Gruppo di ricerca geriatrica

Venerdì 4 novembre 2011
Aggiornamenti in Geriatria

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

Appunti sull'Ortogeriatria

Giuseppe Bellelli

Outline

- Il contesto epidemiologico
- Il significato clinico dell'ortogeriatria
- I diversi modelli di ortogeriatria e le evidenze scientifiche sull'efficacia
- Le questioni irrisolte
- Conclusioni

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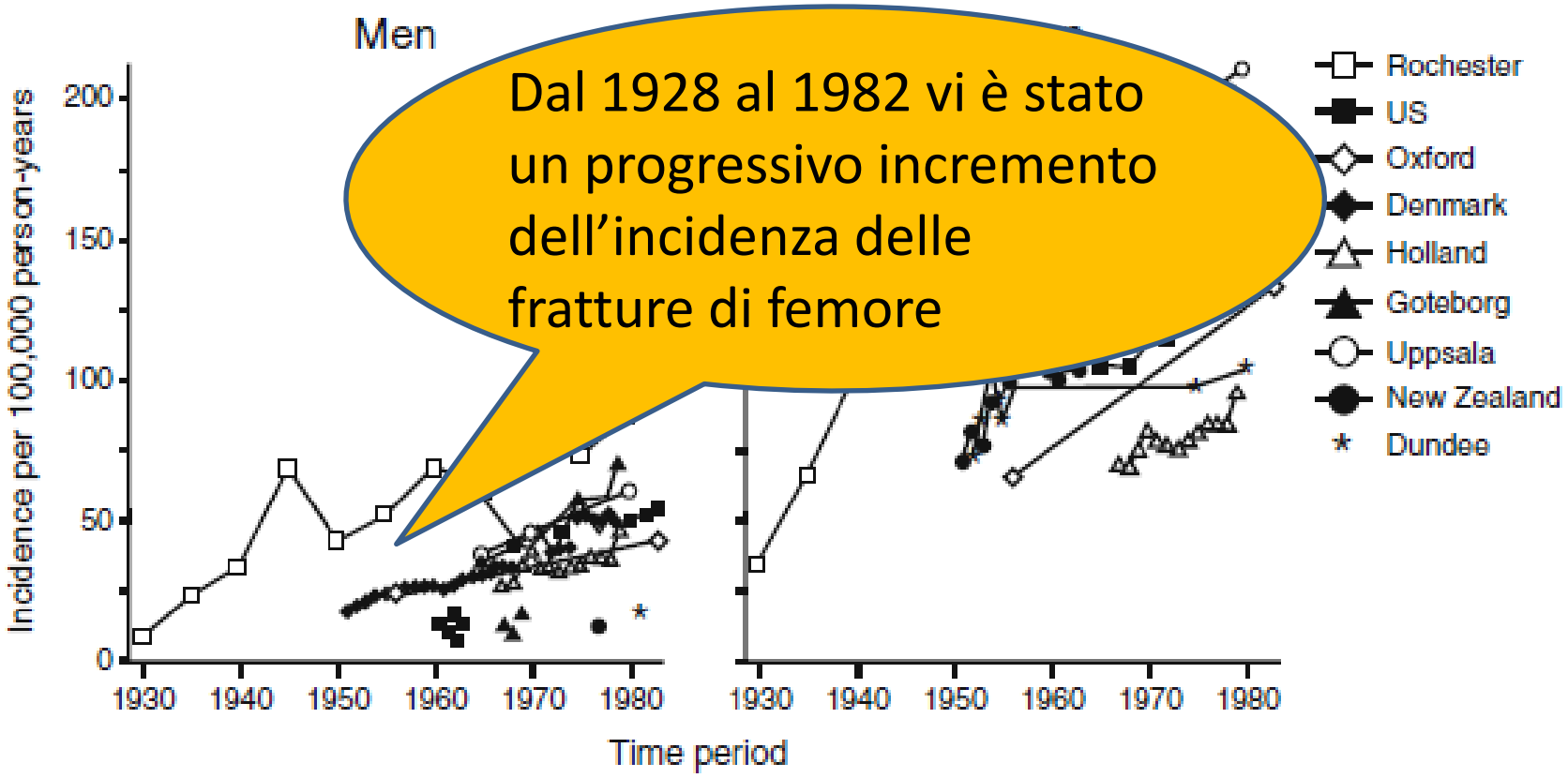
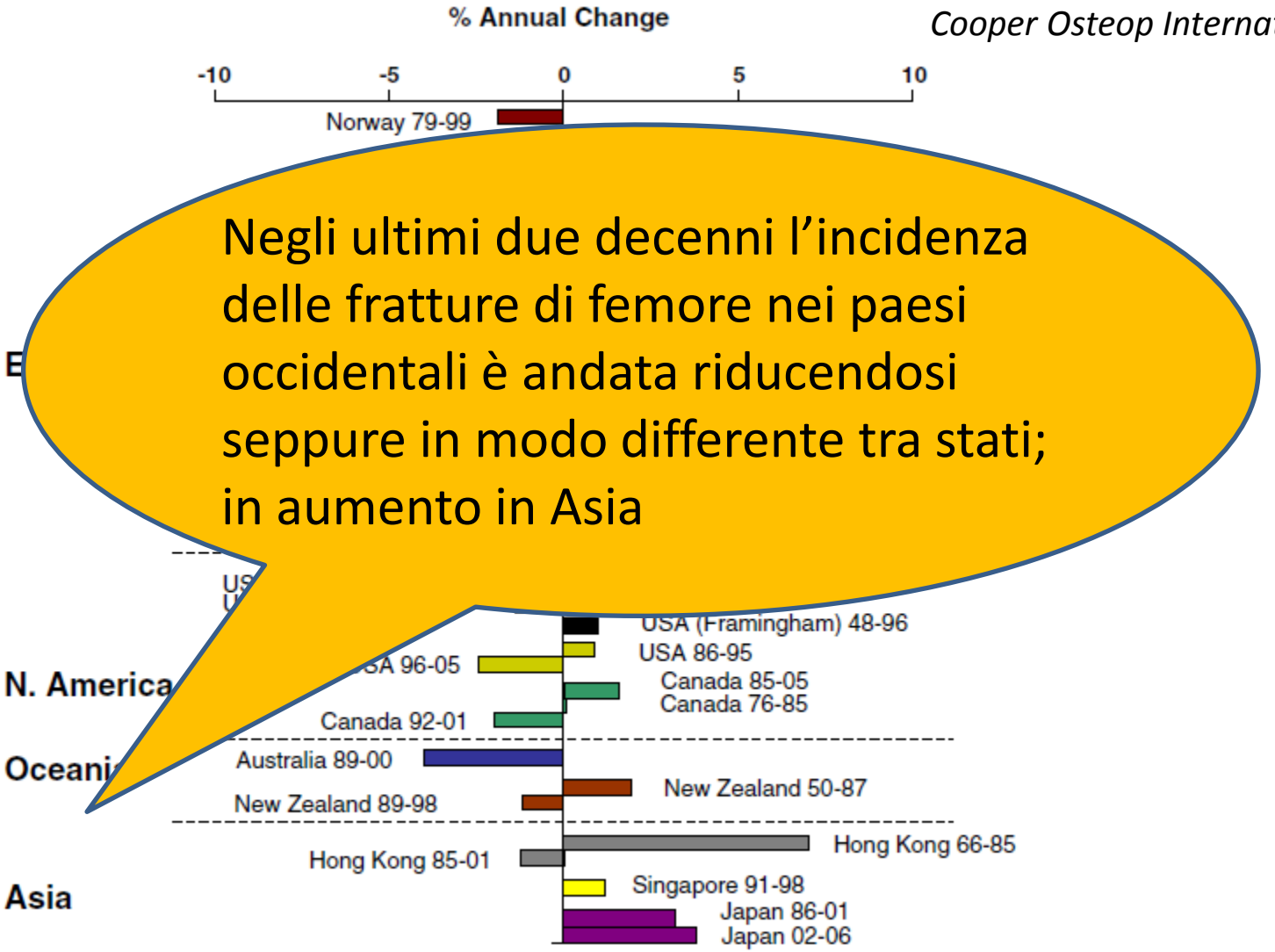
Secular trends in the incidence of HF: 1928-1982



