

AN ALGORITHM AFTER A HIP OSTEOPOROTIC FRACTURE

IOANNIS K. TRIANTAFYLLOPOULOS, MD, MSci, DrSci, FEBOT
*ASS. PROFESSOR OF ORTHOPAEDICS, MEDICAL SCHOOL,
NATIONAL AND KAPODESTRIAN UNIVERSITY OF ATHENS, GREECE*



LABORATORY FOR THE RESEARCH OF THE MUSCULOSKELETAL SYSTEM

What kind of fx is HIP fx?

In children and young adults:

sudden, severe injury, such as a vehicle accident, sports injury, or a high-impact fall.



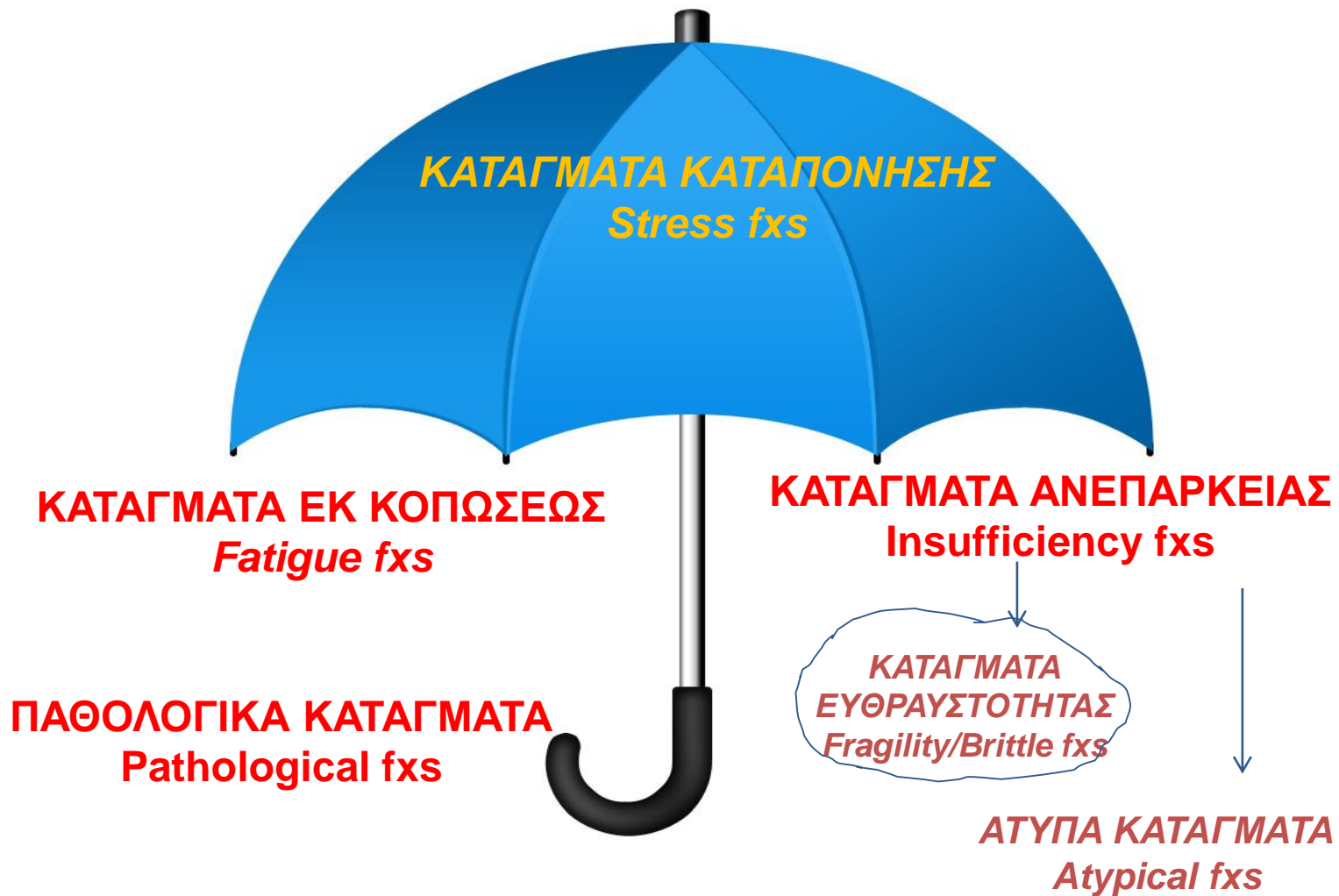
In older adults, in their late 70s and 80s:

by a fall, are at an increased risk for hip fractures due to osteoporosis.



What kind of fx is HIP fx?

Usually, it is osteoporotic...



A growing burden....as the population keeps getting older

The Burden of Fragility Fractures



Fragility fractures are common

- 1 in 3 women and 1 in 5 men over 50 years of age. One fracture every 3 seconds.

