

Inquadramento clinico delle fratture da fragilità

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Con il Patrocinio



Università
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di Ferrara

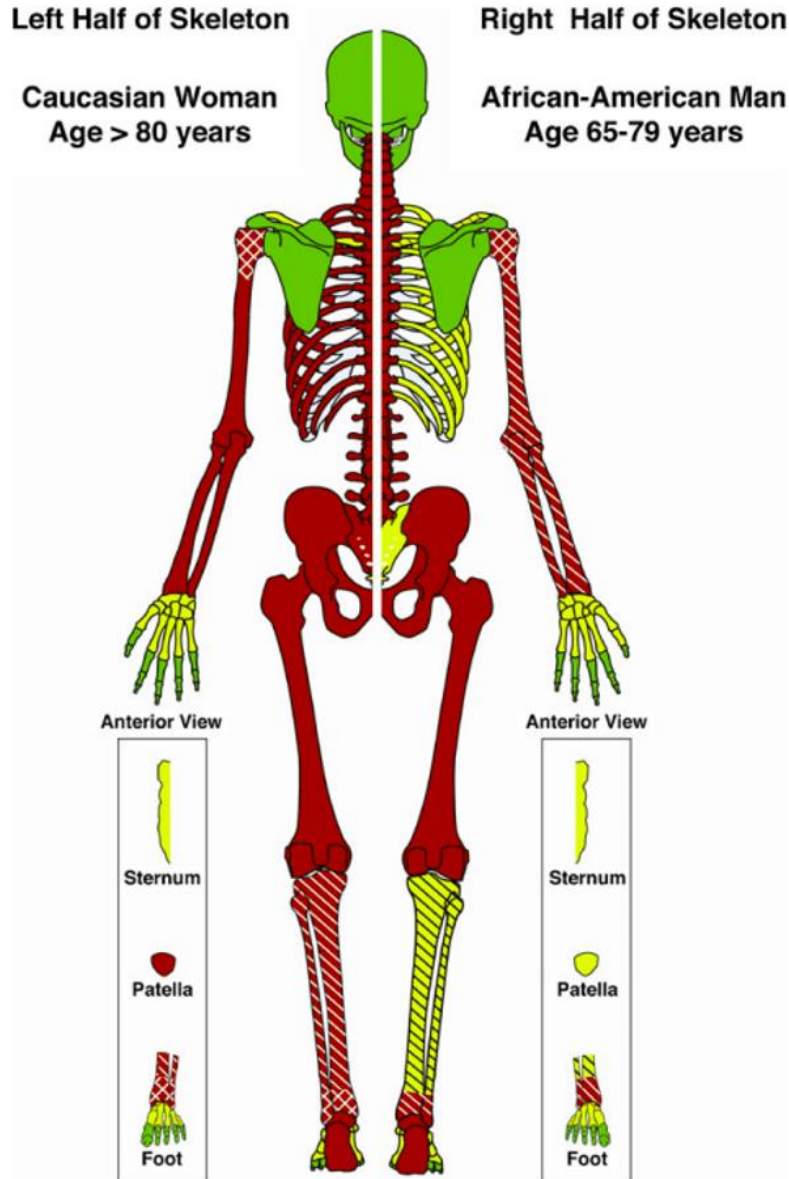
Cosa si intende per frattura da fragilità?

Frattura causata da un trauma a bassa energia che non fratturerebbe un osso sano.

- *Sedi escluse: cranio, volto, dita di mani e piedi;*
- **Fratture patologiche** (neoplasia, metastasi, altra patologia ossea locale) e **Fratture da stress**

Fracture type	Description	Examples
Osteoporotic (fragility) fractures		
Major osteoporotic fracture ^a	Fractures associated with impaired bone strength	Clinical, vertebral, hip, humerus, and forearm fractures ¹⁵
Minor osteoporotic fracture		All other fractures except face, hands, skull, feet, ankles
Traumatic fracture	Caused by a significant external impact force or injury	Force greater than a fall from standing height
Pathologic fracture	Occur secondary to altered skeletal physiology and mechanics in the setting of a benign or malignant lesion ¹⁷	Fracture in a bone affected by malignancy or multiple myeloma or other skeletal pathology
Stress fracture	Associated with major recent increase in physical activity or repeated excessive activity with limited rest ¹⁸	Tibia, tarsal navicular, metatarsal stress fracture in runners, fibula, femur, pelvis, and spine ¹⁹⁻²¹

Fratture maggiori vs fratture minori



FRAX[®]

Frattura osteoporotica maggiore (MOF)

- Femore prossimale → 19.6%
- Colonna Vertebrale → 15,5%
- Radio distale → 17,9%
- Omero prossimale

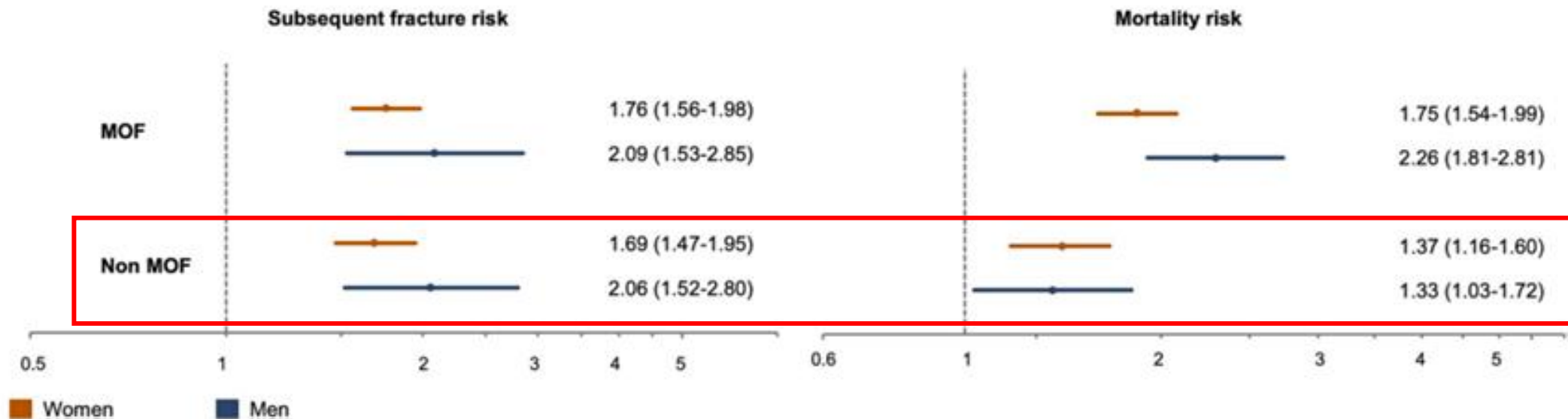
Fratture "minori"

- Pelvi
- Sacro
- Coste → 49%
- Femore distale
- Omero distale

Warriner et al, 2011 Roux et al, 2012

Fratture maggiori vs fratture minori

- Rischio di **rifrattura** +69% nelle donne e +106% negli uomini dopo NonMOF, contro +76% e +109% dopo MOF;
- Le NonMOF comportano comunque un **eccesso di mortalità sostanziale**: +37% nelle donne, +33% negli uomini.



Schwarcz Y, et al 2024

Le fratture di coste come campanello d'allarme

Una frattura costale a basso trauma è associata a bassa BMD, predice fratture successive e aumenta la mortalità.

Una storia di frattura costale dopo i 45 anni **aumenta di 5,4 volte** il rischio di nuova frattura costale e di **2,4 volte** il rischio di qualsiasi nuova frattura.

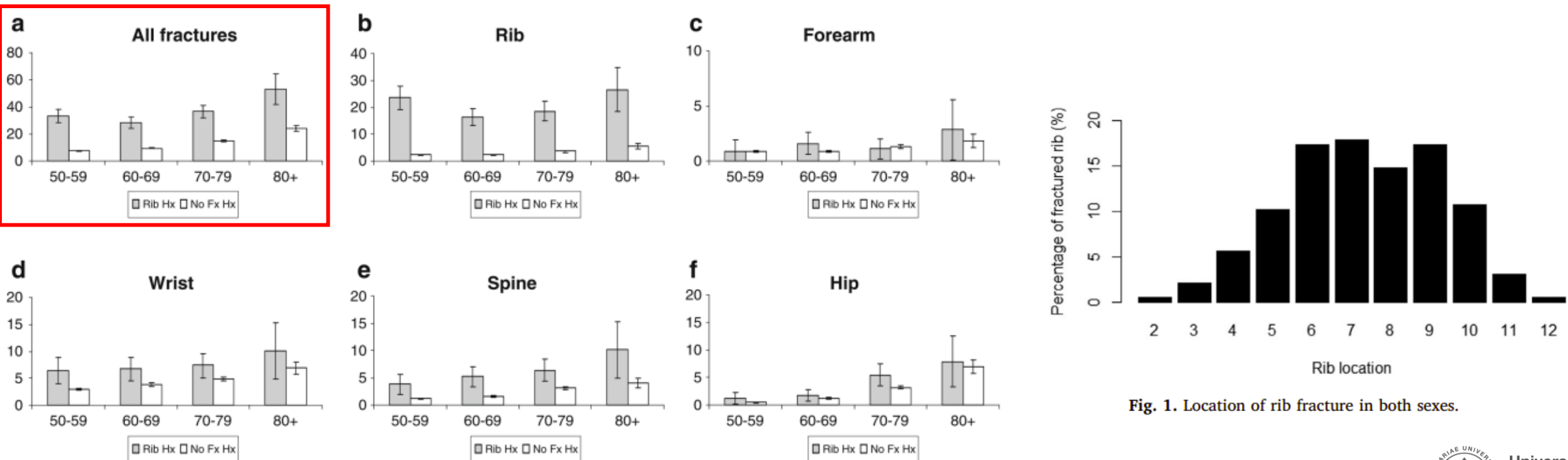


Fig. 1. Location of rib fracture in both sexes.