Adapted from Melton 1987

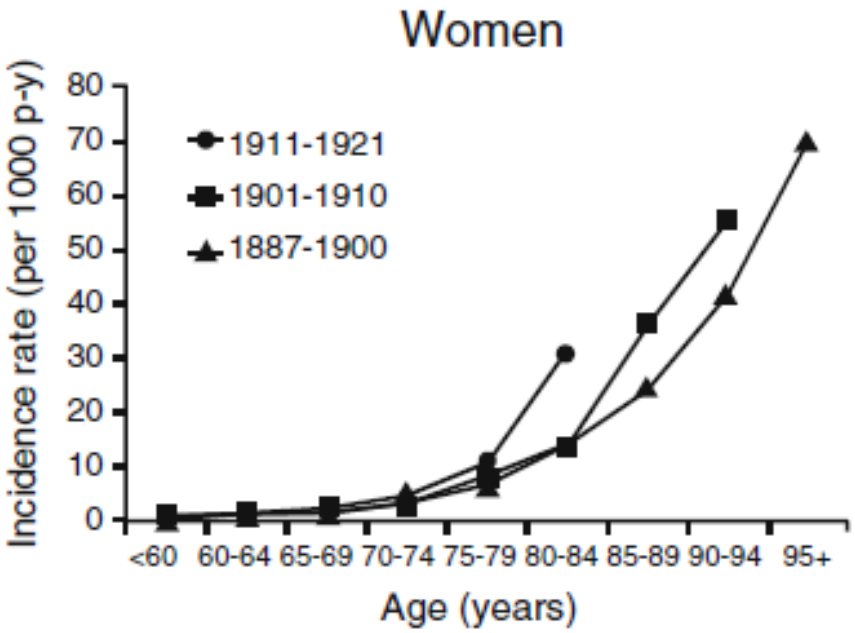
Secular trends in HF worldwide: annual change in age- and sex- adjusted HF incidence

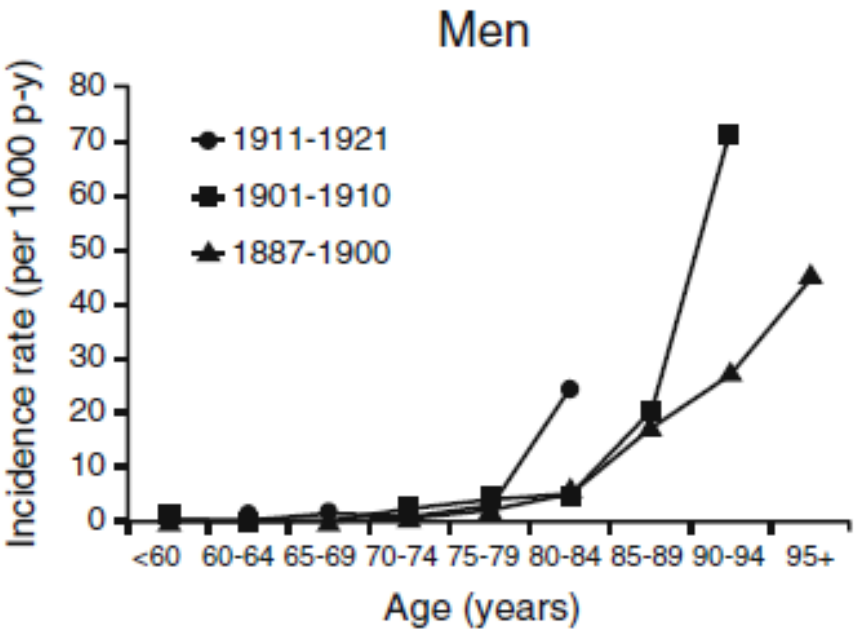
Cooper Osteop Internat 2011



Negli ultimi due decenni l'incidenza delle fratture di femore nei paesi occidentali è andata riducendosi seppure in modo differente tra stati; in aumento in Asia

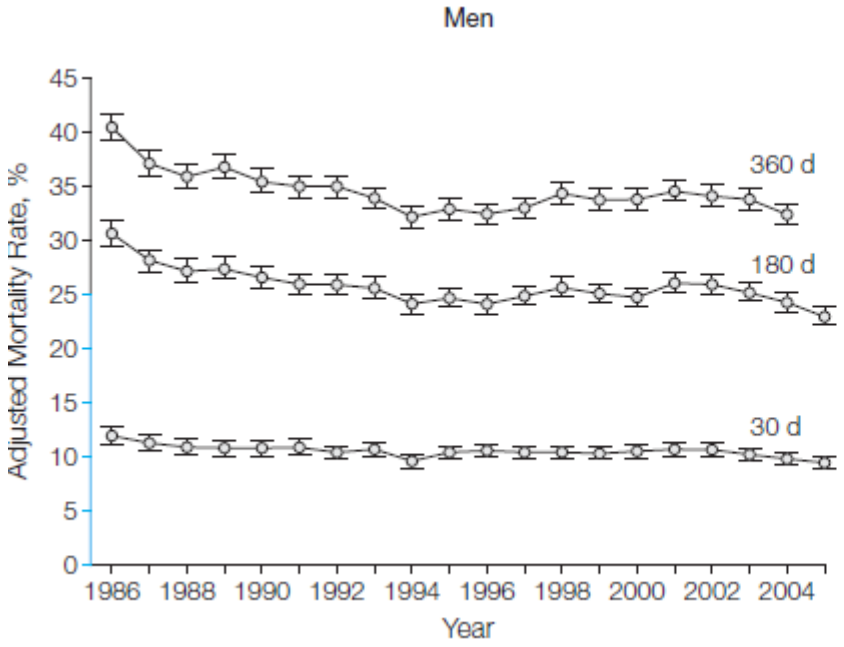
Il numero assoluto di persone anziane in cui si verificheranno HF è in aumento

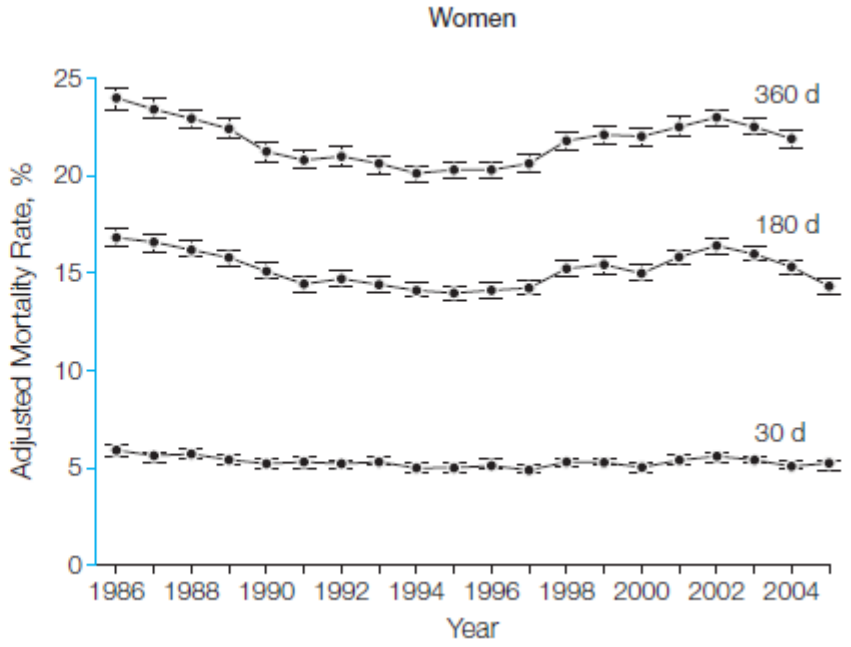




Cooper Osteop Internat 2011

Trends in risk-adjusted mortality at 30, 180 and 360 days





Brauer CA et al, JAMA 2009

Patients at risk for HF are frailer

Potential Risk Factor	Osteoporosis, RR (95% CI), *p*	Without Osteoporosis, RR (95% CI), *p*
Demographic		
Age, y		
66–74 vs 85+	0.56 (0.39–0.82), .003	0.49 (0.38–0.62), <.001
75–84 vs 85+	0.67 (0.53–0.86), .001	0.70 (0.60–0.83), <.001
Sex: male	0.94 (0.65–1.36), .730	0.56 (0.47–0.66), <.001
Diagnoses		
Parkinson's disease	*	1.51 (1.12–2.04), .008
Functional status		
ADL impairment	*	1.26 (1.05–1.50), .013
Uses ambulation aide	1.33 (1.05–1.69), .018	1.44 (1.23–1.68), <.001
Falls	1.59 (1.27–2.00), <.001	1.23 (1.05–1.43), .009
Cognitive status		
Cognitive impairment	*	1.31 (1.10–1.57), 0.003
Health status		
Severe malnutrition	*	3.51 (2.16–5.71), <.001
Morbid obesity	*	0.29 (0.12–0.70), .006
Health behaviors		
Tobacco use	1.59 (1.06–2.38), .024	1.41 (1.06–1.87), .019

