hurria et al, J Clin Oncol 2011
Kanesvaran et al, J Clin Oncol 2011
Soubeyran et al, J Clin Oncol 2012
Puts et al, Ann Oncol 2014

Development of a Touchscreen Geriatric Assessment

- Computerized geriatric assessment
- Validated in multiple languages
- Understand the needs of:
  - patients
  - their caregivers

Hsu et al. Cancer 2014

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GERIATRIC ASSESSMENT TOOLS

Chemotherapy Toxicity Tool and Geriatric Assessment Tool

The Chemo-Toxicity Calculator

The Chemo-Toxicity Calculator is a pre-chemotherapy assessment that captures sociodemographics, tumor/treatment variables, laboratory test results (hemoglobin, creatinine clearance), and geriatric assessment variables (function, comorbidity, cognition, psychological state, social activity/support, and nutritional status). The Chemo-Toxicity Calculator is based on the results of a study which enrolled 500 patients across seven participating institutions, in order to identify factors that predict risk of severe chemotherapy-related side effects in older adults with cancer (Hurria et al. JCO 2011). The results from this study were identified by the American Society of Clinical Oncology's as one of the Clinical Cancer Advances in 2012. Having this predictive model that incorporates geriatric and oncologic correlates of vulnerability to chemotherapy toxicity in older adults could help both the healthcare provider and the patient weigh the benefits and risks of chemotherapy treatment. Our ultimate goal is to utilize this Chemo-Toxicity Calculator in clinical practice, where it can be used as a part of shared decision-making.

Chemo Toxicity Calculator

Geriatric Assessment Tool

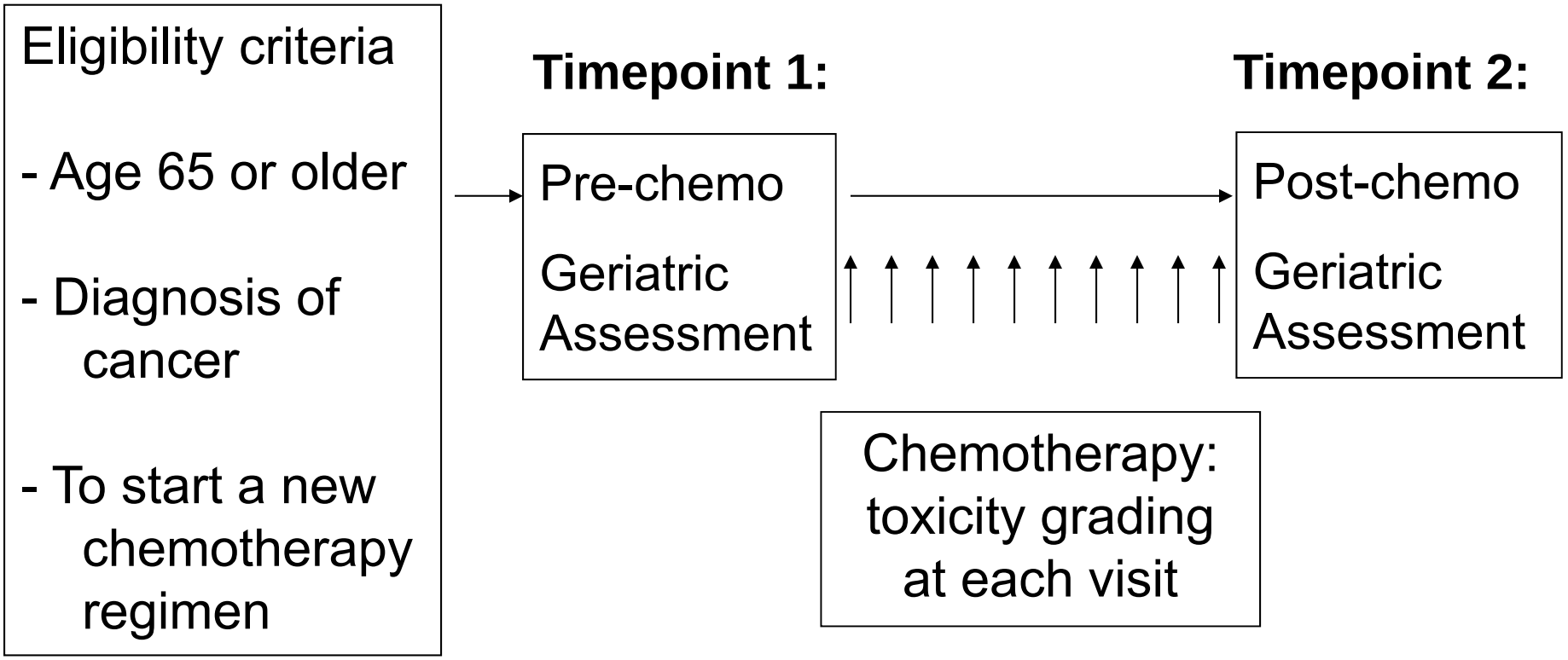
A geriatric assessment is utilized to capture information about a patient's medical history as well as functional, cognitive, and psychosocial status, which can then be used by treating physicians to identify the most vulnerable patients (for example, those at high risk for chemotherapy toxicity). However, these assessments have not been routinely used in oncology practice because of the time and resources required for their administration. A geriatric assessment tool (that can be completed primarily by patients) was developed for incorporation into oncology clinical trials and routine care settings.[1,2] The domains that are assessed include functional status, comorbidities, medications, nutritional status, cognitive function, and psychosocial status.
Please click on the below for more information regarding the geriatric assessment tool:

[1]Hurria et al. Cancer 2005

[2]Hurria et al. JCO 2011

Geriatric Assessment in English

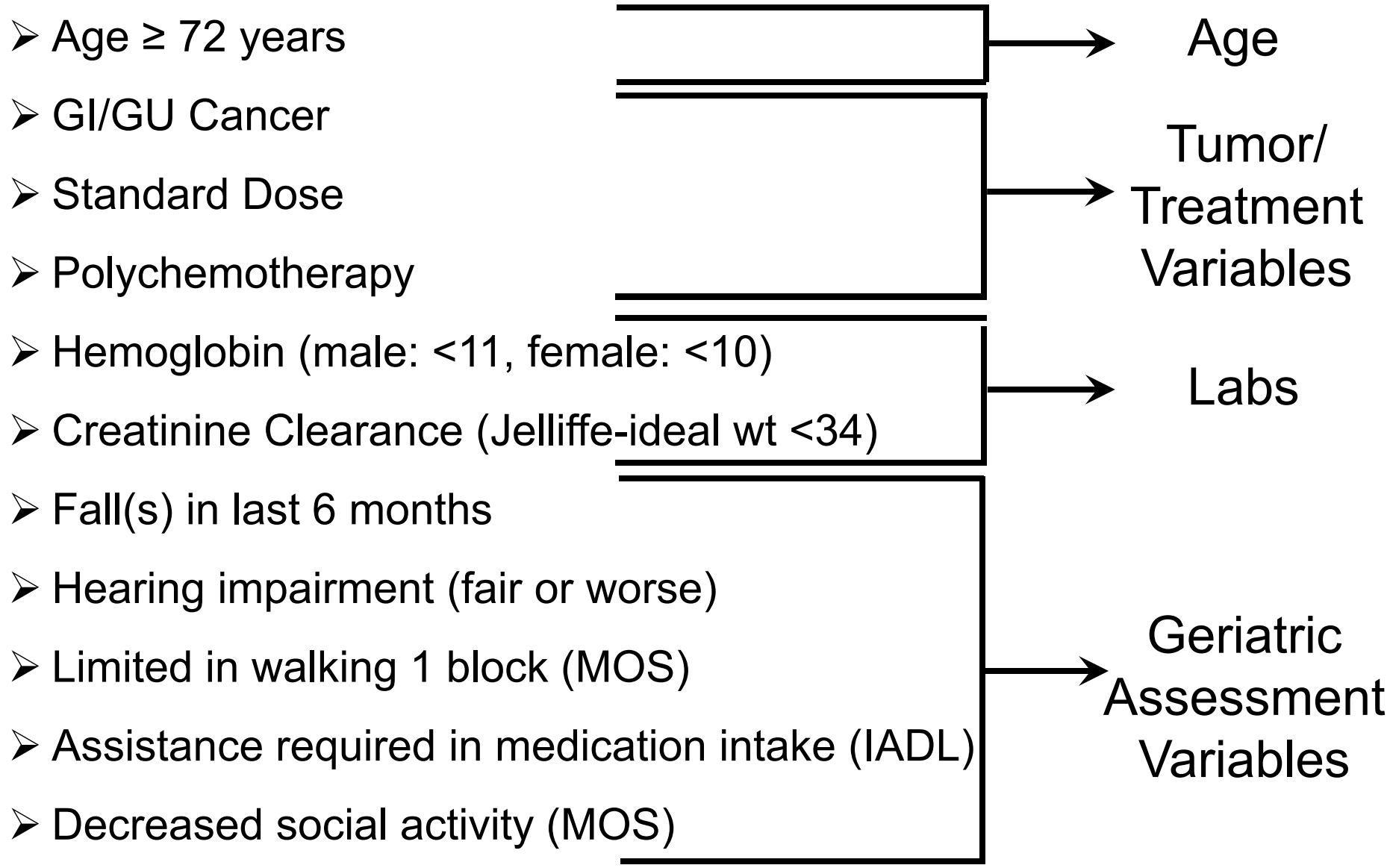
Can Geriatric Assessment Predict Chemo Toxicity? (PI: Hurria)