Fratture non osteoporotiche e rischio di frattura

Osteoporosis International (2024) 35:1839–1847
https://doi.org/10.1007/s00198-024-07169-3

ORIGINAL ARTICLE

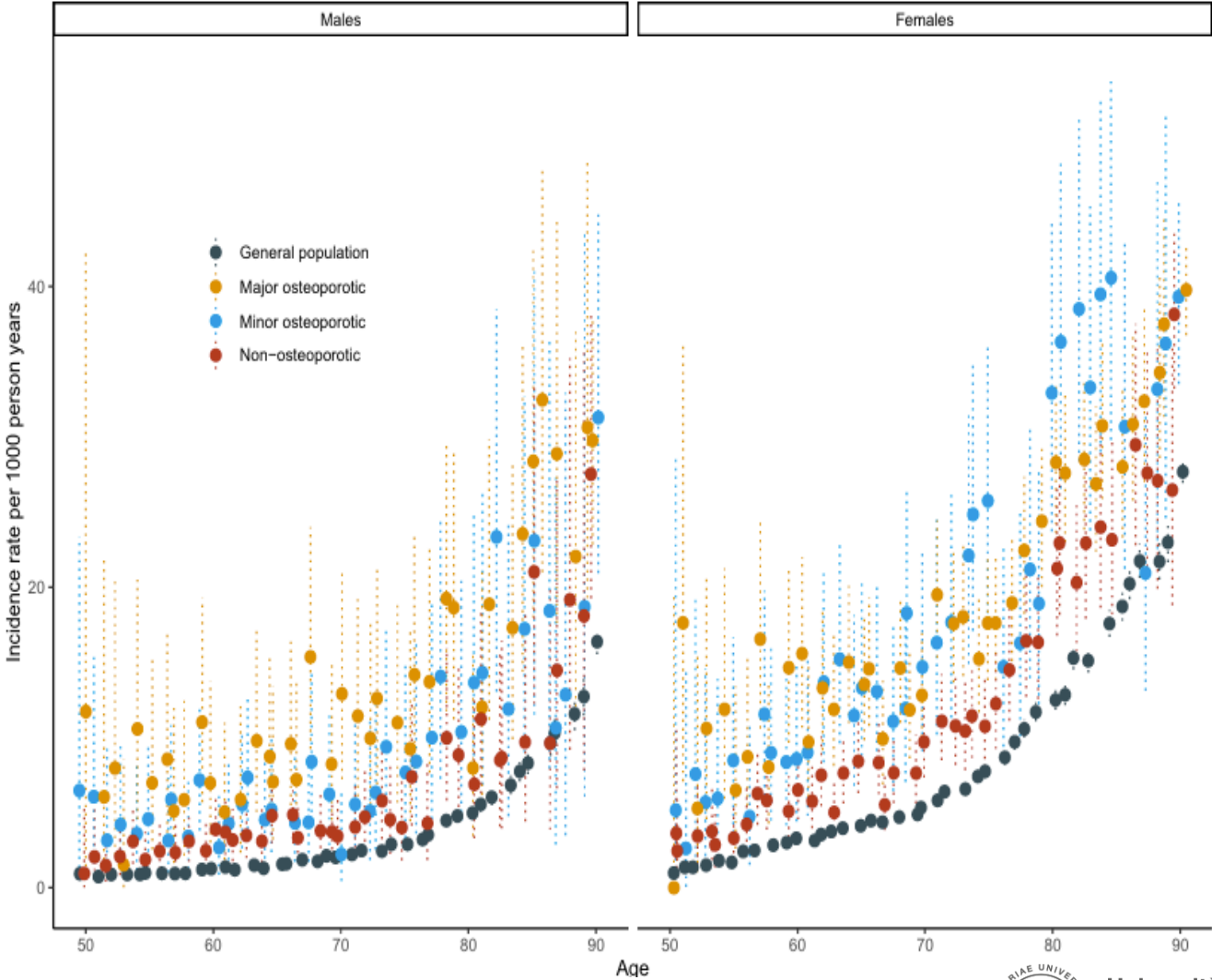


Non-osteoporotic fractures are associated with increased risk of subsequent major osteoporotic fractures

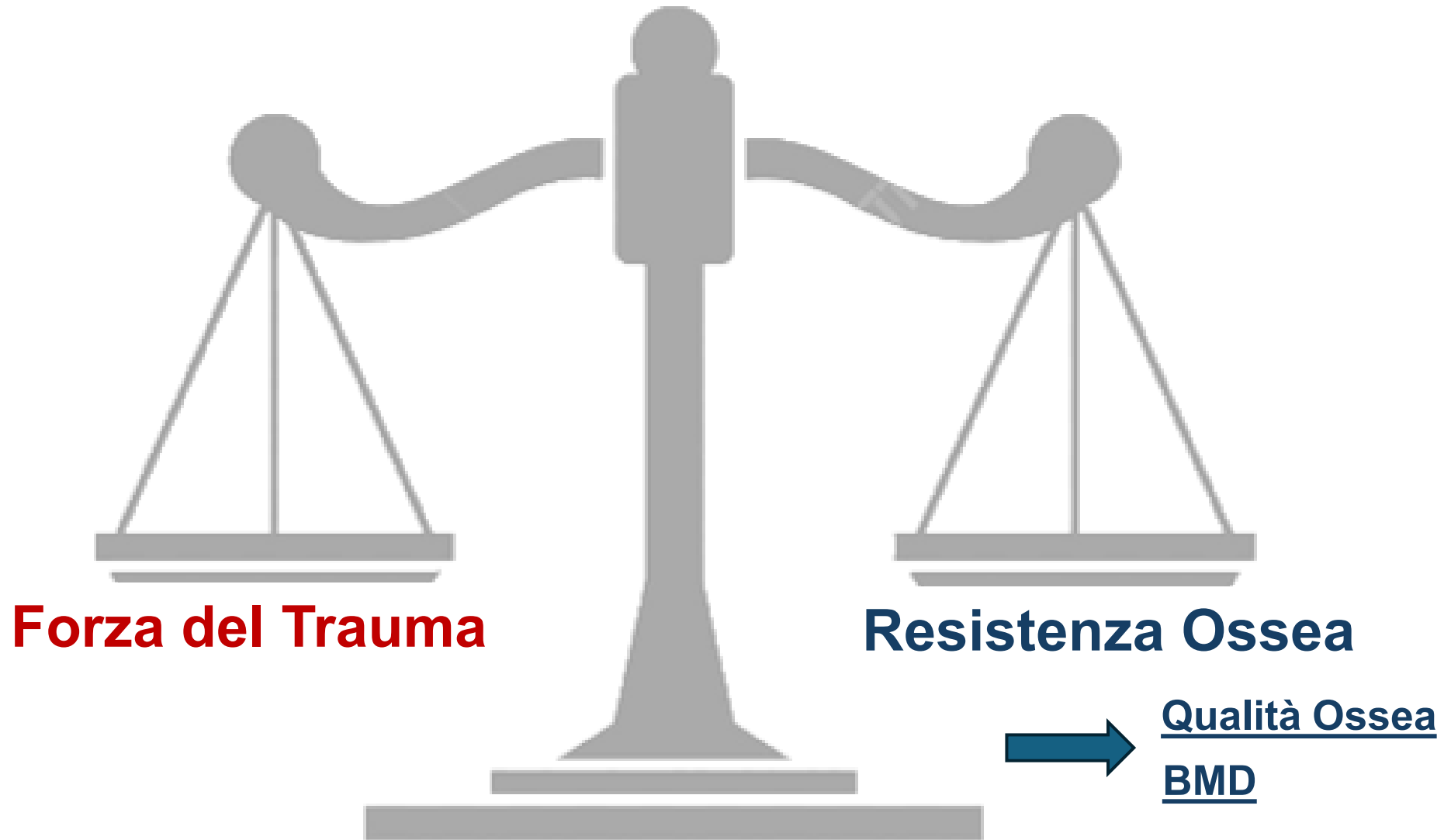
Yonatan Schwarcz^{1,2} · Chen Yanover² · Vanessa Rouach³ · Shai Luria⁴ · Inbal Goldshtein²

Table 4 Exposure groups fracture distribution

Major-osteoporotic		Minor-osteoporotic		Non-osteoporotic	
Fracture site	Frequency	Fracture site	Frequency	Fracture site	Frequency
Distal Radius	24.1%	Clavicle	37.3%	Hand	42.3%
- Distal Radius and Ulna	2.7%	Rib	23.6%	- Phalanx of Hand	24.5%
Proximal Humerus	28.1%	Elbow	18.8%	- Thumb injury	4.3%
Proximal Femur	34.2%	- Upper end of Forearm	11.9%	- Metacarpal bone	17.0%
Vertebral Column	14.7%	- Distal Humerus	6.8%	Foot	30.1%
- Lumbar Spine	6.2%	Pelvis	11.6%	- Forefoot	25.9%
- Thoracic Spine	5.8%	- Pubis	9.1%	- Tarsal bone	3.5%
- Cervical Spine	2.1%	Femur	5.0%	- Calcaneus	1.6%
		- Femur Shaft	2.4%	Fibula	7.2%
		- Distal Femur	2.1%	Tibia	3.4%
		Scapula	3.5%	- Tibia and Fibula	1.3%
		Sternum	2.5%	Ankle	25.3%
		Proximal Tibia	2.0%	- Distal Fibula	7.0%
		Vertebral Column	1.7%	- Distal Tibia	3.2%
				- Closed distal Tibia and distal Fibula	1.2%
				Skull	5.1%
				- Facial bone	2.9%
				Patella	2.2%