Stoole et al, J Gerontol 2003

….they are also comorbid

	Patients With a Hip Fracture, %			
	Men		Women	
	1986-1988 (n = 22 941)	2003-2005 (n = 28 097)	1986-1988 (n = 83 541)	2003-2005 (n = 84620)
Acute or old myocardial infarction	4.5	13.1	3.4	9.2
Cancer and metastatic carcinoma	8.1	13.6	3.9	6.2
Cerebrovascular disease	13.3	12.4[b]	10.6	10.8[c]
Chronic pulmonary disease	23.1	34.3	9.6	24.2
Chronic renal failure	3.3	9.0	1.2	4.1
Congestive heart failure	13.5	29.0	12.5	25.2
Dementia	6.3	7.7	7.0	8.4
Diabetes with or without sequelae	9.6	25.0	9.8	19.8
Moderate or severe liver disease	0.2	0.3[b]	0.5	0.8
Paralysis	3.1	1.6	2.0	1.3
Peripheral vascular disease	3.5	10.7	1.9	6.5
Rheumatologic disease	1.3	2.2	1.2	3.9
Ulcer disease	2.8	3.7	1.8	3.0
Chronic liver disease/cirrhosis	0.4	0.7	0.2	0.5

Brauer CA et al, JAMA 2009

Considerazioni

- L’incidenza delle fratture di femore è in lieve riduzione in alcuni paesi occidentali (in questi ultimi anni) ma il numero assoluto aumenterà perché la frattura di femore è una problematica età correlata
- Il primo anno dopo una frattura di femore è il più critico per l’elevato tasso di mortalità intra ed extra-ospedaliera e per la disabilità correlata
- I pazienti che sviluppano frattura di femore sono più fragili rispetto ai corrispettivi di pari età e tendono ad avere sempre più complicanze nel corso degli anni

I costi dovuti a fratture di femore anziani (>65 anni) sono elevati

	Numeri assoluti (Italia, 2002)
Numero di ricoveri per frattura femorale	80.800
Costi diretti relativi ai ricoveri (euro)	394.000.000 euro
Costi di 1 mese di riabilitazione post-operatoria (escluso 5% di mortalità acuta)	412.000.000 euro
Costi sociali (pensioni di invalidità e accompagnamento)*	108.000.000 euro
Costi indiretti (20% dei costi diretti totali)	183.000.000 euro
Stima dei costi totali	1.097.000.000 euro

*per i 18.000 pazienti stimati disabili ogni anno

Rossini et al 2005

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Why Orthogeriatrics?

- ….a simple fall, most commonly at home, marks the beginning of a ***complex journey of care***. This takes patients through the accident and emergency (A&E) department, to an orthopedic ward, to an operating theatre, to a ward again and then -depending on the circumstances of the patient and the nature of the services available- back home either directly or via more extended in-patient rehabilitation , or to an alternative placement within the private or voluntary sector, or local authority or NHS care.

Scottish Intercollegiate Guidelines Network, 2009

Le fratture di femore sono gravate da un tasso elevato di complicanze mediche

Table 2. Patient-Specific Index Complications and Mortality in 8930 Patients Undergoing Hip Fracture Repair*

Index Complication	No. of Patients (% of Total)	30-d Mortality, % (95% CI)	1-y Mortality, % (95% CI)
All patients, with and without complications	8930 (100)	4 (3.6-4.4)	16 (15-17)
No complications	7193 (81)	1.7 (1.4-2)	12 (11.5-13)
Any complication	1737 (19)	14 (12-15)	34 (32-36)
Any cardiac	720 (8)	11 (9-13)	31 (27-34)
Any pulmonary	344 (4)	14 (11-19)†	41 (36-46)†
Serious cardiac	178 (2)	22 (17-29)	36 (28-46)
Serious pulmonary	229 (2.6)	17 (12-23)‡	44 (38-51)‡
Combined cardiopulmonary	117 (1)	33 (25-43)§	58 (48-67)§
Gastrointestinal bleeding	195 (2)	8 (4-12)	26 (20-33)
DVT/PE	89 (1)	4 (1-11)	11 (6-20)
TIA/CVA	85 (1)	18 (10-27)	39 (28-50)
Hypotension requiring vasopressors, no other complication	85 (1)	9 (4-18)	18 (10-27)
2 Complications, not cardiopulmonary	65 (0.7)	29 (19-42)	43 (31-56)
≥3 Complications	24 (0.3)	38 (19-59)	62 (41-81)
Renal failure	8 (0.09)	38 (8-76)	62 (24-92)
Septic shock	5 (0.06)	0	40 (5-85)

- Soprattutto le complicanze di tipo respiratorio (polmoniti) e respiratorio grave o quelle di tipo cardiorespiratorio si associano ad una mortalità più elevata

Lawrence V et al, Arch Intern Med 2000

The Effects of Dehydration on Rehabilitation Outcomes of Elderly Orthopedic Patients

Jon A. Mukand, MD, PhD, Chunbo Cai, MD, Anita Zielinski, CRRN, Michele Danish, PharmD, Judith Berman, RD, LDN

Patients	n	Age (y)	Gender		LOS (d)	Initial FIM	ΔFIM	HTN (%)	Initial Hgb	Initial Albumin	Discharge to Home (%)
			F	M							
+O +A	10	82 (74–94)	8	2	13.6±2.7*	77.4±10.8	25.3±8.4	70	10.2±1.7	2.7±0.4	80
+O −A	8	77 (67–90)	5	3	13.1±4.5	80.0±9.2	24.0±7.3	75	9.8±1.2	2.4±0.3	88
−O +A	11	78 (58–87)	10	1	12.3±3.1	78.1±11.2	23.6±9.3	64	10.7±1.7	2.7±0.4	82
−O −A	10	75 (66–82)	6	4	7.2±2.8	84.3±10.6	23.7±6.1	70	9.8±1.0	2.6±0.3	100

NOTE. Values are n (range) or mean ± SD.
Abbreviations: A, azotemia; O, orthostasis; +, with the condition; −, without it.
* P=.04 for statistical interaction of orthostasis and azotemia.

Prerenal azotemia and orthostasis are present in a significant number of elderly orthopedic patients and have a major effect on rehabilitation outcomes

Mukand et al, Arch Phys Med Rehab, 2003

Il ritardo nell'intervento chirurgico aumenta il rischio di lesioni da decubito

TABLE II Unadjusted Odds Ratio Related to Waiting Time for Surgery

	Delay of >24 Hours		Delay of >36 Hours		Delay of >48 Hours	
	Odds Ratio (95% Confidence Interval)	P Value*	Odds Ratio (95% Confidence Interval)	P Value*	Odds Ratio (95% Confidence Interval)	P Value*
Return to independent living conditions†	0.80 (0.48 to 1.34)	NS	0.56 (0.32 to 0.97)	<0.05	0.46 (0.24 to 0.87)	<0.05
Pressure ulcer	1.87 (1.08 to 3.24)	<0.05	3.04 (1.78 to 5.18)	<0.001	3.76 (2.09 to 6.75)	<0.001
Mortality rate	1.19 (0.79 to 1.80)	NS	1.36 (0.87 to 2.13)	NS	1.07 (0.59 to 1.94)	NS

*NS = not significant. †Data on patients without dementia (see text).