Fractures are costly

- **EU:** estimated costs of 32 billion EUR per year
- **USA:** costs of 20 billion USD per year

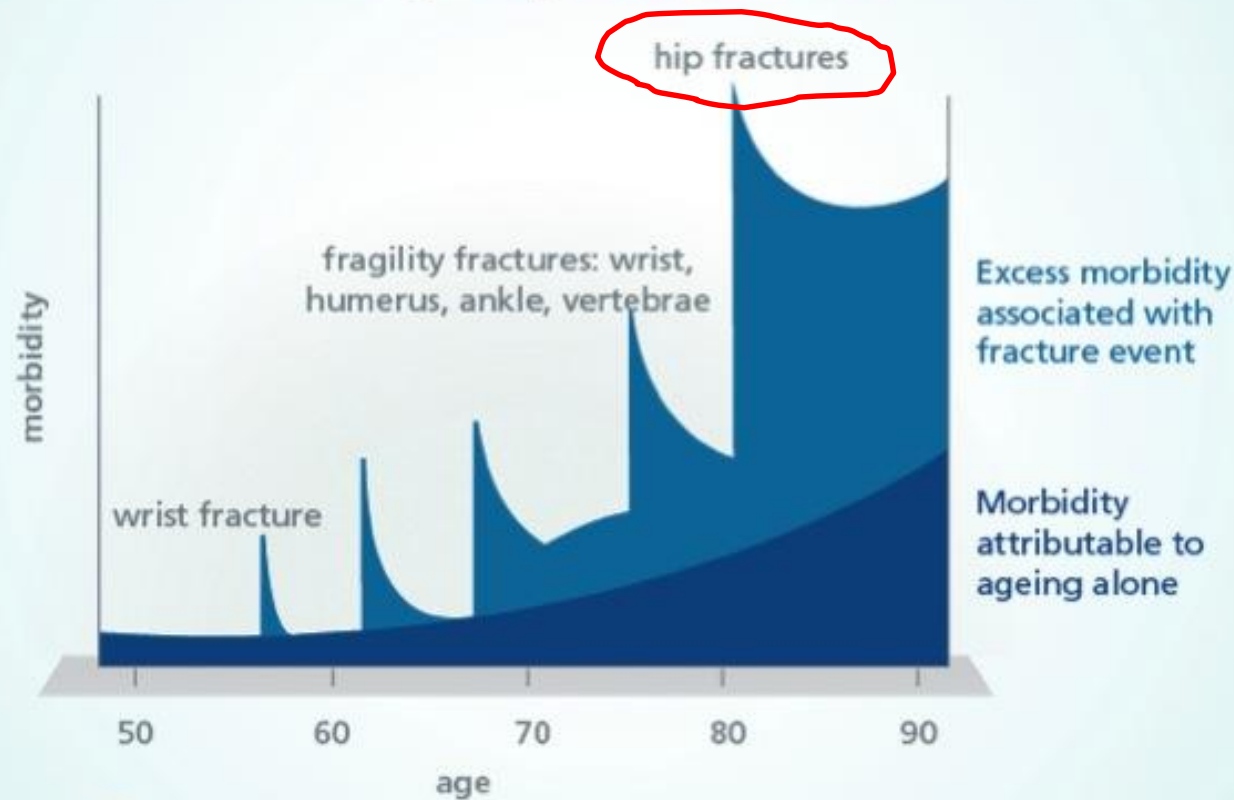
Fractures affect quality of life

- Functional decline, loss of independence
- Mortality