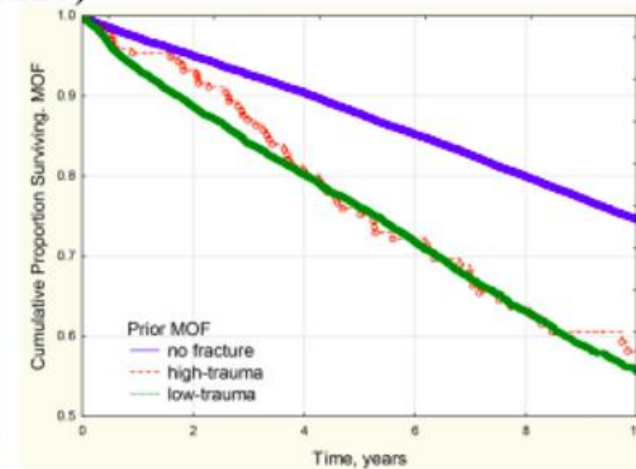
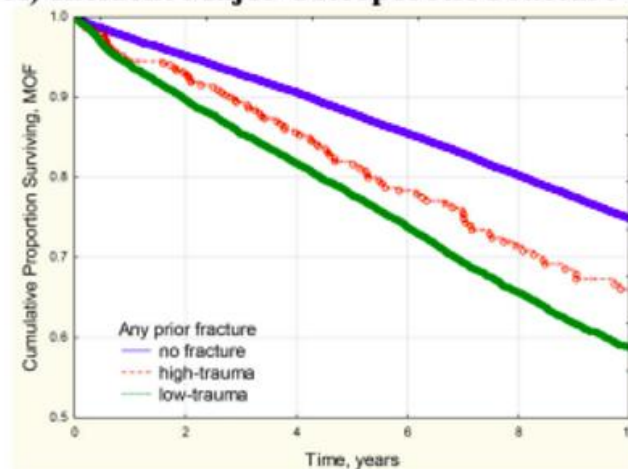
Perché avviene la frattura?



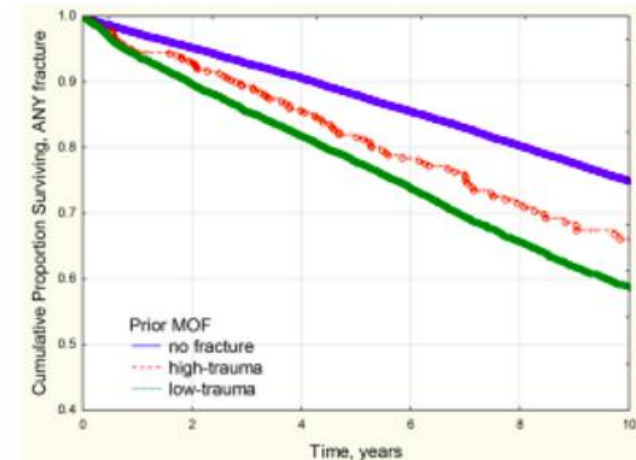
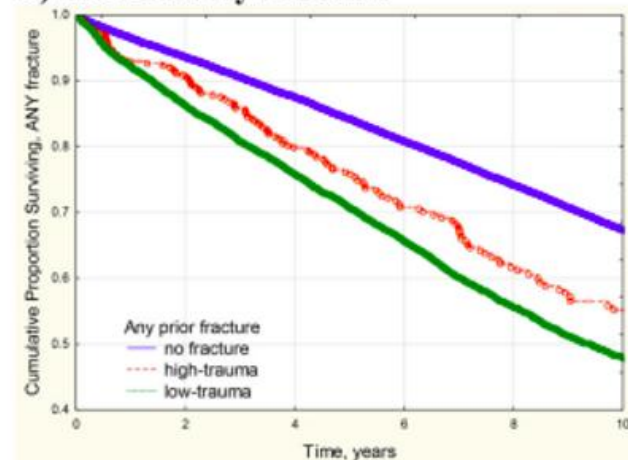
La frattura ad alto trauma esclude l'osteoporosi?

BMD Location	Women		Men	
	High-Trauma Fracture	Low-Trauma Fracture	High-Trauma Fracture	Low-Trauma Fracture
Total hip				
Age-adjusted ^a	1.47 (1.28-1.69)	1.50 (1.44-1.56)	1.58 (1.27-1.97)	1.67 (1.49-1.87)
Multivariate-adjusted ^b	1.45 (1.23-1.72)	1.49 (1.42-1.57)	1.54 (1.20-1.96)	1.69 (1.49-1.91)
Femoral neck				
Age-adjusted ^a	1.33 (1.15-1.53)	1.49 (1.43-1.56)	1.47 (1.17-1.85)	1.65 (1.46-1.86)
Multivariate-adjusted ^b	1.23 (1.04-1.46)	1.46 (1.39-1.53)	1.41 (1.10-1.79)	1.66 (1.46-1.89)
Lumbar spine				
Age-adjusted ^a	1.39 (1.21-1.60)	1.38 (1.32-1.43)	1.54 (1.23-1.93)	1.47 (1.31-1.64)
Multivariate-adjusted ^b	1.30 (1.11-1.53)	1.35 (1.29-1.42)	1.47 (1.16-1.85)	1.41 (1.26-1.59)

A) Incident Major Osteoporotic Fracture (MOF)