Al-Ani A et al, J Bone Joint Surgery, 2008

Il grado di anemia condiziona il recupero funzionale

Table 2. Associations between anaemia, functional mobility and mobilization on the first three post-operative days in 487 hip fracture patients

		Walking independently	Walking with human assistance	Not able to walk	*P*	Mobilisation (hours out of bed)	
1st post-operative day	No anaemia $n = 317$	52 (16%)	160 (51%)	105 (33%)	0.049	3 (1–5)	0.011
	Anaemia $n = 170$	9 (5%)	103 (61%)	58 (34%)		2 (0.5–4.5)	
2nd post-operative day	No anaemia $n = 330$	82 (25%)	175 (53%)	73 (22%)	0.007	4 (2–6)	0.024
	Anaemia $n = 132$	24 (18%)	62 (47%)	46 (35%)		3 (1–5.5)	
3rd post-operative day	No anaemia $n = 314$	124 (40%)	130 (41%)	60 (19%)	0.001	5 (3–7)	0.129
	Anaemia $n = 116$	30 (26%)	47 (41%)	39 (34%)		4 (2.5–6)	

Anaemia defined to be present in any patient who on that given day had a hb measurement of <100 g/l. Data are presented as number of patients (%) for categorical variables and as median (25–75% quartiles) for continuous data. Test for statistical significance performed with chi-square corrected for linear-by-linear association for categorical data.

Foss N et al, Age Ageing 2008

Relationship Between Pain and Opioid Analgesics on the Development of Delirium Following Hip Fracture

R. Sean Morrison,[1] Jay Magaziner,[2] Marvin Gilbert,[3] Kenneth J. Koval,[4] Mary Ann McLaughlin,[1] Gretchen Orosz,[1] Elton Strauss,[3] and Albert L. Siu[5]

Background. Delirium and pain are common following hip fracture. Untreated pain has been shown to increase the risk of delirium in older adults undergoing elective surgery. This study was performed to examine the relationship among pain, analgesics, and other factors on delirium in hip fracture patients.

Methods. We conducted a prospective cohort study at four New York hospitals that enrolled 541 patients with hip fracture and without delirium. Delirium was identified prospectively by patient interview supplemented by medical record review. Multiple logistic regression was used to identify risk factors.

Results. Eighty-seven of 541 patients (16%) became delirious. Among all subjects, risk factors for delirium were cognitive impairment (relative risk, or RR, 3.6; 95% confidence interval, or CI, 1.8–7.2), abnormal blood pressure (RR 2.3, 95% CI 1.2–4.7), and heart failure (RR 2.9, 95% CI 1.6–5.3). Patients who received less than 10 mg of parenteral morphine sulfate equivalents per day were more likely to develop delirium than patients who received more analgesia (RR 5.4, 95% CI 2.4–12.3). Patients who received meperidine were at increased risk of developing delirium as compared with patients who received other opioid analgesics (RR 2.4, 95% CI 1.3–4.5). In cognitively intact patients, severe pain significantly increased the risk of delirium (RR 9.0, 95% CI 1.8–45.2).

Conclusions. Using admission data, clinicians can identify patients at high risk for delirium following hip fracture. Avoiding opioids or using very low doses of opioids increased the risk of delirium. Cognitively intact patients with undertreated pain were nine times more likely to develop delirium than patients whose pain was adequately treated. Undertreated pain and inadequate analgesia appear to be risk factors for delirium in frail older adults.

Journal of Gerontology: MEDICAL SCIENCES
2003, Vol. 58A, No. 1, 76–81

Il rischio di inadeguato "nutritional intake" è elevato nell'immediato post-operatorio

Table 3. Relationship between average nutritional intake for the first three post-operative days of <100% of basic metabolic rate (BMR) and categorised perioperative patient characteristics in 262 consecutive elderly hip fracture patients treated according to a multi-modal rehabilitation regimen

Average energy intake (day 1–3 after surgery)	<100 % of BMR univariate analysis				<100 % of BMR multivariate analysis			
	Odds ratio	95% CI Upper	Lower	*P*	Odds ratio	95% CI Upper	Lower	*P*
>85 years	1.82	1.07	3.08	0.03	1.70	0.91	3.18	0.09
Female sex	0.76	0.41	1.44	0.40	0.89	0.46	1.95	0.89
ASA score III/IV	1.39	0.85	2.29	0.19	0.82	0.44	1.54	0.54
Dementia	3.31	1.75	6.26	<0.01	2.64	1.10	6.35	0.03
Pre-fracture NMS 0–5	1.83	1.11	3.02	0.02	1.12	0.57	2.20	0.75
BMI <20	0.34	0.19	0.61	<0.01	0.21	0.10	0.42	<0.01
Nursing home residence	4.20	1.95	9.04	<0.01	2.62	0.97	7.06	0.06
Perioperative medical complication	2.39	1.29	4.45	0.003	3.19	1.40	7.26	<0.01
Delirium	1.44	0.84	2.46	0.18	1.56	0.74	3.29	0.24
Albumin <35 g/l	0.70	0.41	1.19	0.19	1.04	0.55	1.95	0.91

<100% of BMR indicates an average energy consumption less than the patients calculated basic metabolic rate for the first three postoperative days.

Foss N et al, Age Ageing 2007

Delay in getting patients out of bed is associated with poor outcomes

Table 4. Adjusted Outcomes Associated With Days of Immobility for Subgroups

Outcome	Adjusted Outcomes Associated With Days of Immobility at the 10th, 50th, and 90th Percentile Values			*P* Value
	10th Percentile (95% CI)	50th Percentile (95% CI)	90th Percentile (95% CI)	
Patients Using Personal Assistance or Supervision for Locomotion				
Death by 6 mo, % (n = 257)	11.3 (6.5-18.1)	17.7 (13.4-23.6)	28.4 (20.2-38.2)	.004
Locomotion at 2 mo (range 2-14) (n = 203)	5.2 (4.6-5.9)	4.7 (4.3-5.1)	4.0 (3.4-4.7)	.03
Self-care at 2 mo (range 6-42) (n = 192)	25.7 (23.4-27.9)	22.9 (21.5-24.4)	19.1 (16.7-21.6)	.001
Transferring at 2 mo (range 3-21) (n = 200)	12.0 (11.0-13.0)	10.4 (9.7-11.0)	8.3 (7.2-9.3)	<.001
Locomotion at 6 mo (range 3-21) (n = 189)	6.3 (5.5-7.1)	5.8 (5.4-6.2)	5.3 (4.6-6.0)	.09
Self-care at 6 mo (range 6-42) (n = 181)	24.2 (21.8-26.5)	24.3 (22.9-25.7)	24.3 (22.1-26.5)	.93
Transferring at 6 mo (range 3-21) (n = 184)	12.5 (11.4-13.6)	11.9 (11.3-12.6)	11.4 (10.3-12.5)	.22
Patients With Independent Mobility at Baseline				
Death by 6 mo, % (n = 275)	2.8 (0.8-7.1)	2.1 (0.6-5.1)	1.6 (0.3-5.4)	.38
Locomotion at 2 mo (range 2-14) (n = 244)	8.8 (8.2-9.4)	8.37 (7.9-8.8)	7.79 (7.1-8.4)	.04
Self-care at 2 mo (range 6-42) (n = 236)	35.8 (34.3-37.3)	35.0 (34.0-36.1)	34.0 (32.3-35.8)	.14
Transferring at 2 mo (range 3-21) (n = 237)	16.0 (15.3-16.8)	15.7 (15.1-16.2)	15.1 (14.3-16.0)	.16
Locomotion at 6 mo (range 3-21) (n = 243)	10.1 (9.53-10.7)	9.97 (9.6-10.4)	9.7 (9.1-10.4)	.40
Self-care at 6 mo (range 6-42) (n = 231)	37.1 (35.7-38.4)	36.8 (35.9-37.7)	36.3 (34.7-37.8)	.45
Transferring at 6 mo (range 3-21) (n = 235)	17.6 (16.9-18.3)	17.3 (16.9-17.8)	16.9 (16.2-17.7)	.24

Siu AL et al, Arch Intern Med 2006

Considerazioni -2

- La frattura di femore è un “complex journey of care” che costringe il paziente ad uno stress clinico e ambientale e l’organizzazione ad uno stress organizzativo notevoli
- Le variabili che influenzano l’outcome non sono legate soltanto al tipo di frattura ed all’intervento chirurgico in se ma coinvolgono aspetti della care che più propriamente sono tipici della cultura e dell’approccio geriatrici