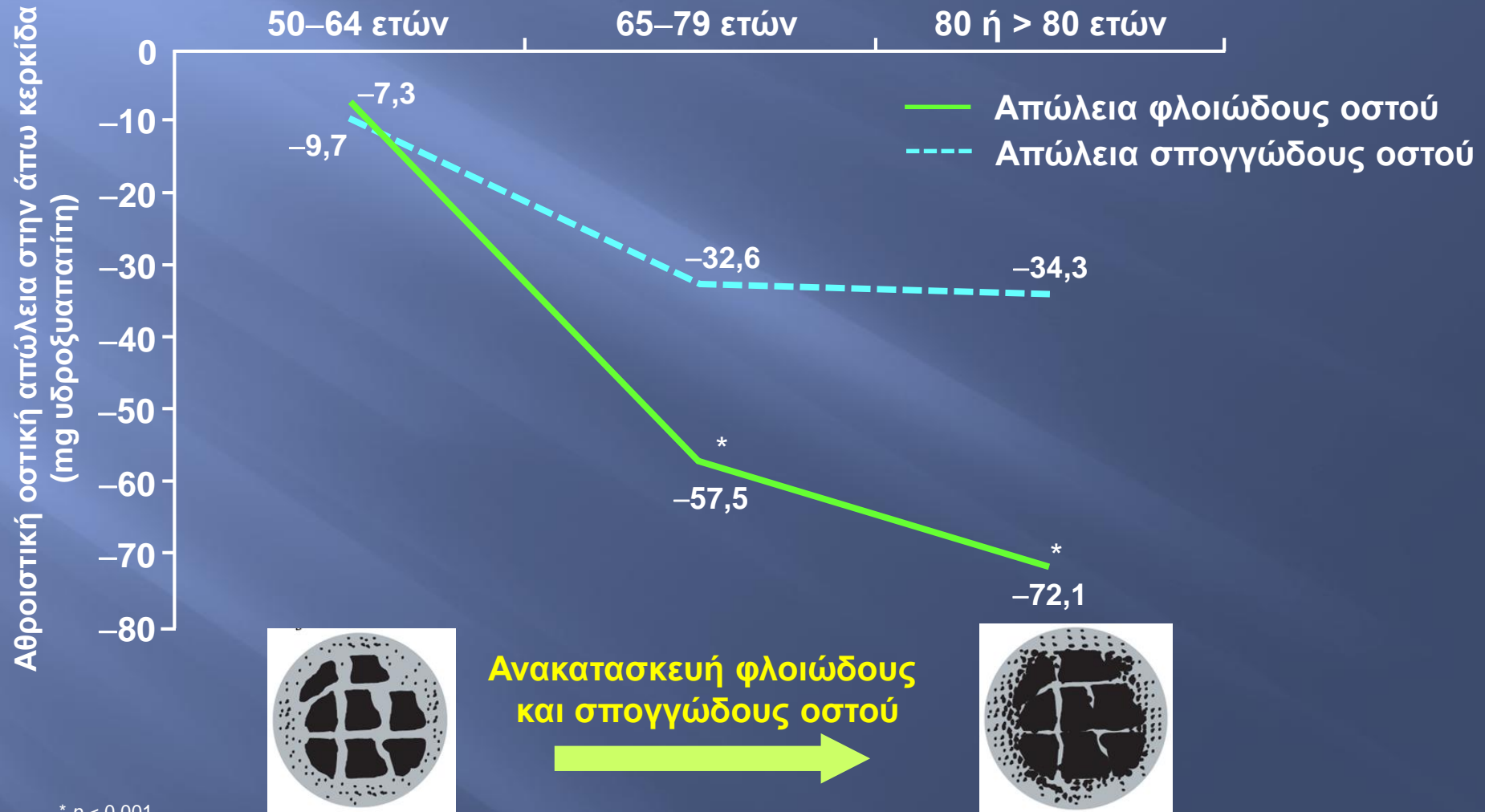
Fragility fractures excess morbidity....

Excess Morbidity Caused by Fragility Fractures



Why Hip Fractures are so common....

Το Μεγαλύτερο Μέρος της Απώλειας Οστικής Μάζας στην Πάροδο του Χρόνου Αφορά το Φλοιώδες Οστό