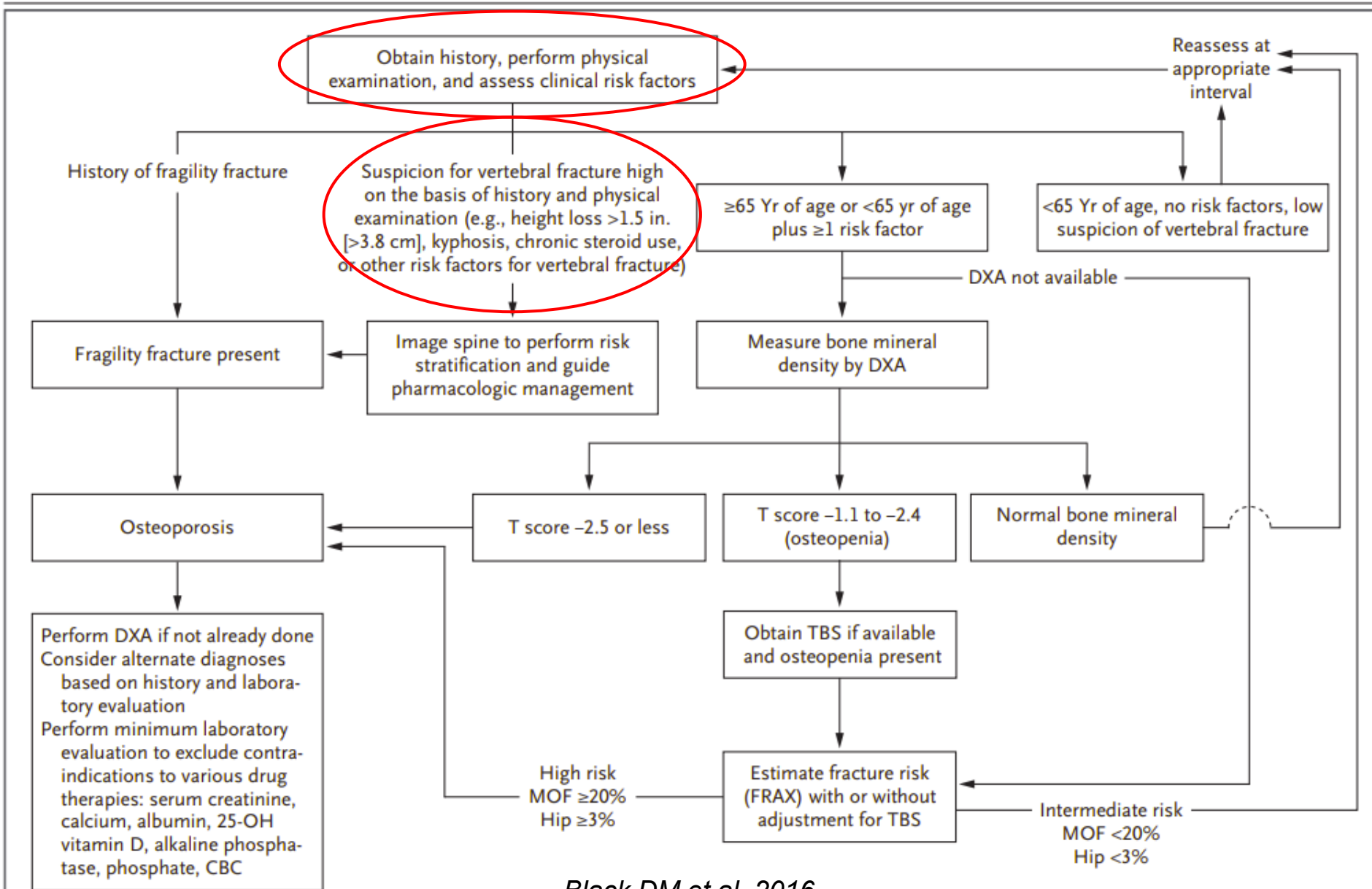


C) Incident Any Fracture

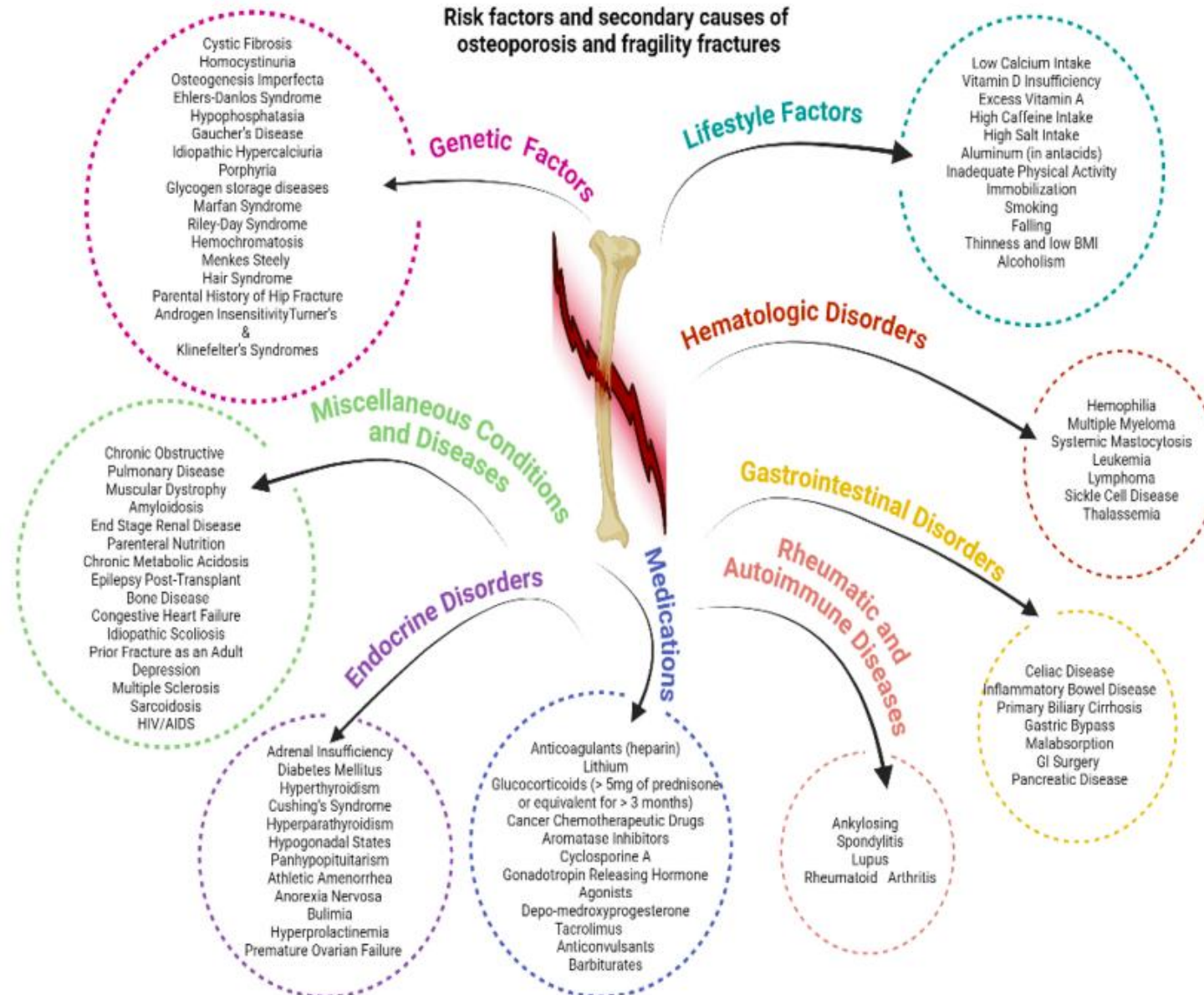


L'inquadramento clinico delle fratture da fragilità è cruciale perché ogni frattura è un "evento sentinella" che segnala la presenza una malattia osteo-metabolica sottostante e apre una finestra di rischio immediato.

Da cosa partire?