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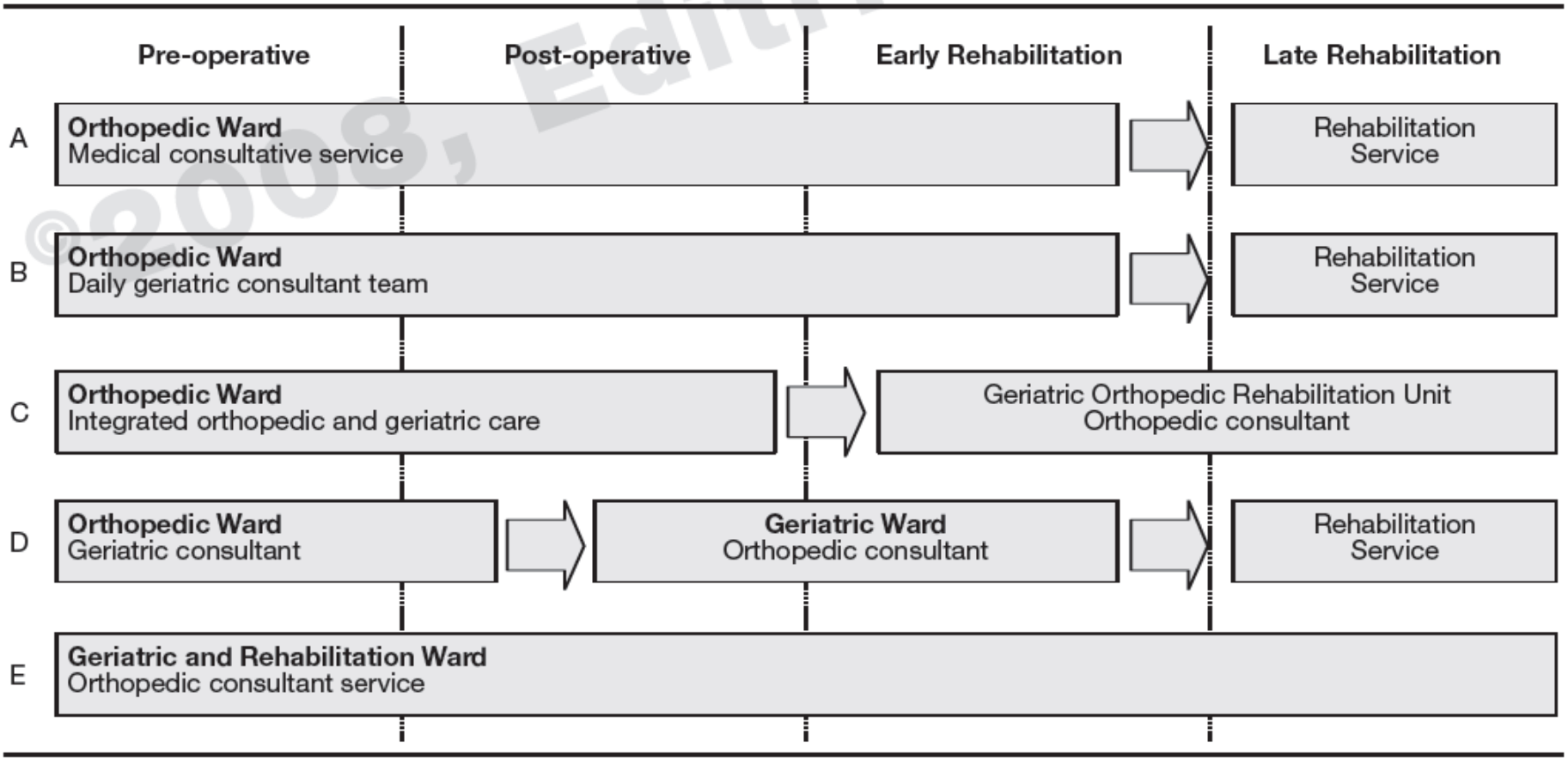
I'm only a humble carpenter and I need a physician to tell me what's wrong with the patient"

Devas MB, 1947

Patients pathways in different models of hip fracture care



Pioli G et al, Aging Clin Exp Res 2006

Considerazioni

- Modelli eterogenei
  - differenti organizzazioni “ospedaliere”
  - differenti sistemi di pagamento
  - differenti figure (team) coinvolti
- Differenti misure (e tempi) di outcomes
- Carenza di RCT, con risultati contrastanti

Interdisciplinary inpatient care for elderly people with hip fracture: a randomized controlled trial

Variable	Group; no. (and %) of subjects: Interdisciplinary care	Usual care	Difference* (and 95% CI)
Death†			
3 mo			7)
6 mo			9)
Decline in ambulation‡			
3 mo§			3)
6 mo			.3)
Decline in transfers‡			
3 mo§			.2)
6 mo	(36.3)	44 (37.6)	–1.3 (–13.5 to 10.9)
Change in residence‡			
3 mo	31 (23.7)	32 (25.4)	–1.7 (–12.3 to 8.8)
6 mo	22 (17.7)	23 (19.7)	–2.0 (–11.8 to 7.9)

The subgroup analysis (based on cognitive status) showed a trend for benefit of interdisciplinary care in patients with mild to moderate cognitive impairment.

Note: CI = confidence interval.
*Absolute difference between percentages for each group.
†Determined on the basis of the entire sample of 141 patients receiving interdisciplinary care and 138 patients receiving usual care.
‡Determined on the basis of surviving patients only: 131 patients receiving interdisciplinary care and 126 receiving usual care at 3 months, and 124 patients receiving interdisciplinary care and 117 receiving usual care at 6 months (see also additional note concerning missing data at 3 months for some variables).
§Data were missing for 3 patients receiving interdisciplinary care and 8 patients receiving usual care.

Naglie G et al, CMAJ 2002

È più efficace un reparto di ortogeriatria vs un reparto ortopedico tradizionale?

Variable	ORT Group		ORTGER Group		
			OR	95% CI	*p* Value
Department					
Orthopedic			1.00	—	—
Orthogeriatric			1.97	1.09–3.65	.03
Admission cognitive FIM (5-unit increase)			2.45	1.89–3.31	<.001
Rehabilitation LOS (3-d increase)			1.02	0.88–1.18	.77
Age (5-y increase)			0.90	0.73–1.10	.30
Type of fracture					
Subcapital			1.00	—	—
Pertrochanteric			1.35	0.79–2.30	.27
Sex					
Male			1.00	—	—
Female			1.37	0.72–2.64	.35
Motor AFE	0.92	0.96 ± 0.66	0.81	0.89 ± 0.53	.29
Motor RFG	0.47	0.46 ± 0.17	0.41	0.42 ± 0.19	.12
Motor RFE × 100	2.26	2.42 ± 1.86	1.59	1.85 ± 1.19	<.001

Adunsky A, J Gerontol 2003

Impact of a Comanaged Geriatric Fracture Center on Short-term Hip Fracture Outcomes

Table 2. Outcomes in the Geriatric Fracture Center (GFC) and Usual Care

Outcome	Unadjusted			Adjusted[a]	
	GFC (n=193)	Usual Care (n=121)	*P* Value	Coefficient[b] (95% Confidence Interval)	*P* Value
Time to surgery, mean (SD), h	24.1 (17.0)	37.4 (63.8)	.007	−12.93 (−2.19 to −23.68)	.02
Restraint use, %	0	14.1	<.001	. . .[c]	. . .[c]
Length of stay, mean (SD), d	4.6 (3.3)	8.3 (6.3)	<.001	−3.74 (−2.56 to −4.91)	<.001
In-hospital mortality, %	1.6	2.5	.68	0.17 (0.02 to 1.14)	.07
30-d Readmission rate, %	9.8	13.2	.35	0.52 (0.23 to 1.18)	.12
Complications overall, %	30.6	46.3	.005	0.26 (0.14 to 0.47)	<.001
Delirium, %	24.4	32.2	.13	0.27 (0.13 to 0.53)	<.001
Postoperative infection, %[d]	2.3	19.8	<.01	0.04 (0.01 to 0.13)	<.001
Renal insufficiency, %	6.2	7.4	.67	0.70 (0.25 to 1.97)	.50
Bleeding, %[d]	0	3.3	.02	. . .[c]	. . .[c]
Cardiac, %[d]	1.0	7.4	.004	0.15 (0.03 to 0.83)	.03
Hypoxia, %	6.7	14.1	.03	0.22 (0.09 to 0.55)	.001
Thromboembolism, %	0.5	5.0	.01	0.07 (0.01 to 0.77)	.03
Stroke, %	0.5	0	>.99	. . .[c]	. . .[c]