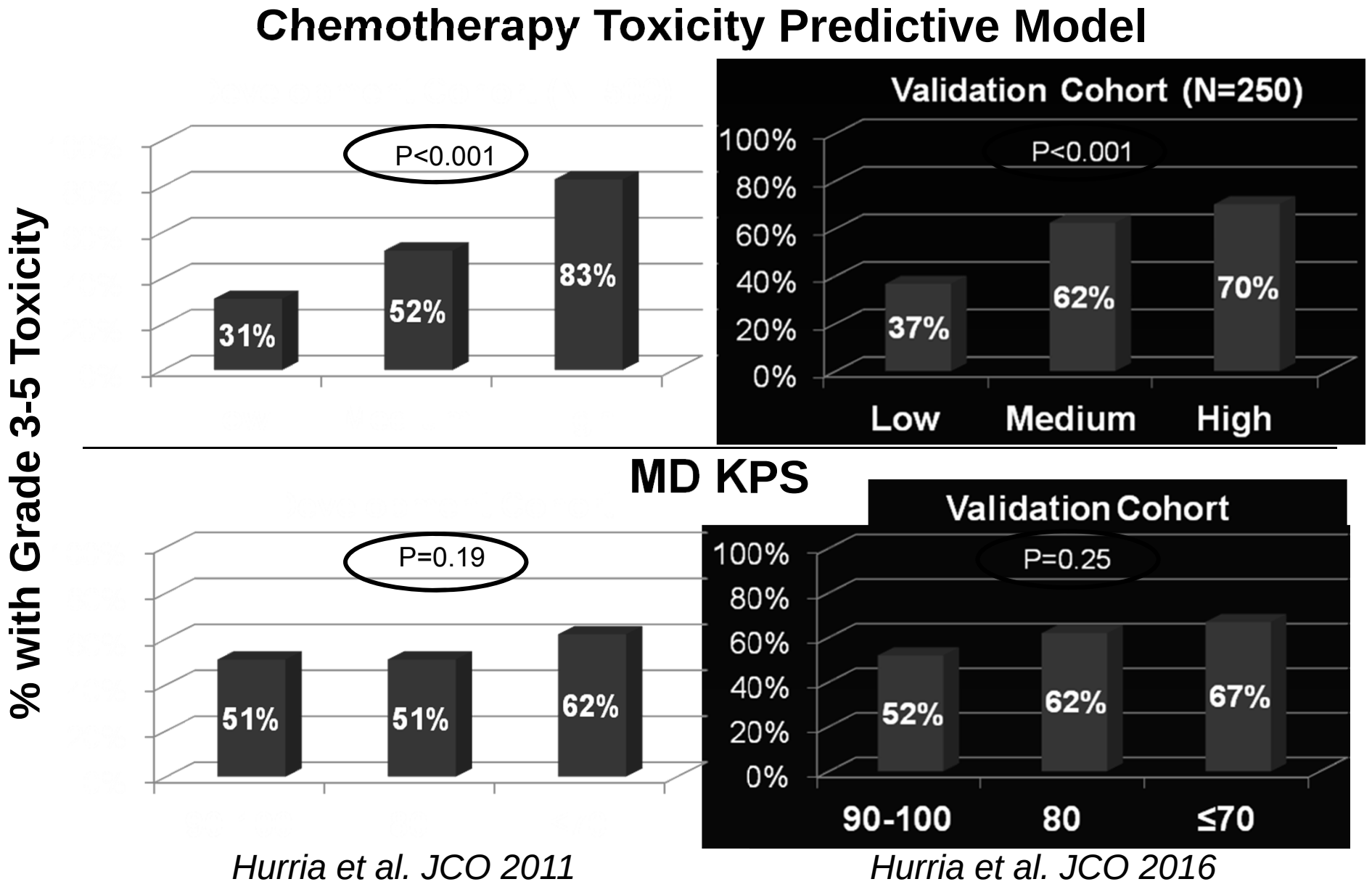
- Sample size: 750 patients (Chemo alone)
- 10 participating institutions (Cancer and Aging Research Group)