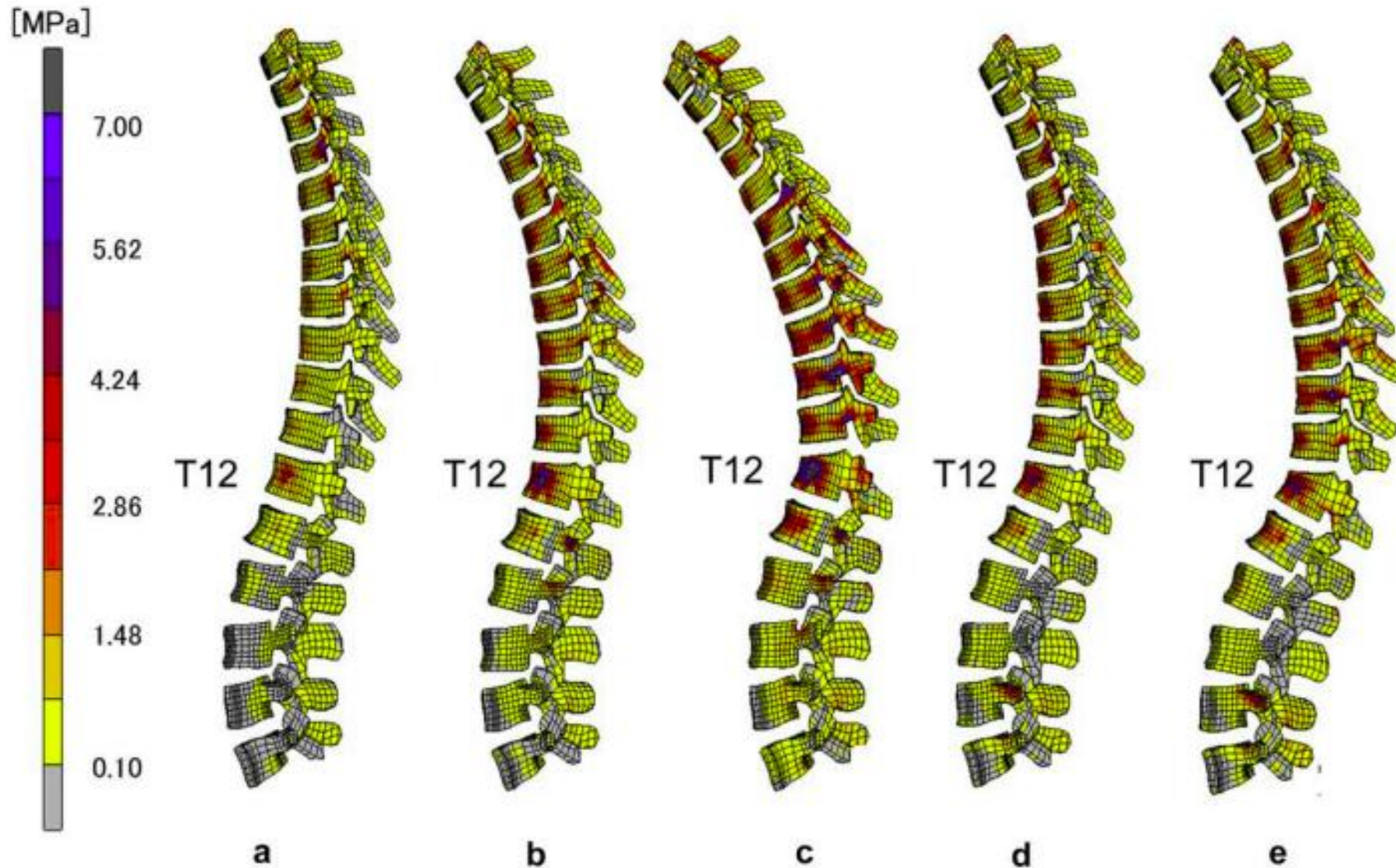
Valutazione fattori di rischio



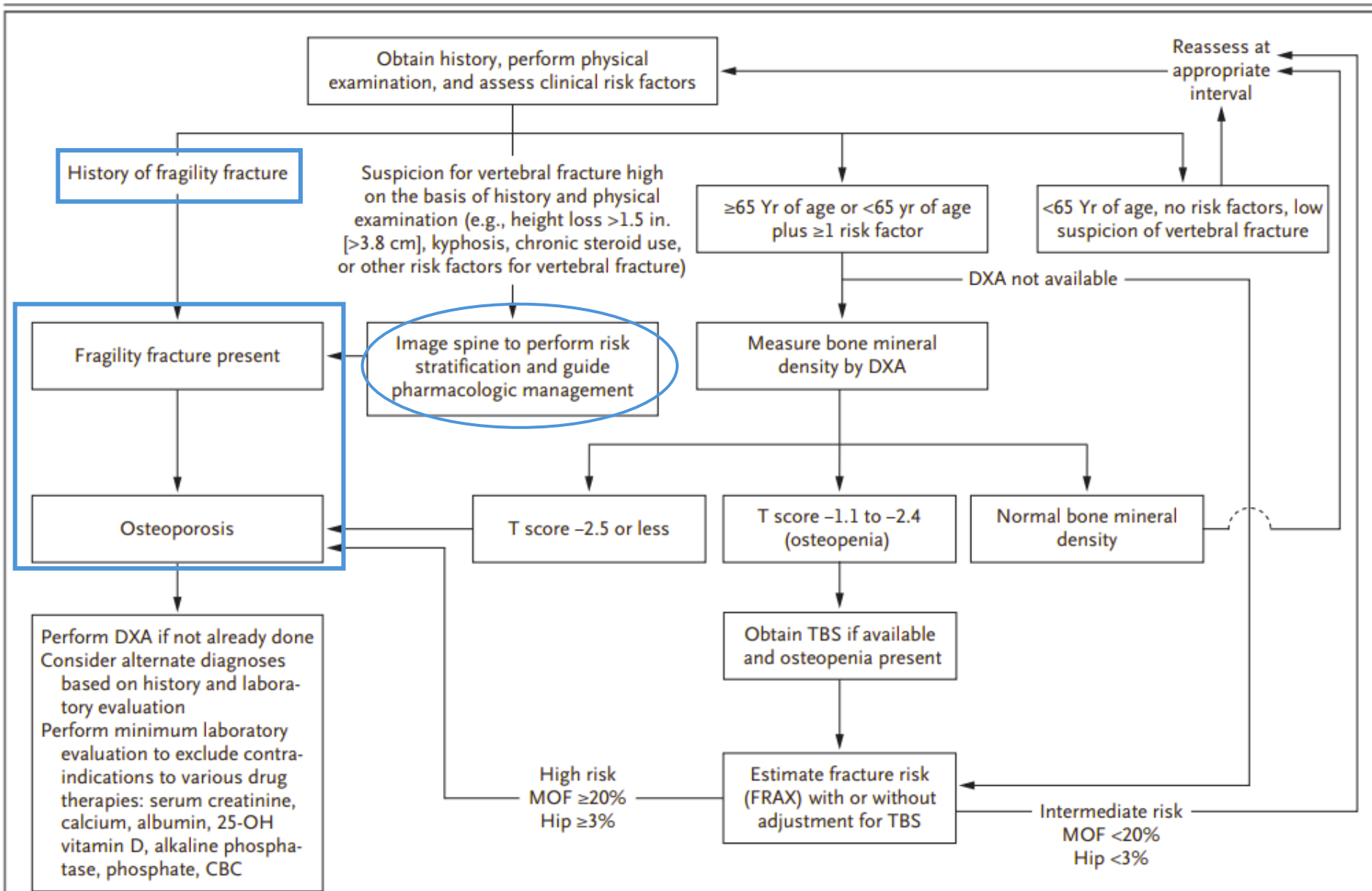
Non modificabili

Modificabili

Cifosi e fratture vertebrali



Okamoto, 2015



Black DM et al, 2016

FRATTURE VERTEBRALI



5-10%
Ospedalizzazione



40-50%
Diagnosi Clinica



50-60 %
Non diagnosticati

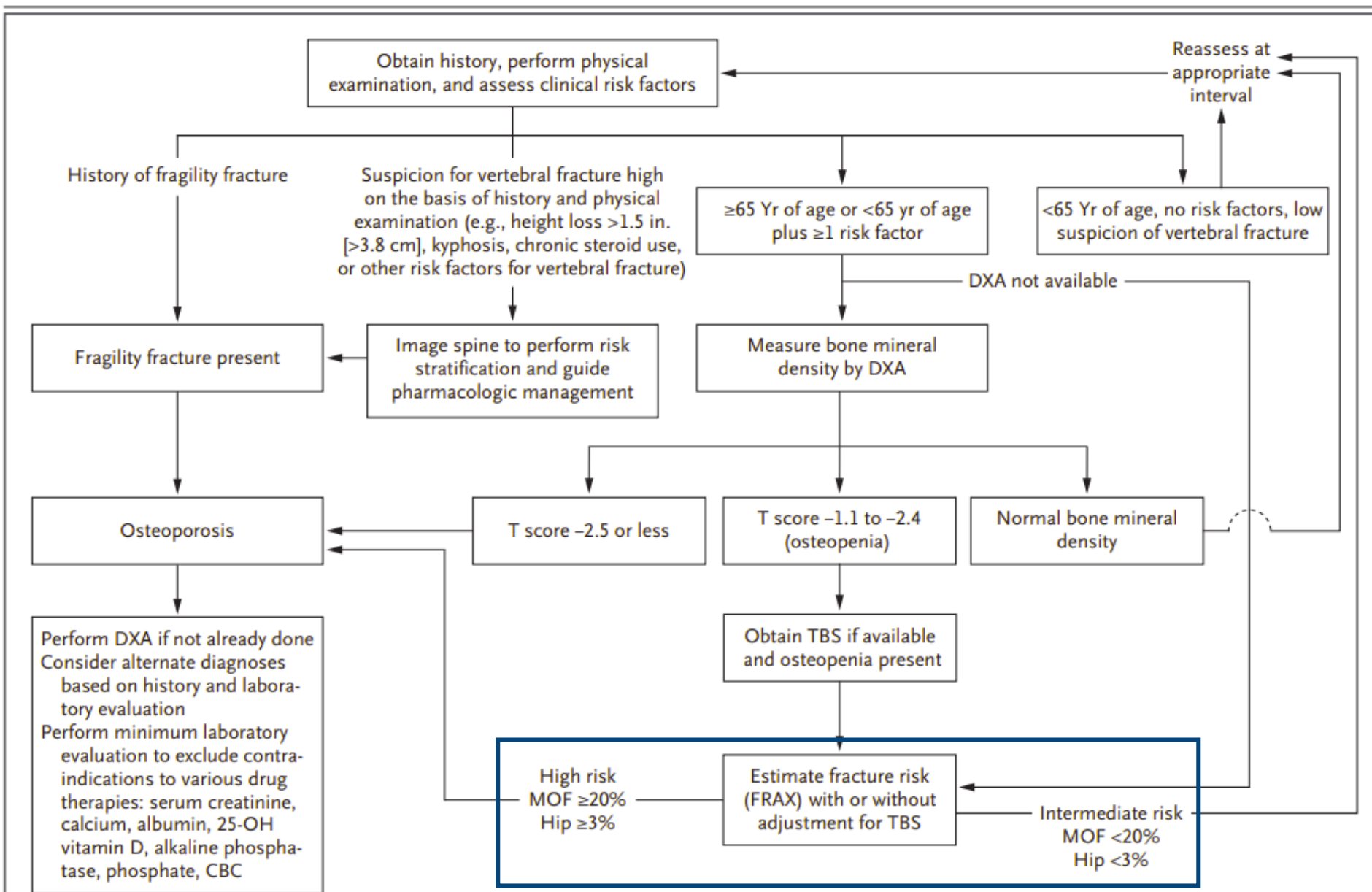
**La frattura è il marcatore diagnostico,
non la BMD.**

**Circa il 70% delle fratture osteoporotiche
avviene in soggetti senza osteoporosi
densitometrica.**

*Morin, Leslie e Schousboe et al 2025.
Reid et al 2020*



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I calcolatori di rischio fratturativo

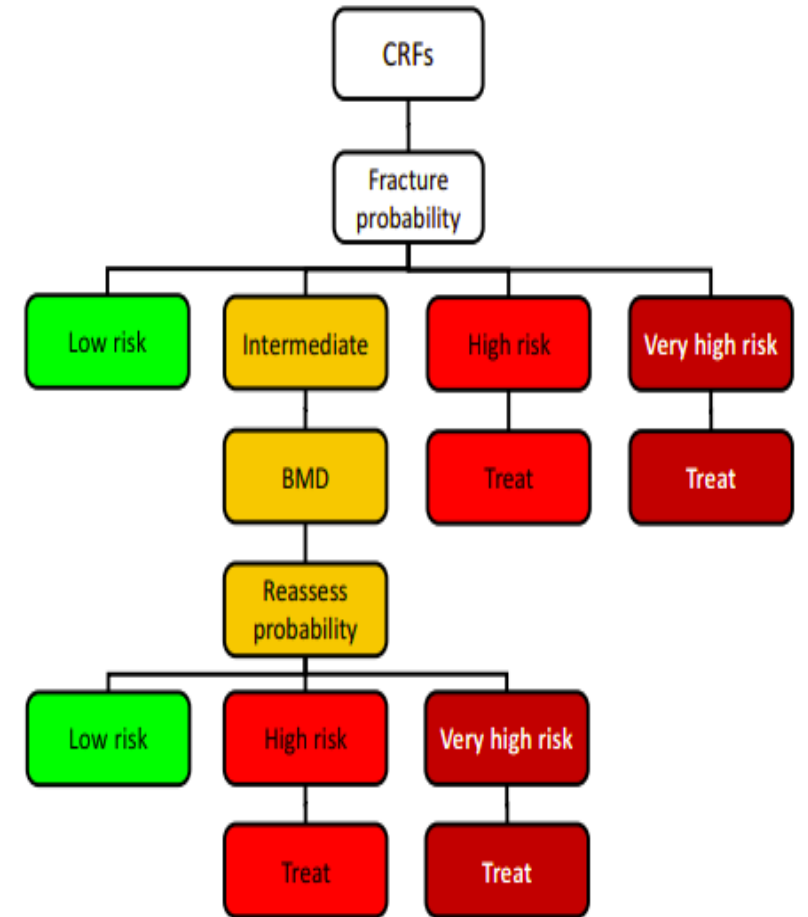
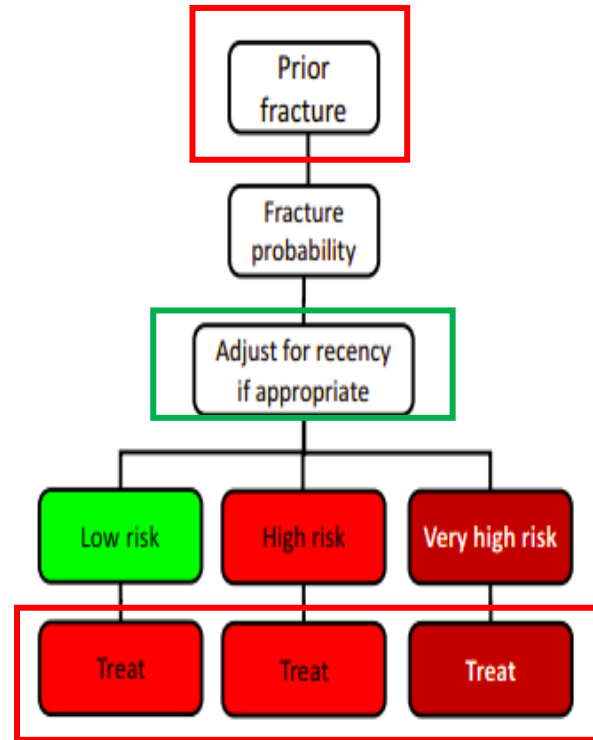
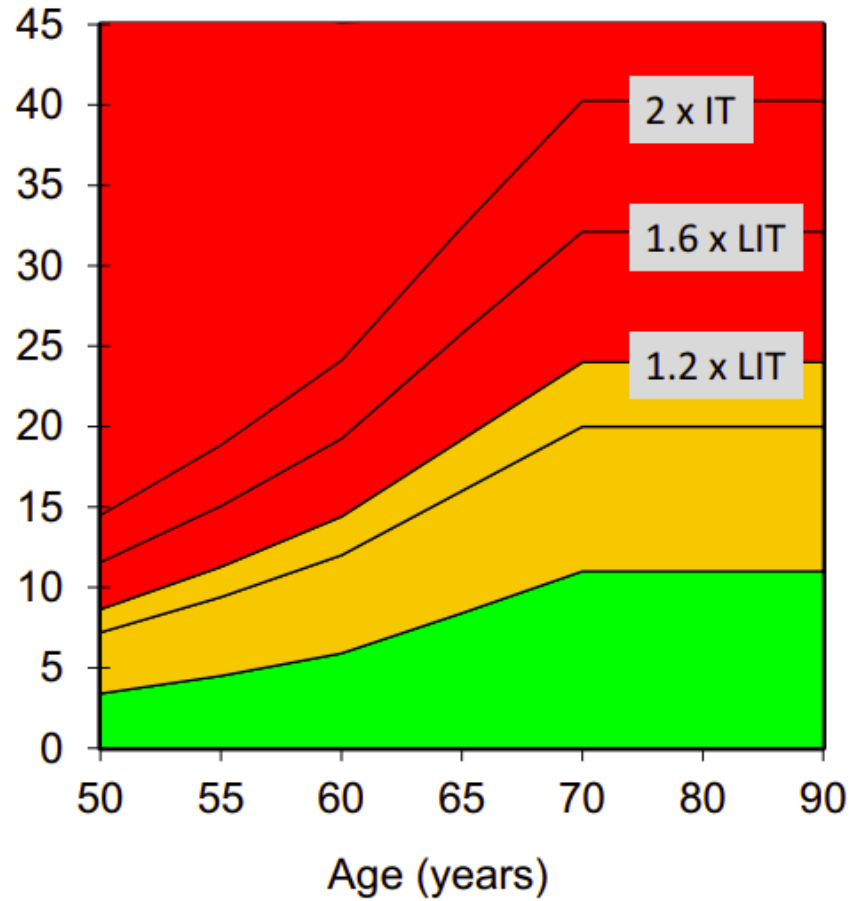