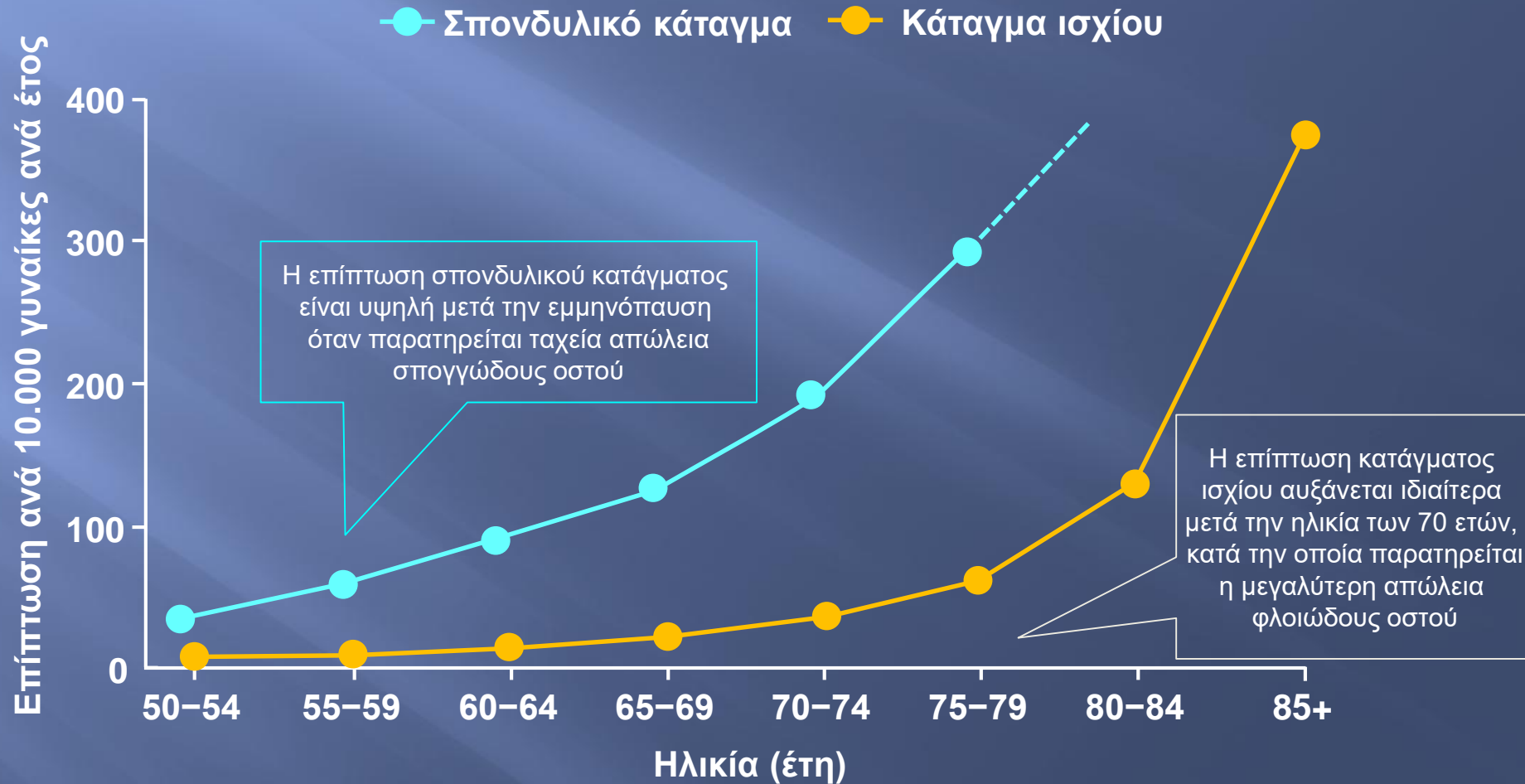


* $p < 0,001$

Adapted from Zebaze RM et al. *Lancet* 2010;9727:1729-1736

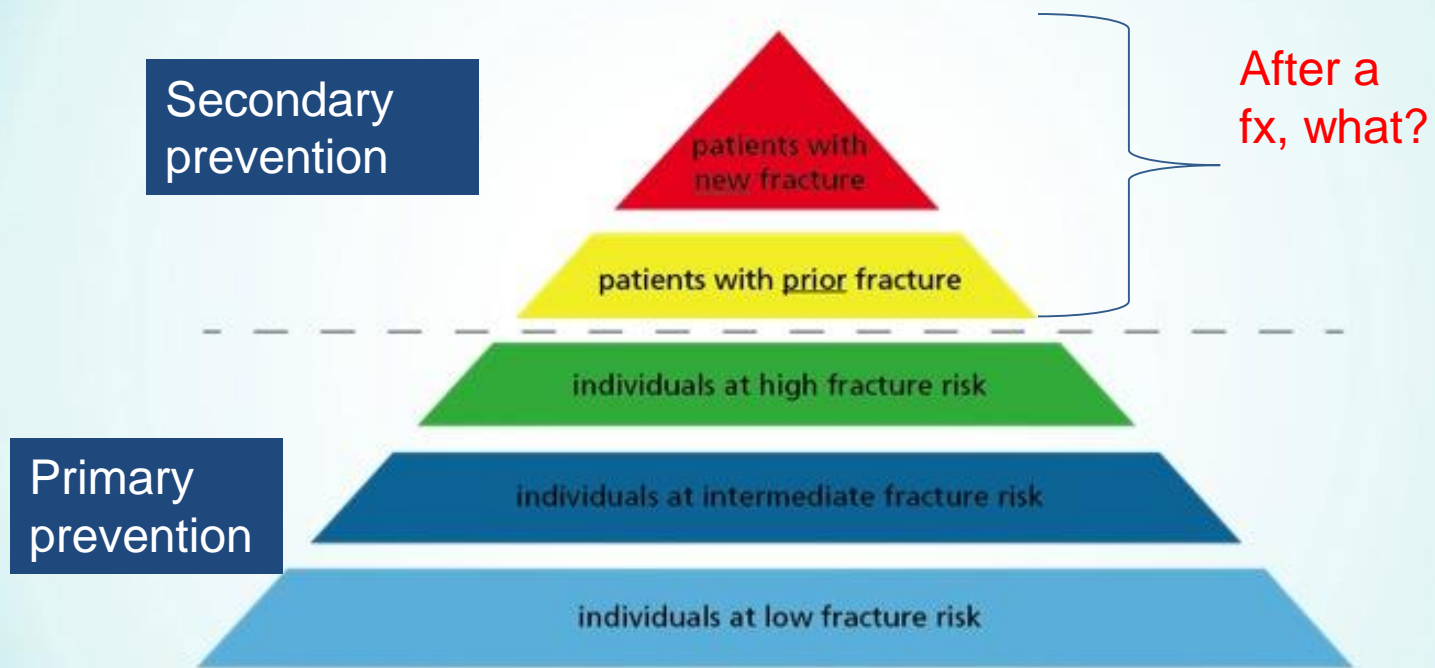
Why Hip Fractures are so common....

Η Επίπτωση Οστεοπορωτικών Καταγμάτων Συσχετίζεται με την Προοδευτική Απώλεια Σπογγώδους και Φλοιώδους Οστού με την Πάροδο του Χρόνου



It is our duty to identify the pts at risk....