Hurria et al, JCO 2011
Hurria et al, JCO 2016

Predictors of Toxicity



MD-rated KPS vs. Predictive Model



Hurria et al. JCO 2011

Hurria et al. JCO 2016

CRASH Score

https://www.moffitt.org/eforms/crashscoreform/

CRASH Score Calculator

This score stratifies patients in 4 risk categories of severe toxicity. Reference for derivation and validation results: Extermann et al. Cancer, Epub Nov 9,2011 http://www.ncbi.nlm.nih.gov/pubmed/22072065. Formal clinical applications of the score still need to be studied.

*** Please click on each link to view/close help on assigning scores**

Chemotherapy risk

Chemotherapy risk	0

Hematologic Risk Factors

Diastolic blood pressure	0
IADL	0
LDH	0

Non-Hematologic Risk Factors

ECOG PS	0
MMS	0
MNA	0

Submit

Extermann et al. Cancer, 2012

Case Example

- 76 yo with stage IV NSCLC (mets to the bones)
- Lives with wife, ambulatory with cane
- Comorbidities: COPD, HTN, CAD, s/p CABG, osteoporosis, hard of hearing
- 5’10”, 160 lbs, BMI 20, BP 136/72, 124/68, HR 96
- Albumin 3.5, Hgb 10.8, Creatinine 1.2