- Sviluppato dalla WHO (2008), **calibrato per singolo Paese**
- Stima la probabilità a 10 anni di frattura maggiore e di frattura d'anca
- Uomini e donne 40–90 anni
- Glucocorticoidi **binario**
- BMD del **collo femorale** opzionale.
- Include età, sesso, BMI, pregressa frattura, familiarità per frattura d'anca, fumo, alcol ≥ 3 U/die, glucocorticoidi, artrite reumatoide, osteoporosi secondaria



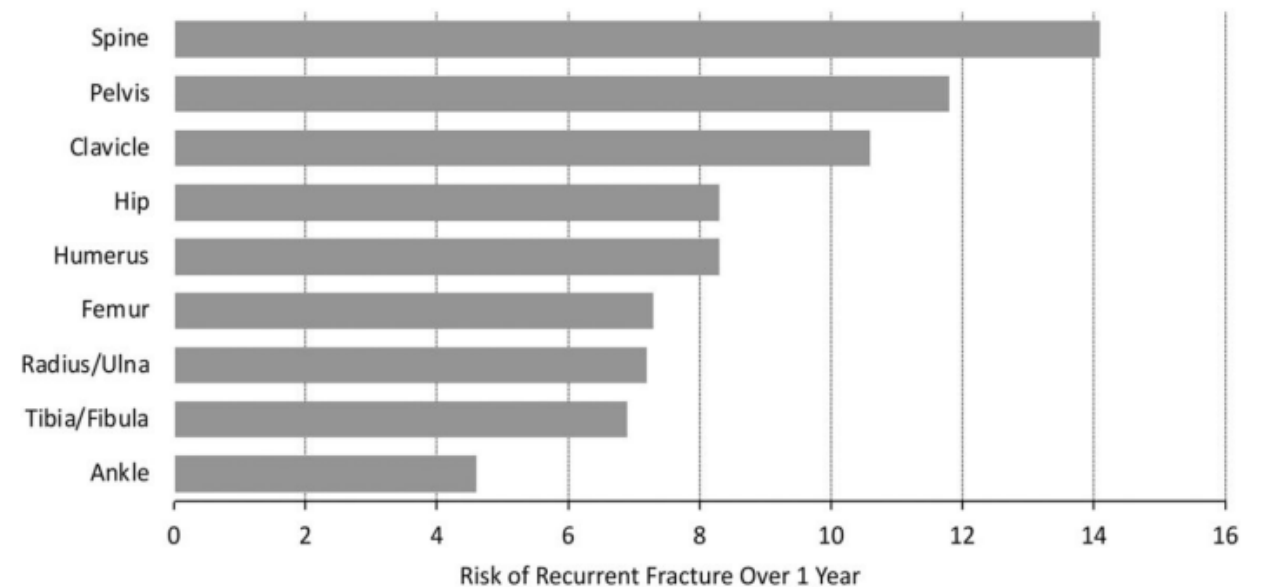
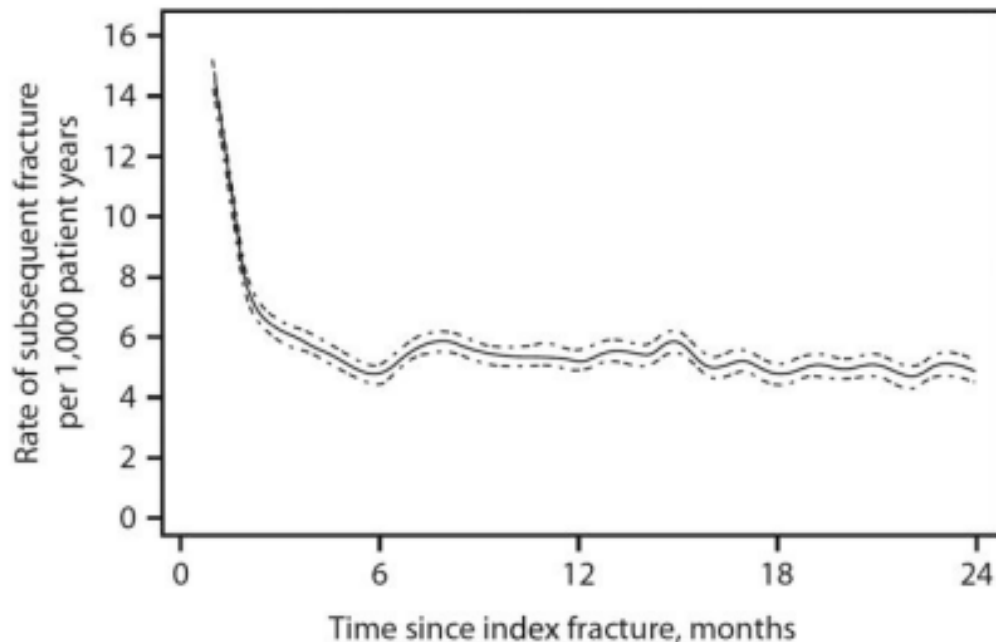
- Versione italiana FRAX-derivata
- Integra **numero e sede** delle pregresse fratture
- Solo donne 50-90 anni
- Dose **semiquantitativa** di glucocorticoidi
- BMD di **rachide lombare + femore**
- Include cadute, apporto calcio/vitamina D, comorbidità, terapia ormonale adiuvante per carcinoma mammario

10-year probability MOF (%)