Friedman SM et al, Arch Intern Med 2009

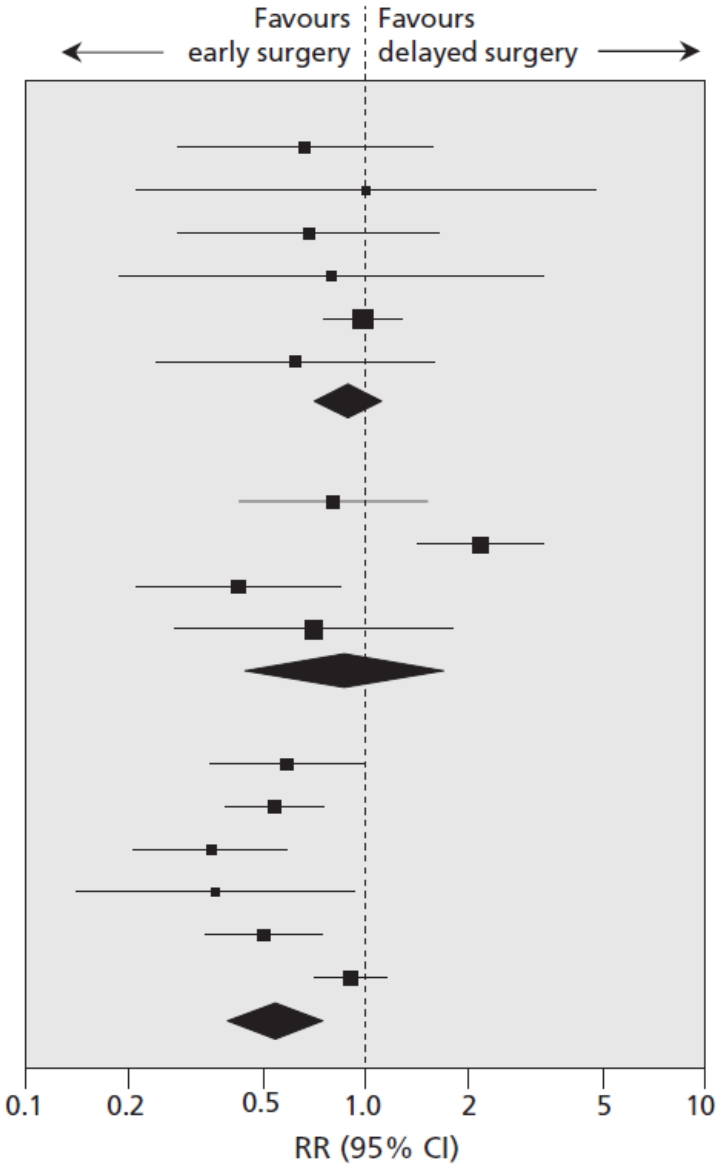
Outline

- Il contesto epidemiologico
- Il significato clinico dell'ortogeriatria
- I diversi modelli di ortogeriatria e le evidenze scientifiche sull'efficacia
- Le questioni irrisolte
- Conclusioni

L’intervallo temporale frattura-intervento chirurgico condiziona l’outcome?

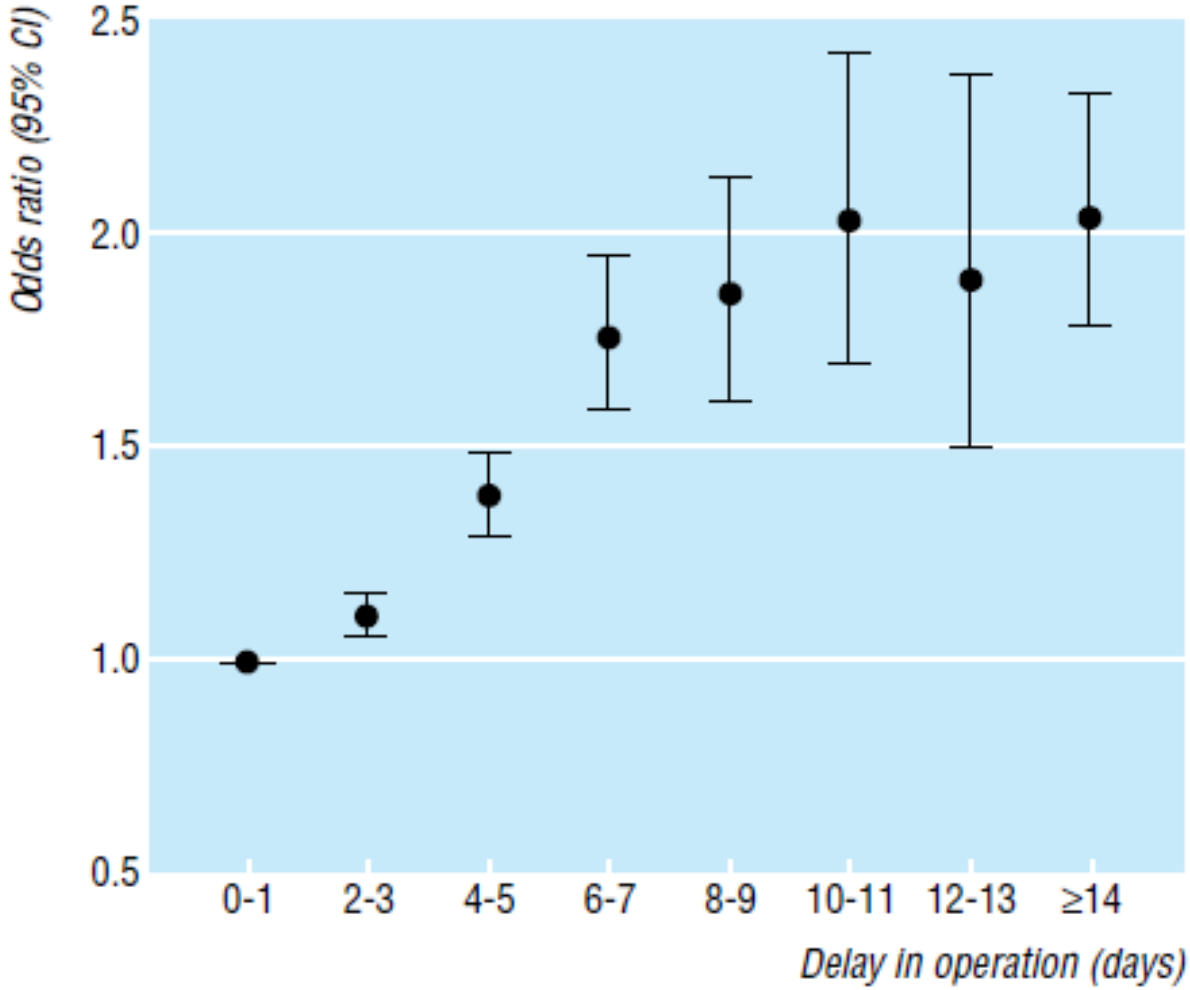
Preoperative timing and risk of death

Timeframe and study	Early surgery, N	Delayed surgery, N	RR (95% CI)
Short-term			
Davie et al.[28]	105	95	0.66 (0.28–1.56)
Harries et al.[30]	40	40	1.00 (0.21–4.71)
Parker et al.[25]*	290	178	0.68 (0.28–1.65)
Smektala et al.[22]	139	22	0.79 (0.19–3.33)
Moran et al.[31]*	982	1372	0.98 (0.75–1.28)
Rae et al.[32]*	137	85	0.62 (0.24–1.59)
Overall	1693	1792	0.90 (0.71–1.13)
Medium-term			
Davis et al.[29]*	45	185	0.80 (0.43–1.50)
Mullen et al.[23]†	8	52	2.17 (1.42–3.31)
Dorotka et al.[12]	158	24	0.42 (0.21–0.84)
Orosz et al.[8]	398	780	0.70 (0.50–0.97)
Overall	609	1041	0.87 (0.44–1.72)
Long-term			
Zuckerman et al.[34]‡	267	100	0.58 (0.35–0.99)
Beringer et al.[27]	133	70	0.54 (0.39–0.75)
Elliott et al.[15]	169	1611	0.35 (0.21–0.59)
Doruk et al.[26]§	38	27	0.36 (0.14–0.92)
Siegmeth et al.[24]*	3454	174	0.50 (0.34–0.74)
Smektala et al.[33]	609	1629	0.90 (0.71–1.15)
Overall	4670	3673	0.55 (0.40–0.75)