Case Example

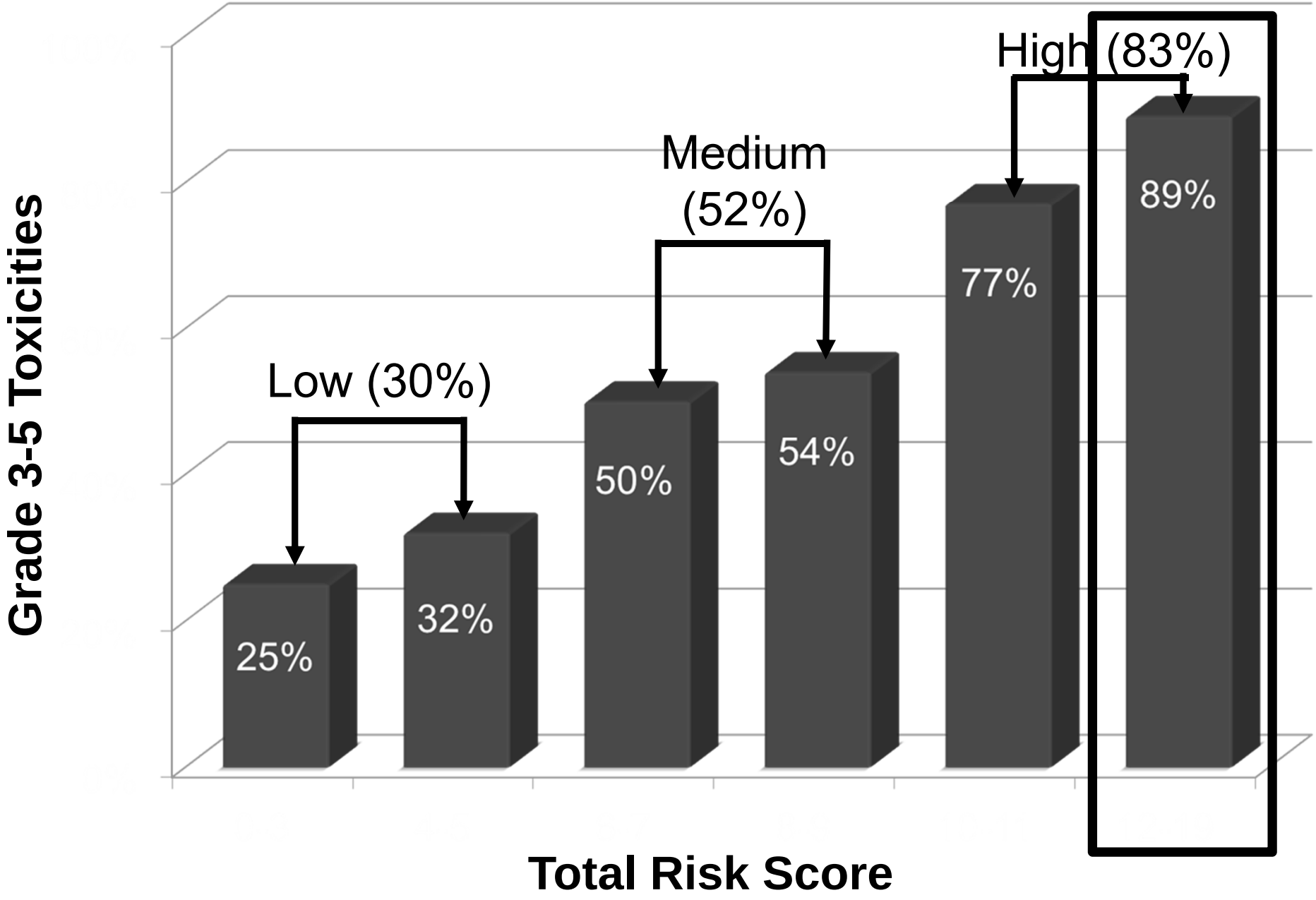
- ADLs: independent
- IADLS: wife does shopping, cooking, cleaning & meds, he drives & pays the bills
- Less socially active than before due to health
- Timed up & go test: 10 s
- Fell 6 months ago (tripped outside on the curb)
- MMSE 29/30

Predictive Model Applied to Our Case

	Toxicity Factor/Question	Value/Response	Score
☑	Patient's Age	Age >= 72	2
☐	Cancer Type	Other	0
☑	Dosage	Standard dose	2
☐	Number of chemotherapy agents	Mono-chemo therapy	0
☑	Hemoglobin	<11 g/dL	3
☑	How is your hearing (with a hearing aid, if needed)?	Poor	2
☑	Number of falls in the past 6 months?	1 or more	3
☑	Can you take your own medicines?	With some help (able to take medicine if someone prepares it for you and/or reminds you to take it)	1
☑	Does your health limit you in walking one block?	Limited a little	2
☑	During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?	Some of the time	1
☐	Creatinine Clearance	49	0