Identifying Patients



Adapted from Curr Med Res Opin 2005;21:4:475-482 Brankin E et al * BOA-BGS 2007 Blue Book. <http://www.nhfd.co.uk>



www.capturethefracture.org



Levels of prevention for fragility fractures

Primary prevention

Before fx, keep BMD above -2,5 SD

Secondary prevention

Treatment after osteoporosis related fx

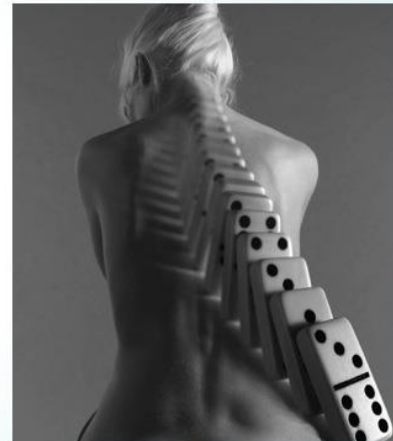
Primary prevention:	Any intervention applied to the general population, independently of evaluation of the fracture risk
Secondary prevention:	Diagnosis in at-risk population through BMD and/or fracture risk algorithms
Tertiary prevention:	Treatment of patients who suffered one or more fragility fracture(s)

The importance of the first fx....

- ✓ An osteoporotic fx is the strongest indicator of risk for future fx
- ✓ An episode of osteoporotic fx at least **doubles** the likelihood of further fxs
- ✓ A past history of at least one Vfx leads to a **4-fold** increased risk of Vfx

The Fracture Cascade

- A prior fracture at any skeletal site doubles future fracture risk.
- 2nd fracture often happens within 6-8 months



www.capturethefracture.org



However, there is a care gap.....

Why ????

- Lack of clarity as to whose responsibility it is to provide secondary prevention
- Ambiguity: no single group can manage all aspects of a fracture.

The Worldwide Care Gap



Fragility fracture patients:

- Fail to have risk assessed
- Remain untreated
- Lack prescriptions
- Are not diagnosed
- Break another bone



Barriers contributing to osteoporosis re-fracture prevention care gap.....

Clinician factors

- Lack of ownership of the problem
- Lack of awareness of increased risk
- Lack of knowledge of treatments and prevention strategies
- Concerns about costs of investigation and treatment
- Concern about treatment side effects
- Lack of awareness of male osteoporotic fracture risk
- Lack of priority to treat this issue in older patients

Patient factors

- Lack of awareness of risk
- Lack of knowledge of possible treatments
- Concern about costs of tests and treatments
- Concern about side effects

Health system and social factors

- Lack of integrated health systems
- Lack of communication between clinical services
- Lack of ICD (International Classification of Diseases) coding for fragility fxs
- Lack of funding and foresight to invest in fragility fracture coordinators



Barriers contributing to osteoporosis re-fracture prevention care gap.....

The lay press

- (+) is a messenger of bringing news and opinion from the scientific community.
- (-) some or much of which may be ill-judged...

Potential side effects of anti-osteoporotic treatment:

- ✓ osteonecrosis of the jaw
- ✓ atypical femoral fxs
- ✓ atrial fibrillation
- ✓ venous thrombosis
- ✓ thromboembolism

The paradox: we seek to treat individual pts to the highest standards but at the same time disservice and disadvantage the wider osteoporosis community...

Are cardiologists smarter than orthopaedic surgeon??



75%

**of individuals that sustained myocardial
infarction
receive beta blockers
to help prevent myocardial infarction**

The need of a multidisciplinary approach

CBP: coordinator-based program

1. Early identification of these pts
2. Documentation of osteoporosis
3. Assessment of osteoporosis
4. Referral (rheumatology and endocrinology consultation of post-fx pts)
5. Initiation and adherence to treatment (dedicated nurses, geriatricians, family physicians)

