

Geriatric assessment in multiple myeloma patients: validation of the International Myeloma Working Group (IMWG) score and comparison with other common comorbidity scores

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Received: April 20, 2016.

Accepted: June 10, 2016.

Pre-published: June 16, 2016.

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Supplementary Table 1. Definition and grading of 13 comorbidities and physical function in myeloma patients

	Variables	Definition and grading			References
		Mild	Moderate	Severe	
MCI	1. Renal function: eGFR/ serum creatinin	CTCAE grade 1	CTCAE grade 2	CTCAE grade 3-4	Kleber ^{7,10}
	2. Lung function: dyspnea or FEV ₁ /FVC ^a , FEV ₁ , TLC, respiratory insufficiency	dyspnea upon intense activity, mild altered lung function	dyspnea upon moderate activity, moderate altered lung function or respiratory insufficiency	dyspnea at rest/few steps taken/the need for oxygen/non-invasive ventilation or FEV ₁ <50%	Kleber ^{7,10}
	3. Karnofsky Performance Status	90%	80%	<70%	Kleber ^{7,10}
	4. Cardiac function: arrhythmias, myocardial infarction/CAD, heart failure	CTCAE grade 1	CTCAE grade 2	CTCAE grade 3 or 4	CTCAE, 4.0
	5. Hepatic function: chronic hepatitis, cirrhosis, fibrosis, hyperbilirubinemia	CTCAE grade 1	CTCAE grade 2-4		CTCAE, 4.0
	6. GI-disease: nausea, vomiting, diarrhea, ulcer	CTCAE grade 1	CTCAE grade 2	CTCAE grade 3	CTCAE, 4.0
	7. Disability: help in personal care and household task	occasional	frequent	≥1x/day	Palumbo ^{4,18}
	8. Frailty: weakness, poor endurance, low physical activity, slow gait speed	1 factor	2 factors	≥3 factors	Fried ^{27,28}
	9. Infection	local intervention	oral intervention	i.v. intervention	CTCAE, 4.0
	10. Thromboembolic event	venous thrombosis	thrombosis, medical intervention indicated	life-threatening, urgent intervention indicated	CTCAE, 4.0 Kristinsson ⁴³
	11. PNP	CTCAE 2-3			CTCAE, 4.0
	12. Pain		requiring analgesia: yes or no		CTCAE, 4.0
	13. Secondary malignancy		1. chronological criteria: before, synchronous or after MM 2. local criteria: local, metastasized, disseminated 3. etiological criteria: hematological, solid or skin malignancy		Hasskarl ⁴⁴ Engelhardt ²² Kleber ^{7,10}

Abbreviations: CAD, Coronary Artery Disease; CTCAE, Common Terminology Criteria for Adverse Events; eGFR, estimated glomerular filtration rate; FEV₁, forced expiratory volume in one second; FVC, forced vital capacity; GI, gastrointestinal; PNP, peripheral neuropathy; TLC, total lung capacity; ^a FEV₁/FVC, Tiffeneau-Pinelli index: ratio of the forced expiratory volume in 1 second and the forced vital capacity

Supplementary Table 2. International comorbidity scores: CCI, HCT-CI, Kaplan Feinstein (KF), initial and revised Myeloma Comorbidity Index (MCI)

	CCI (Weighted)	HCT-CI (Weighted)	Adjusted KF^a	Initial MCI	Revised MCI (Weighted)
References	Charlson 1987 ¹²	Sorrer 2015 ^{13,45}	Extermann 2000 ^{42,46}	Kleber 2013 ⁷	Dommm 2014 ²¹
Develop- ment	1 yr mortality in medical pts, validation in breast cancer pts	Development based on the CCI; specifically targeting transplant pts	Pts with diabetes	Pts with MM	Pts with MM
Factors	<ul style="list-style-type: none"> - Myocardial infarction [1] - Congestive heart failure [1] - Peripheral vascular disease [1] - Cerebrovascular disease [1] - Dementia [1] - Chronic pulmonary disease [1] - Connective tissue disease [1] - Peptic ulcer disease [1] - Mild liver disease [1] - Mild diabetes [1] - Hemiplegia [2] - Moderate-severe renal disease [2] - Diabetes with end organ damage [2] - Tumor without metastases (exclude if >5y from diagnosis) [2] - Leukemia [2] - Lymphoma [2] - Moderate-severe liver disease [2] - Metastatic solid tumor [6] - AIDS [6] 	<ul style="list-style-type: none"> - Cardiac [1] - Arrhythmia [1] - Cerebrovascular [1] - Psychiatric disturbance [1] - Diabetes [1] - Infection [1] - Mild liver disease [1] - Obesity [1] - Inflammatory bowel disease [1] - Moderate-severe renal disease [2] - Moderate pulmonary disease [2] - Peptic ulcer [2] - Rheumatologic disease [2] - Heart valve disease [3] - Severe pulmonary disease [3] - Moderate-severe liver disease [3] - Prior solid tumor [3] 	<ul style="list-style-type: none"> - Cardiac disease - Hypertension - Peripheral vascular- - Respiratory- - Hepatic - Renal - Gastrointestinal impairment - Cerebral/psych. - Alcoholism - Collagen disease, epistaxis, chronic active infections 	<ul style="list-style-type: none"> - Moderate-severe lung disease [1] - Severe renal disease [1] - Reduced KPS: 80-90% [2] ≤70% [3] - Age >60 - ≤70y [1] Age >70y [2] - Moderate-severe frailty [1] - Unfavorable cytogenetics [1] 	
Number of factors	18	15	13	3	6
Max. points	33 (+1 per decade from an age of 50)	26	3	3	9

Abbreviations: CCI, Charlson Comorbidity Index; HCT-CI, Hematopoietic Cell Transplantation Comorbidity Index; KF, Kaplan Feinstein, ^a adjusted KF: without malignancies; KPS, Karnofsky Performance Status; pts, patients; y, years

Scoring rules:

a) R-MCI/MCI/HCT-CI/CCI: Addition of present comorbidities, sum score;

b) adjusted KF: the number of points range from 0 to 3; in case of coexistence of several comorbidities the most severe comorbidity is considered; if ≥2 comorbidities exist in one patient with a grading of 2 points each, the total number of points is 3