Patient Total Risk Score: 16

Risk of Toxicity by Score



CRASH Score

MOFFITT CANCER CENTER

TakeCharge! TOTAL CANCER CARE

CRASH Score Calculator

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Chemotherapy risk

Chemotherapy risk 0

Hematologic Risk Factors

Diastolic blood pressure 0

IADL 0

LDH 0

Non-Hematologic Risk Factors

ECOG PS 0

MMS 0

MNA 0

Submit

Results

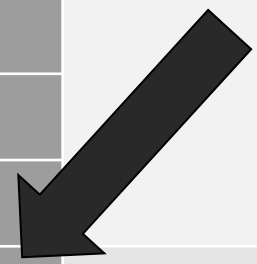
Description	Score	Risk
Heme Score	3	Low
Non Heme Score	6	Med High
Combined Score	**9**	**Med High**

Extermann et al. Cancer, Epub Nov 9,2011 http://www.ncbi.nlm.nih.gov/pubmed/22072065.

Example email sent to oncologist

We identified the following:

Recommendations for issues identified from the Geriatric Assessment	
Comorbidities (high blood pressure, diabetes)	Identify that the patient has a PCP and send a copy of these recommendations to the outside MD in Kingsburg, CA
19% weight loss (self-reported) Current weight: 148 Past weight: 183	Nutritionist consult
BMI = 33.83	
Patient reports problems with eating	
Toxicity score 9 of 19, risk 66%	Follow-up by geriatric oncology NP



Follow up by Geriatric Oncology NP

- Patient's with medium or high risk on toxicity tool
- Phone calls
- Side effect review
- Clinic visits

Can We Intervene to Decrease the Risk? (UniHealth Grant, PI: Hurria)

Objective: To determine whether the geriatric assessment driven interventions will lead to improvement patient outcomes

Pre-Chemotherapy (Baseline)
- Geriatric Assessment
- Calculation of Chemotherapy Toxicity Risk Score

RANDOMIZATION (2:1)