The Link: A dedicated coordinator

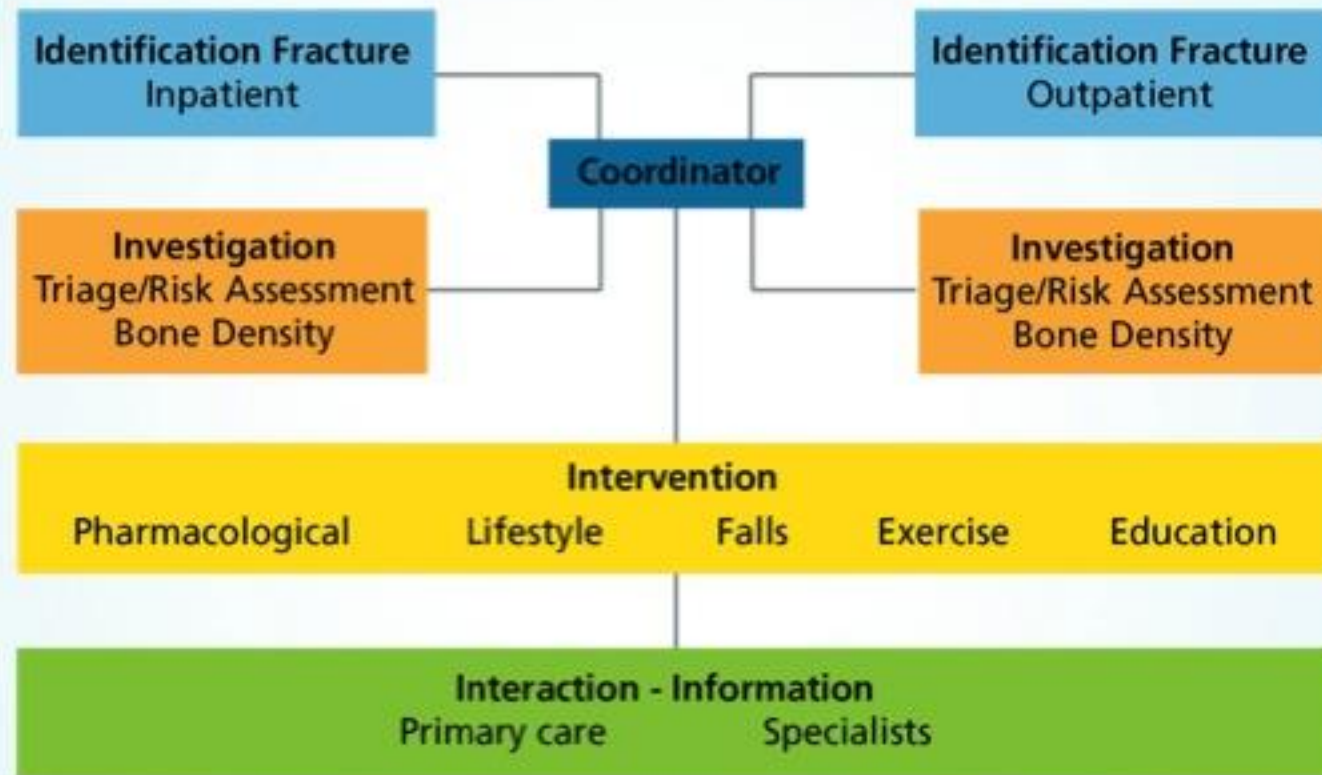


Coordinator links:

- Patient
- Primary care physician
- Orthopaedic team
- Osteoporosis & falls team

 www.capturethefracture.org  International Osteoporosis Foundation

Coordinator-based System



Adapted from McLellan et al OI 2003, 14:1028-1034.





But...this is Greece!

Orthopaedic surgeons are usually the first to assess and treat a patient after a fragility fx.

why care gap

Insufficient education on bone metabolism disorders

Focus on surgical treatment

What should we do after the first fx

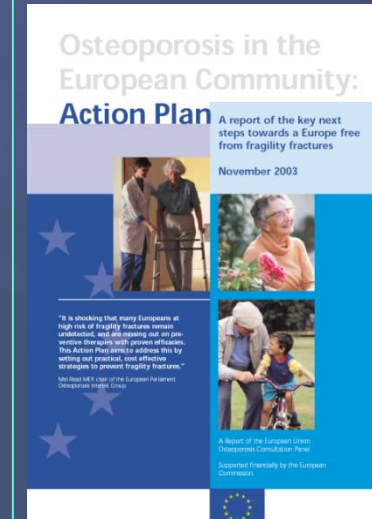
Apart from the surgical intervention...



some simple steps

Step 1: reveal the osteoporotic profile of the pt

- ▣ Assess (diagnose) osteoporosis
- ▣ Medical history
- ▣ Seek for previous labs and ask for new ones
- ▣ Seek for previous treatments
- ▣ Check for hidden osteomalacia



Step 2:

What caused the fall??

Προδιαθεσικοί παράγοντες για πτώση

1. Ηλικία άνω των 80 ετών

2. Φύλο – γυναίκες

*(αληθής φυλετική διαφορά
ή οι γυναίκες επιζητούν ιατρική βοήθεια
πιο συχνά από ότι οι άνδρες;;;)*

3. Χαμηλό σωματικό βάρος

4. Ιστορικό πτώσεων

5. Εξάρτηση στις καθημερινές δραστηριότητες



Step 2:

What caused the fall??

Προδιαθεσικοί παράγοντες για πτώση

6. Κατάχρηση αλκοόλ
7. Σακχαρώδης διαβήτης
8. Διαταραχές επιπέδου συνείδησης – σύγχυση
9. Διαταραχές της όρασης
10. Διαταραχές ισορροπίας και συντονισμού
11. Διαταραχές βάδισης
12. Ακράτεια
13. Ακατάλληλη υπόδηση
14. Περιβαλλοντικοί παράγοντες
15. Εργονομία χώρου
16. Μυϊκή αδυναμία
17. Κατάθλιψη
18. Άνοια με μειωμένη αντίληψη του χώρου



Step 2:

What caused the fall??