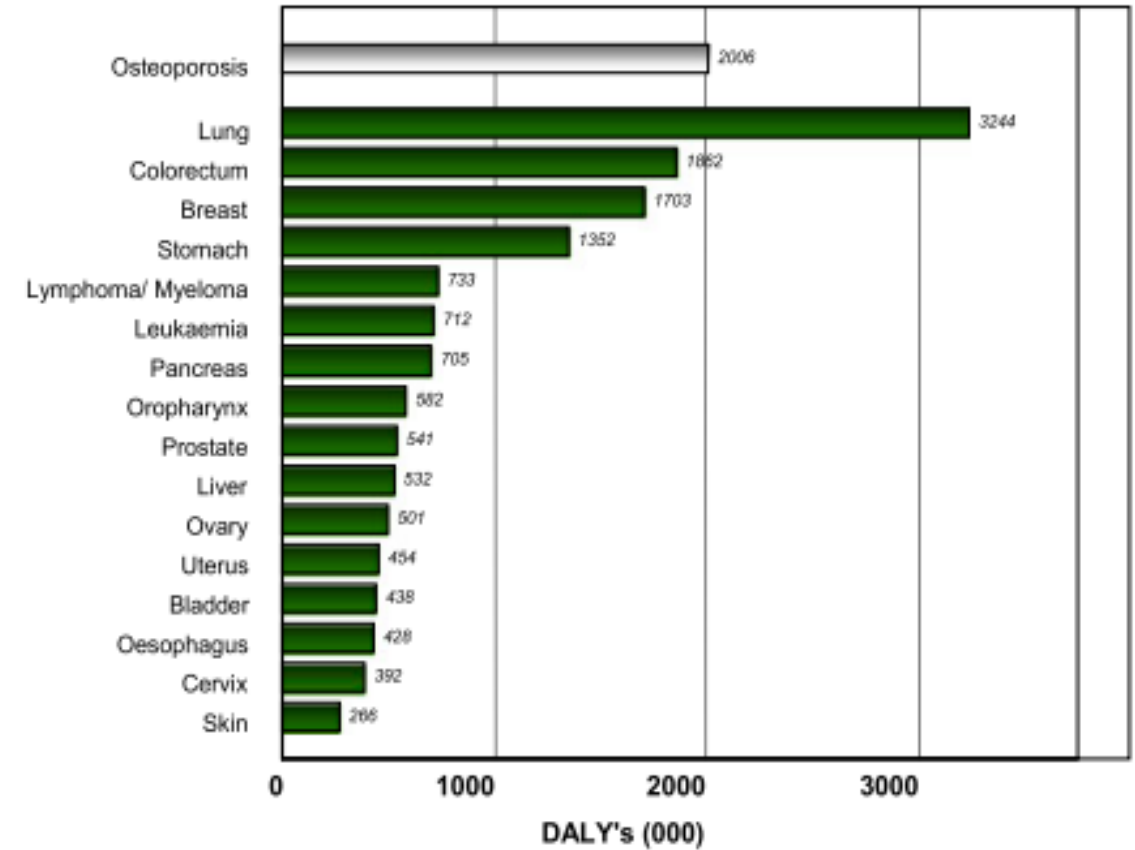
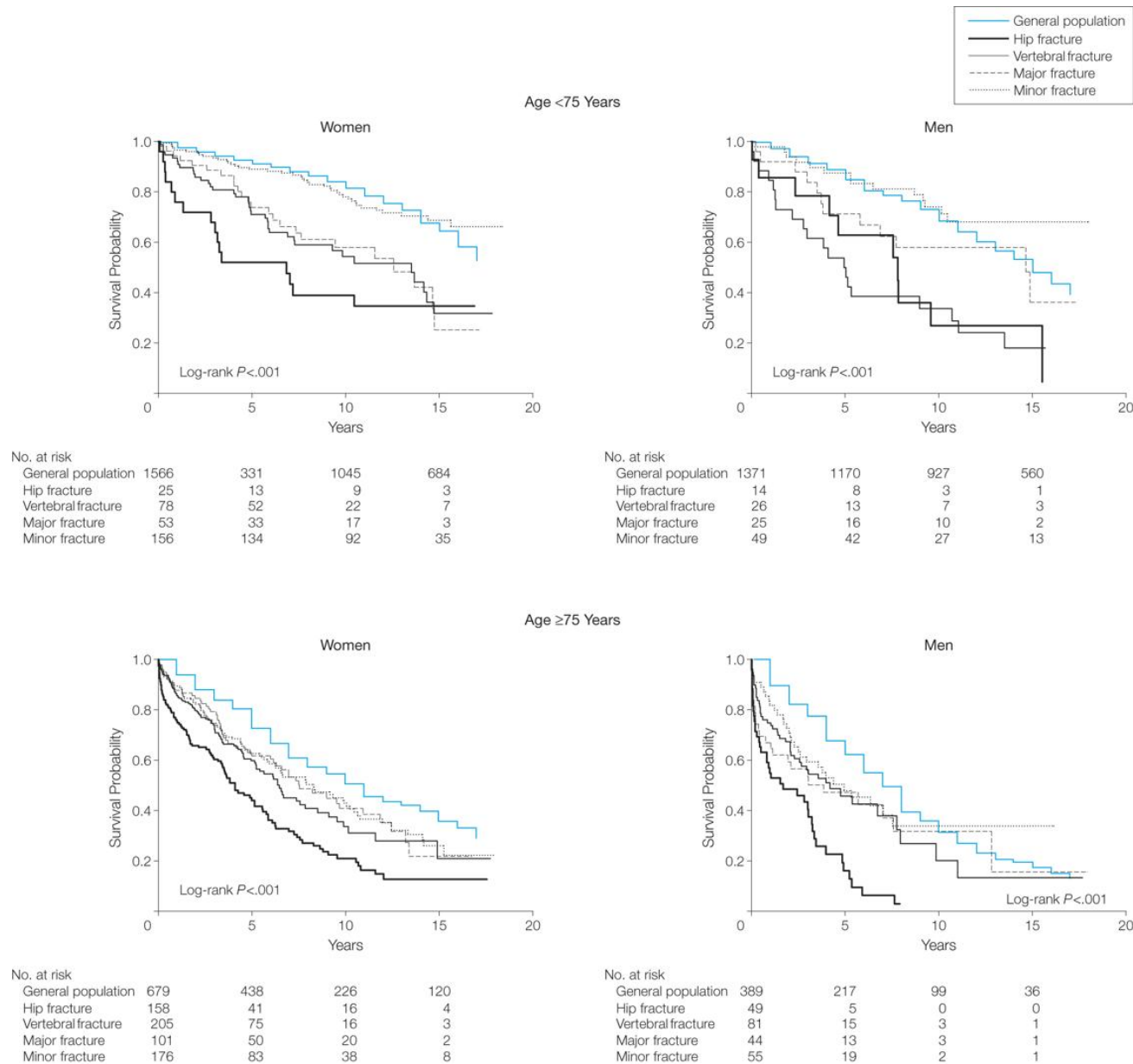
Il rischio di una nuova frattura **non è costante**: è massimo nei primi 3-6 mesi e resta alto nei primi 2 anni.

Incidenza cumulativa è **7,6% a 1 anno** e **11,6% a 2 anni** e particolarmente elevato dopo fratture vertebrali e di bacino.