Usual Care	Usual Care + Geriatric Assessment Intervention



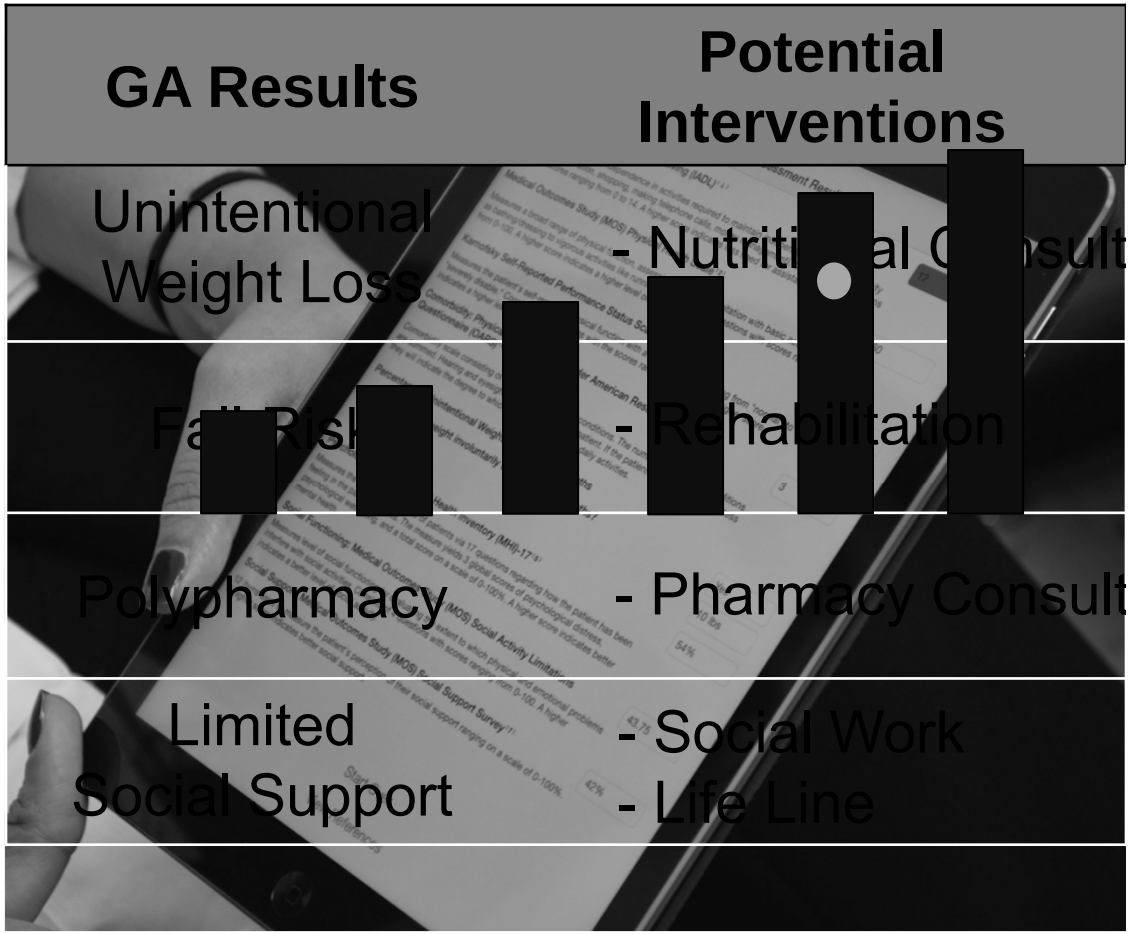


Facilitating Quality Cancer Care

Facilitating Quality Cancer Care

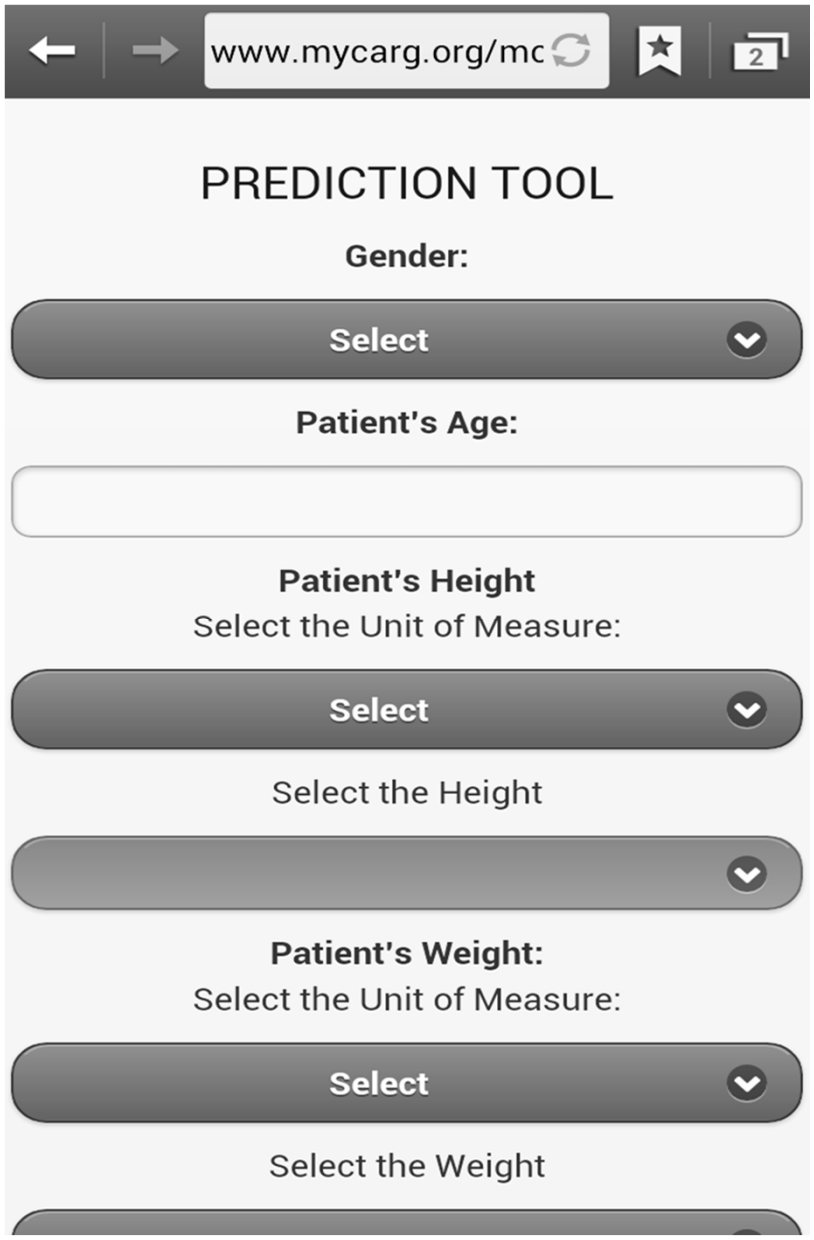
Information Provided to the Healthcare Team