Προδιαθεσικοί παράγοντες για πτώση

19. Ορθοστατική υπόταση

(60% αυξημένος κίνδυνος πτώσης τις πρώτες 45 ημέρες έναρξης αντι-υπερτασικής αγωγής)

20. Φαρμακευτική αγωγή

- **ψυχοτρόπα**: βενζοδιαζεπίνες, αντικαταθλιπτικά, αντιψυχωσικά
- **υποτασικά**
- **αντι-επιληπτικά**

21. Πολυφαρμακία

(14% αύξηση του κινδύνου πτώσης με κάθε προσθήκη νέου φαρμάκου σε ασθενείς που λαμβάνουν άνω των 4 φαρμάκων και ανεξαρτήτως του είδους των φαρμάκων)



Step 3: prevent a future fracture

Improve bone strength through therapeutic schemes :

- ▣ Easy to administer
- ▣ Safety
- ▣ Compliance
- ▣ Effectiveness
- ▣ Long term action

“Bone up on bone loss”

www.aaos.org
www.nof.org

IK Triantafyllopoulos, et al. In: Bone-implant interface in orthopaedic surgery,
Springer Verlag, 2014

Step 4: emphasize osteoporotic character

In all administration papers (charts, admission and discharge notes, etc)

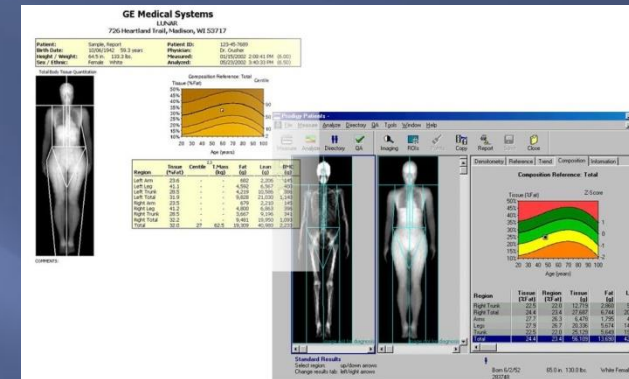
WRITE: “OSTEOPOROTIC” FRACTURE



Even if you cannot order further laboratory or imaging test...
Even if you cannot refer the pt to endocrinologist, rheumatologist...
Even if you are very busy to treat the patient after discharge....

Step 5: order simple labs - initial investigation

- ✓ DXA measurements
- ✓ Calcium, Phosphorus
- ✓ OH-vit-D3 (osteomalacia)
- ✓ PTH (1ry hyperparathyroidism)



either during hospitalization (if possible)
or after discharge as a recommendation

Step 6:

stay alert -high suspicious index for DXA
(primary prevention)

<50 yrs

- **Low energy Fx**
- Hypogonadism
- Early emminopause
- Malabsorption
- 1ry hyperparathyroidism
- Medication related to bone loss or Fx risk (cortisone, aromatase inhib)
- Pathology related to bone loss or fx risk (RA, Cushing, DM-1, CPD)

50-64 yrs

- **Low energy Fx < 40 yrs**
- Parent's hip fx
- Spine fx or Ro osteopenia
- Low BW (<60kgr)
- BW loss (>10% of BW at the age of 25)
- Alcohol (>25-30 gr/daily)
- Smoking
- Other factors as in age <50 yrs

>65 yrs

- All men and women

• **Not applicable:**

**not compliant patients
over aged and biologically incapable patients**

Step 7:

stay alert -high suspicious index
(secondary prevention)



“Fracture after a low-energy trauma”

High suspicious index

- 1. Metabolic disorder (osteoporosis)**
- 2. Metastatic disease.**

Johnell O, et al. Acta Orthop Scand 2001

Step 8:

use the tools - FRAX

WHO fracture risk assessment tool FRAX[®]

10-year
probability
of fracture

Country

Bone mineral density

Age

Gender

Clinical risk factors

- Low body mass index
- Previous fragility fracture
- Parental history of hip fracture
- Glucocorticoid treatment
- Current smoking
- Alcohol intake (3 or more units per day)
- Rheumatoid arthritis
- Other secondary causes of osteoporosis



www.shef.ac.uk/FRAX

Step 9: use the tools – NDA (EOΦ)

FRAX >20% for major Ofx
or >3% for hip fx

+
osteopenia

FRAX 10-20% for major Ofx

+
osteopenia

FRAX 10% for major Ofx

+
osteopenia



**RE-ASSESSMENT
AFTER 3 YRS**

Spine fx
Hip fx
>1 other fx of low energy

T score < -2,5

Spine fx
Wrist fx at the age >65
Breast Ca under aromatase inhib.
Prostate Ca
Glucocorticoids intake
Repeated (>2) falls (# balance,
vision)

**TREATMENT
(IF ≥ 1 FACTORS)**

**RE-ASSESSMENT in 1-2 YRS
(LACK OF FACTORS)**

Step 11: learn the basics for further treatment



A. OSTEOPOROSIS TREATMENT

1. Stop smoking, control alcohol, protein intake.
2. Calcium (>1000mg/day) and Vit D (>400-800 IU/day) supplements
3. Anti-osteoporotic medication