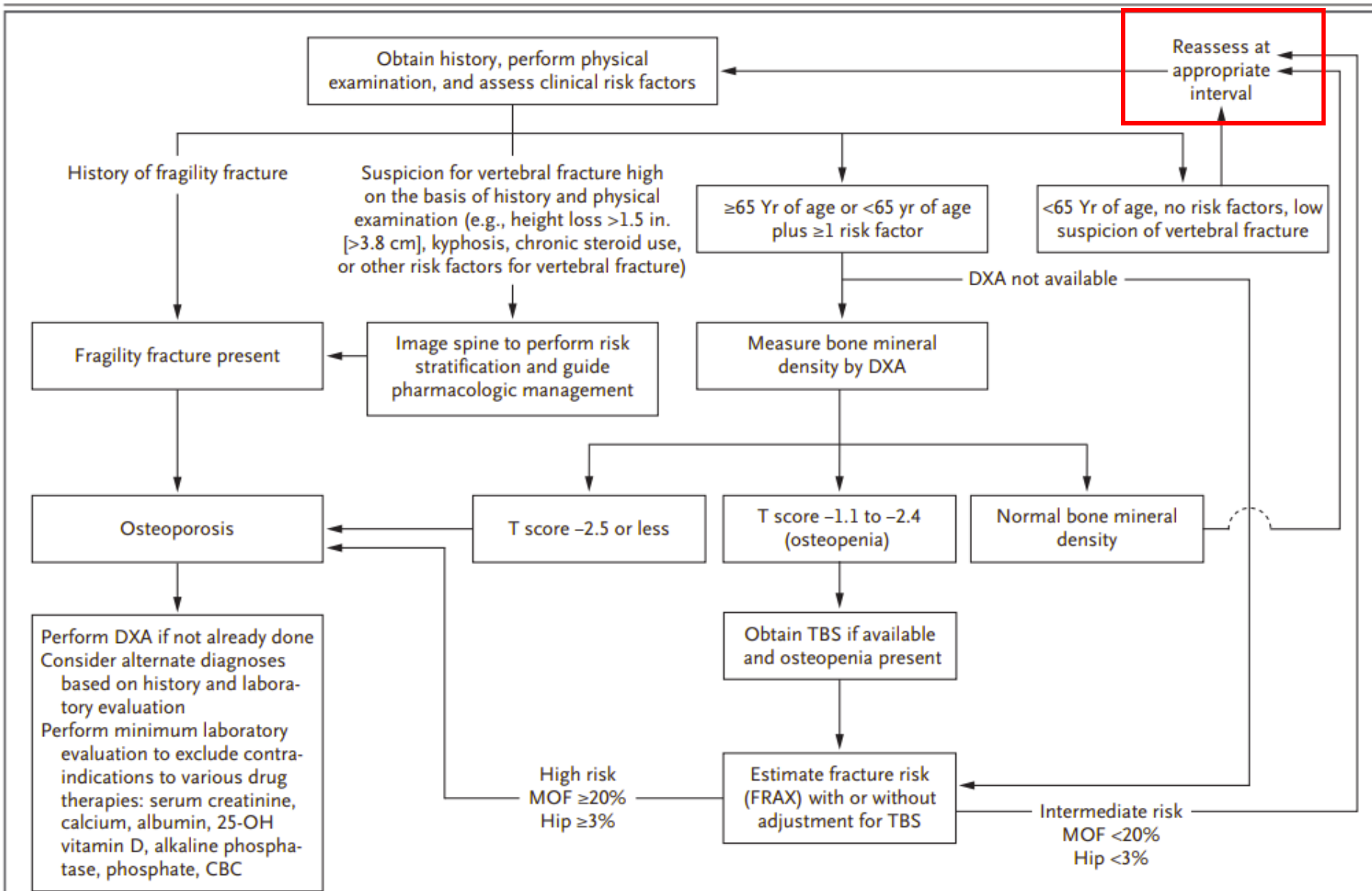


Vilaca et al, 2026

La frattura da fragilità: oltre l'osteoporosi

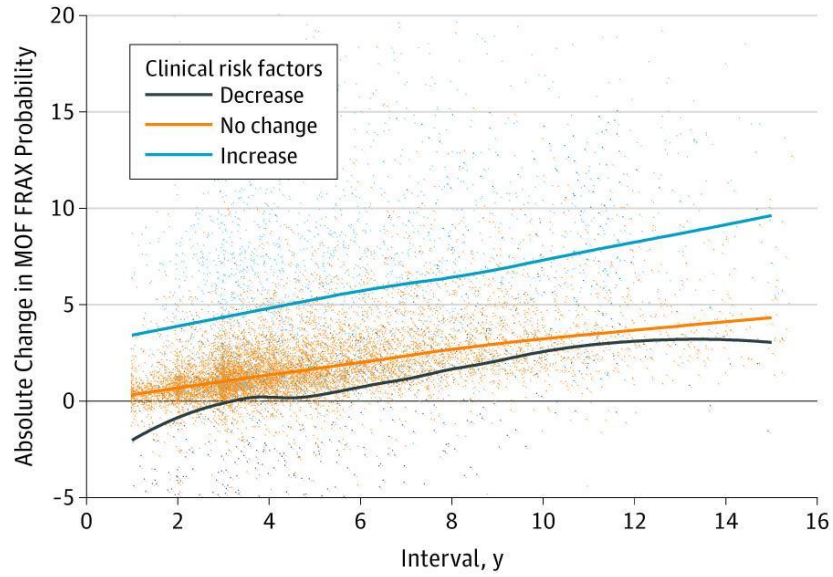


Alajlouni et al, 2026
Johnell, Kanis et al 2006

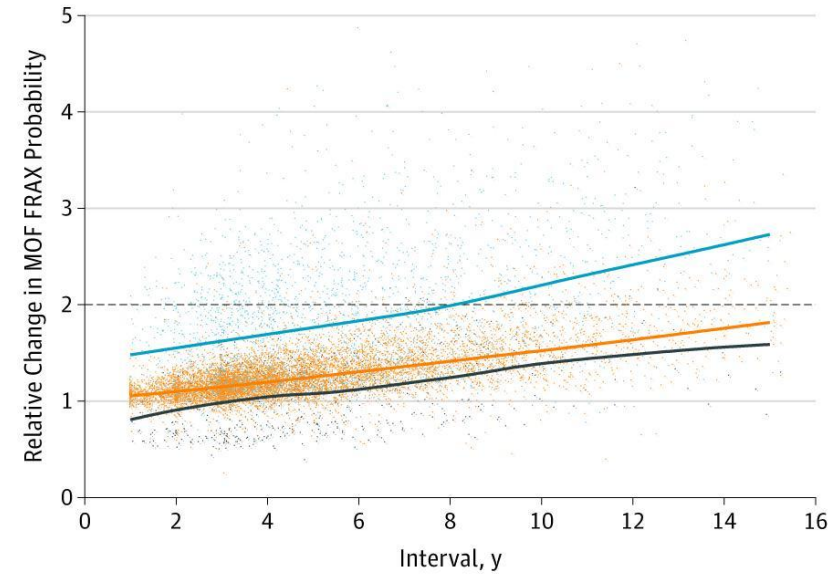


Black DM et al, 2016

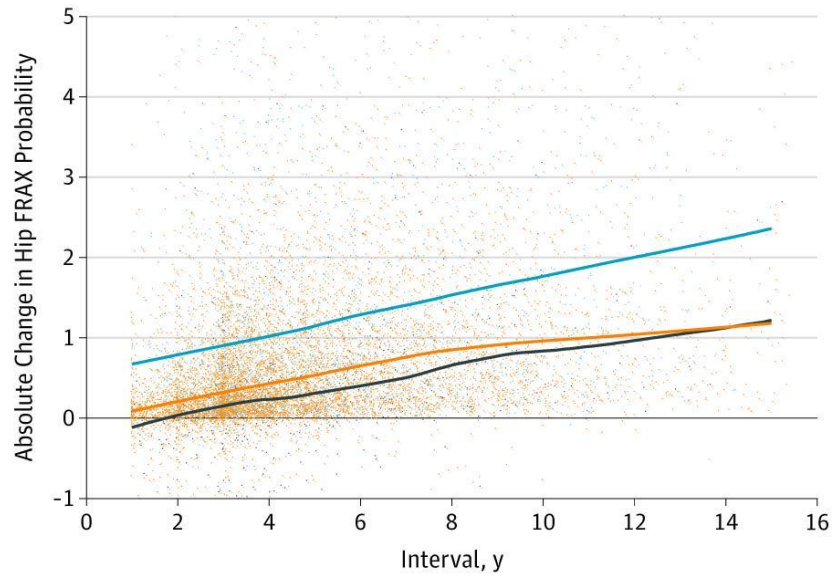
A Absolute change in major osteoporotic fracture risk



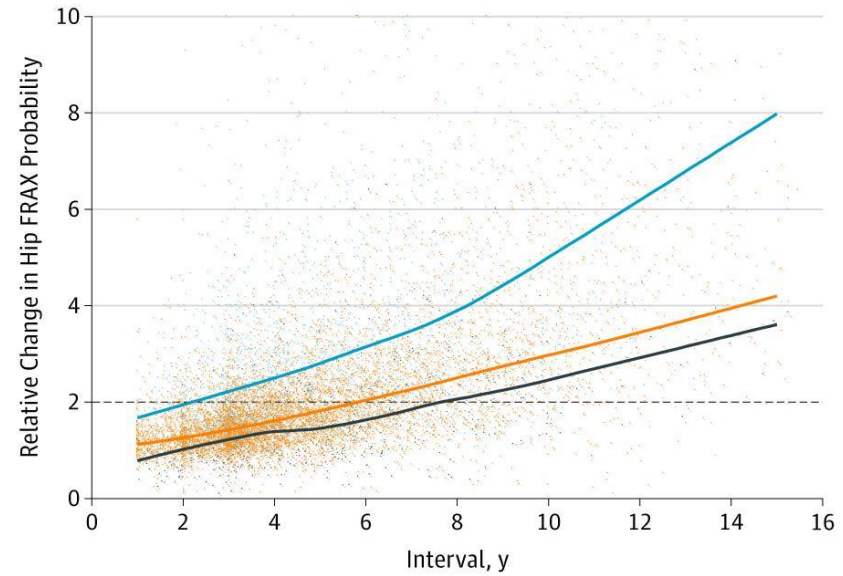
B Relative change in major osteoporotic fracture risk

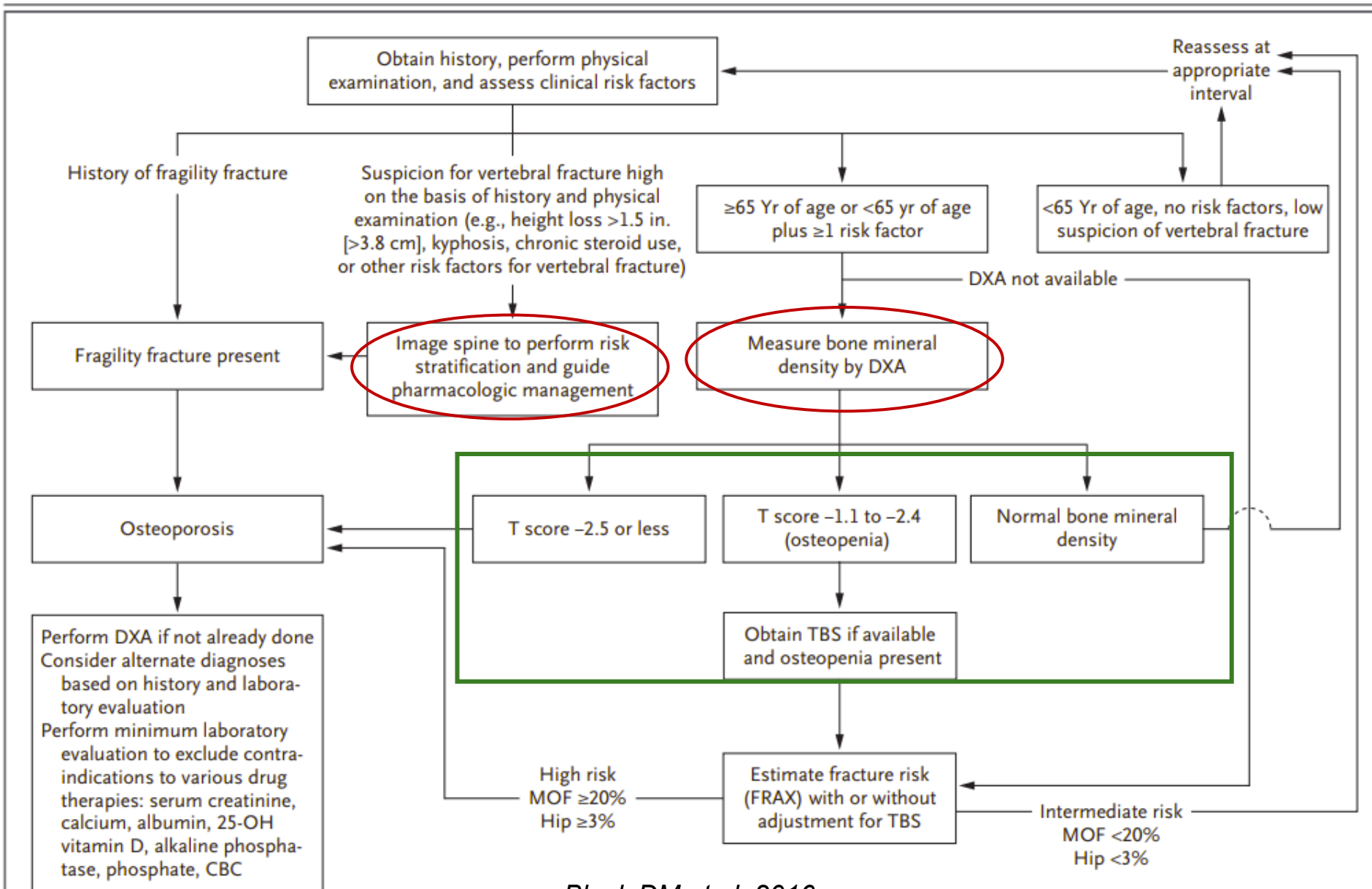


C Absolute change in hip fracture risk



D Relative change in hip fracture risk





Black DM et al, 2016

Grazie per l'attenzione