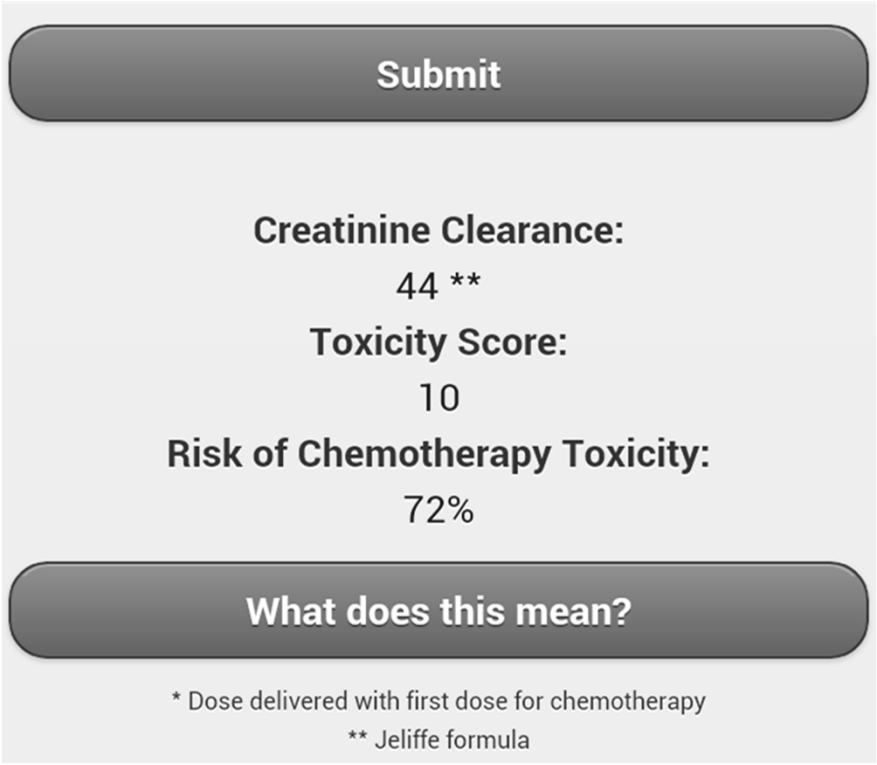
- Geriatric Assessment Results
- List of Potential Interventions
- Chemotherapy Toxicity Risk Score is Generated



Facilitating Quality Cancer Care

Facilitates Communication and Decision-Making Between the Oncologist and Patient





http://www.mycarg.org/mctc

Practical Issues

- Validated in the outpatient setting
- Score does not suggest who not to give chemotherapy to
- Education of staff and providers on the use of a predictability tool and implications
- Follow up after use of tool is key

Conclusions

- The population is aging
- Cancer is a disease associated with aging
- “Chronological age” ≠ “Functional age”
- We need better tools to understand the risks and benefits of chemotherapy in older adults
- A melding of geriatric and oncology principles

Thank you!