B. FALL PREVENTION

4. Exercise programs for muscle strengthening (30min x 3-4 times/week)
5. Education: Balance, Agility, Proprioception.
6. Ergonomics

C. FRACTURE AREA PREVENTION

7. Injury-site protection, hip protectors, etc

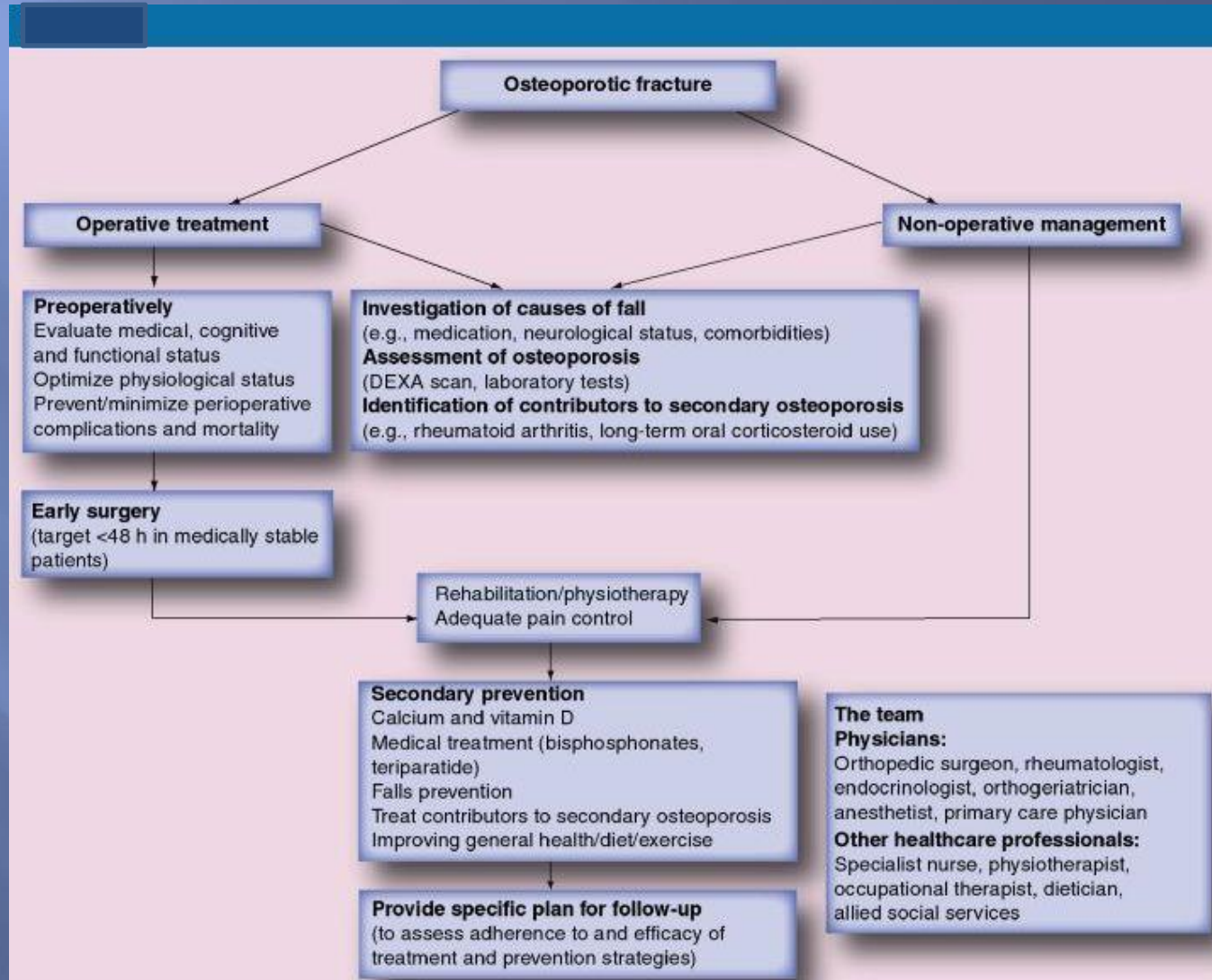
Step 12: work as a team



*Time to invest in a
“fracture liaison nurse”*

Larsson S. [Time to invest in a “fracture liaison nurse”!](#) Injury, 2007
Rizzoli R, et al. Medicographia 2014

Step 13: know how to work-out



Step 14: you need evidence



“Evidence”

Evaluation of anti-osteoporotic treatment after a fragility fx

Seek for every anti-osteoporotic medication:

NNT = number of pts needed to be treated to avoid one radiological fx

RR = relative risk

CI = confidence intervals

CC = cost – effectiveness (lower BMDs or increased RR)

ISFR International Society for Fracture Repair

Goldhahn J, Aspenberg P, et al. Bone, 2009

Lippuner K. Eur Spin J, 2003

Fragility Fractures Are No Accident

The underlying cause is **osteoporosis**



www.capturethefracture.org



International Osteoporosis
Foundation

www.capturethefracture.org