Simunivoic N et al, CMAJ 2010

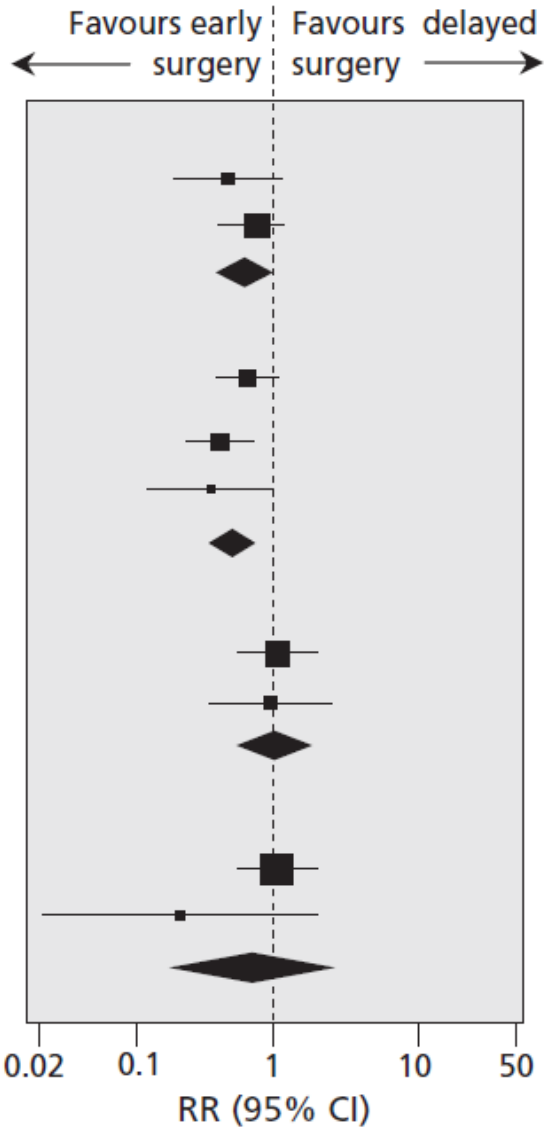
A dose-effect relationship between delayed surgery and mortality



Bottle A et al, BMJ, 2006

Preoperative timing and risk of complications

Complication and study	Early surgery, *n/N*	Delayed surgery, *n/N*	RR (95% CI)
Pneumonia			
Parker et al.[25]*	8/290	11/178	0.45 (0.18–1.09)
Smektala et al.[33]	16/631	66/1694	0.65 (0.38–1.12)
Overall	24/921	77/1872	0.59 (0.37–0.93)
Pressure sores			
Davis et al.[29]*	12/45	80/185	0.62 (0.37–1.03)
Parker et al.[25]*	18/290	28/178	0.39 (0.22–0.69)
Smektala et al.[33]	4/631	32/1694	0.34 (0.12–0.95)
Overall	34/966	140/2057	0.48 (0.34–0.69)
Deep vein thrombosis			
Moran et al.[31]*	15/982	21/1372	1.00 (0.52–1.93)
Smektala et al.[33]	5/631	15/1694	0.89 (0.33–2.45)
Overall	20/1613	36/3066	0.97 (0.56–1.68)
Pulmonary embolism			
Moran et al.[31]*	15/982	21/1372	1.00 (0.52–1.93)
Parker et al.[25]*	1/290	3/178	0.20 (0.02–1.95)
Overall	16/1272	24/1550	0.66 (0.17–2.58)



Simunivoic N et al, CMAJ 2010

NHS
National Institute for Health and Clinical Excellence

Issue date: June

Hip frac

The management of hip fracture in adults

- **Perform surgery on the day of, or the day after, admission.**
- **Identify and treat correctable comorbidities immediately so that surgery is not delayed** by: anemia, anticoagulation, volume depletion, electrolyte imbalance, uncontrolled diabetes, uncontrolled heart failure, correctable cardiac arrhythmia or ischaemia, acute chest infection, exacerbation of chronic chest conditions

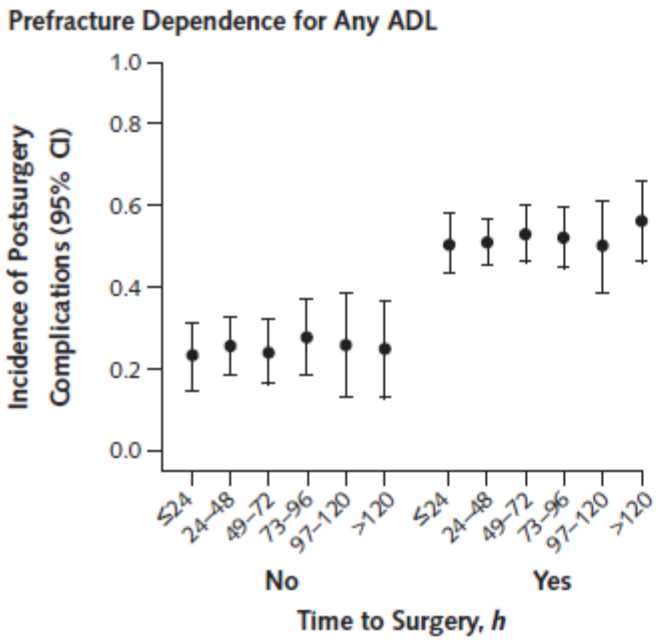
NICE clinical guideline 124
Developed by the National Clinical Guideline Centre

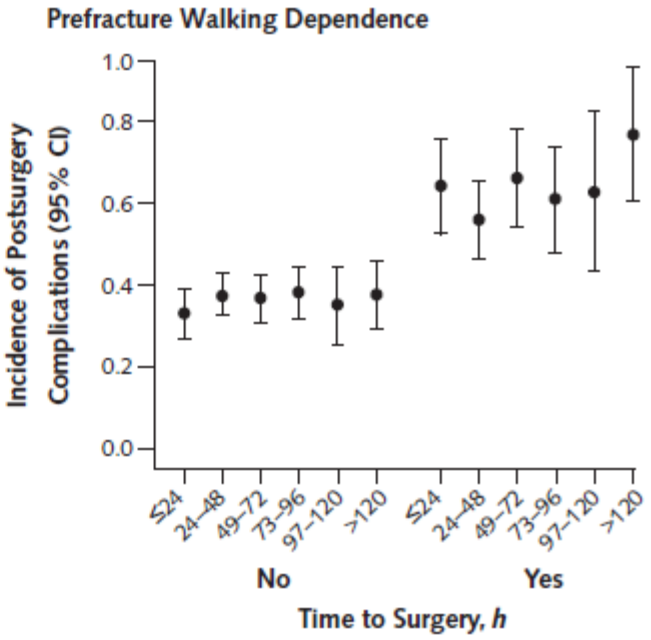
ORIGINAL RESEARCH | Annals of Internal Medicine

Causes and Effects of Surgical Delay in Patients With Hip Fracture

A Cohort Study

María T. Vidán, MD, PhD; Elisabet Sánchez, MD; Yassira Gracia, RN; Eugenio Marañón, MD; Javier Vaquero, MD, PhD; and José A. Serra, MD, PhD





Annals Internal Med 2011

Anticoagulation in hip fracture patients: a clinical conundrum

Table 1
Clinical and functional characteristics of 390 patients admitted to an Ortho-Geriatric Unit according to the use of anticoagulants[a] on admission.

	Anticoagulant non-users ($n=349$)	Anticoagulant users ($n=41$)	p
Age, years	84.1 ± 6.5	81.1 ± 5.0	.004
Gender female, n (%)	287 (82.2)	32 (78.0)	.511
Fracture type			
Femoral neck, n (%)	158 (50.0)	22 (59.4)	.178
Pertrochanteric, n (%)	126 (39.4)	9 (24.3)	
Subtrochanteric, n (%)	35 (11.1)	6 (16.2)	
Pre-fracture autonomy in activities of daily living (ADL)			
Independent (5–6 functions spared), n (%)	118 (33.8)	24 (58.5)	.004
Partially dependent (3–4 functions spared), n (%)	113 (32.4)	8 (19.5)	
Totally dependent (≤2 functions spared), n (%)	111 (31.8)	7 (17.1)	
Mini-Mental State Examination	12.5 ± 12.0	18.5 ± 12.2	.003
Charlson Comorbidity Index	3.1 ± 2.2	4.7 ± 2.1	<.001
Drugs, n (%)	4.5 ± 2.8	6.7 ± 2.6	<.001
A.S.A. score[b]	2.7 ± 0.6	3.0 ± 0.4	.005
Major post-operative complications	1.4 ± 1.2	1.4 ± 1.0	.949
Cardiovascular (including angina, heart failure, new-onset arrhythmia)	26 (7.4)	7 (17.1)	.04
Length of stay (days)	14.5 ± 5.9	16.0 ± 6.3	.113

Values are intended as means ± SD unless otherwise specified.
[a] Anticoagulants include warfarin and acenocoumarol.
[b] American Society of Anaesthesiology score, as assessed by the anaesthetist.

Mazzola P et al, Injury 2011

Il ritardo chirurgico ha lo stesso impatto nei pazienti fit e nei pazienti unfit?

Early Mortality After Hip Fracture: Is Delay Before Surgery Important?

By Christopher G. Moran, MD, FRCS(Ed), Russell T. Wenn, BA, Manoj Sikand, MS, FRCS, and Andrew M. Taylor, DM, FRCS

There was no a priori protocol for determining which patients were unfit for surgery and anesthesia, a judgment that will always vary between clinicians. However, the striking difference in mortality between the patients deemed to be fit for surgery and those considered to be unfit for surgery indicates that current clinical methods are successful in identifying patients who are at increased risk of death following hip fracture surgery. This important subgroup of patients requires separate analysis in future studies, and any national audit should also include a separate analysis of these patients, who could have an important effect on the observed mortality in individual trauma units.

J Bone Joint Surgery, 2005

The combined effect of ADL impairment and delay in time from fracture to surgery on 12-month mortality: an observational study in orthogeriatric patients

Giuseppe Bellelli, MD*,†,#, Paolo Mazzola, MD*, Maurizio Corsi, MD*, Antonella Zambon, PhD§, Giovanni Corrao, PhD§, Giuseppe Castoldi, MD‡, Giovanni Zatti, MD‡, Giorgio Annoni, MD*

- **Objective:** To assess the effect of delayed hip fracture surgery on 1-year mortality according to the existence of a pre-fracture Activity of Daily Living (ADL) impairment.

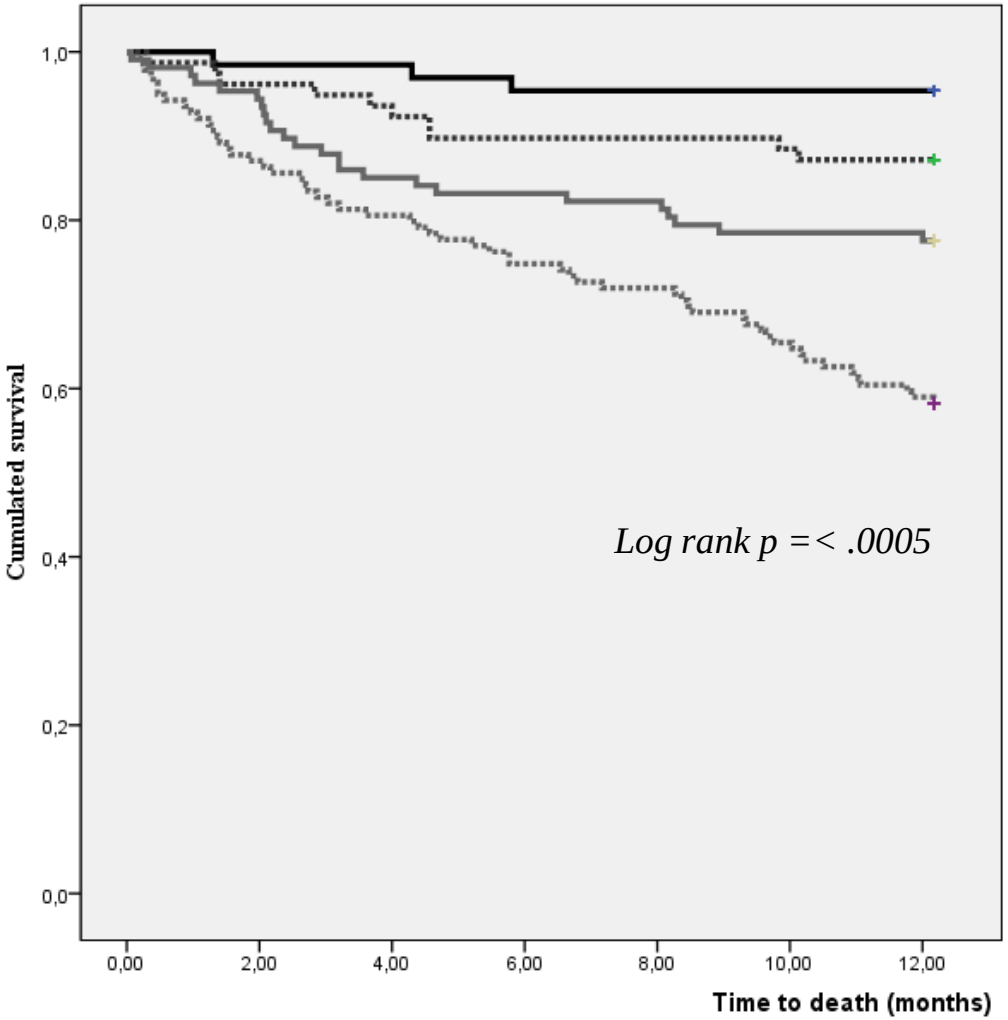
Clinical and functional characteristics of 377 patients consecutively discharged alive from an Orthogeriatric unit, according to mortality at 1-year follow-up.

	Alive (n=281)	Dead (n=96)	P
Age, years	83.1±6.1	85.0±7.0	.01
Gender, female	237 (84.3)	74 (77.1)	.10
From NH	33 (11.7)	10 (10.4)	.72
Femoral neck fracture	129 (49.8)	44 (50.6)	.75
Late surgery (> 48h)	142 (50.5)	68 (70.8)	.0005
Pre-fracture dependence in 2+ ADL	152 (54.1)	82 (85.4)	<.0001
Charlson Index	2.9±2.0	4.2±2.5	<.0001
Pre-fracture cognitive impairment	145 (51.6)	67 (69.8)	.002
Albumin gr/dl	3.2±1.3	3.1±1.3	.76
Post-operative delirium	89 (31.7)	52 (54.2)	<.0001
LOS	14.1±5.1	16.2±7.0	.008

	No ADL impairment		ADL impairment	
	No delay (n=66)	**Delay (n=78)**	**No delay (n=107)**	**Delay (n=139)**
Age, years	81.7±5.3	80.2±5.9	85.7±6.4	85.2±6.1
Females, n (%)	51 (77.3)	63 (80.8)	93 (86.9)	112 (80.6)
Place of fracture				
Home, n (%)	51 (77.3)	54 (69.2)	78 (72.9)	115 (82.7)
Out of home, n (%)	15 (22.7)	22 (28.2)	5 (4.7)	7 (5.0)
Nursing home, n (%)	--	2 (2.6)	24 (22.4)	17 (12.2)
Fracture type				
Femur neck/head, n (%)	27 (45.8)	36 (52.2)	43 (43.4)	74 (57.4)
Pertrochanteric, n (%)	27 (45.8)	23 (33.3)	44 (44.2)	41 (31.8)
Subtrochanteric, n (%)	5 (8.5)	10 (14.5)	12 (12.1)	14 (10.9)
ASA score	2.3±0.5	2.6±0.5	2.8±0.5	2.9±0.4
Time from fracture to surgery	1.5±0.5	4.3±1.9	1.6±0.5	4.3±2.1

	No ADL impairment		ADL impairment	
	No delay (n=66)	**Delay (n=78)**	**No delay (n=107)**	**Delay (n=139)**
Surgical treatment				
Endoprosthesis, n (%)	51 (77.3)	54 (69.2)	78 (72.9)	115 (82.7)
Internal fixation, n (%)	15 (22.7)	22 (28.2)	5 (4.7)	7 (5.0)
Anticoagulant users	4 (6.1)	21 (26.9)	2 (1.9)	14 (10.1)
Charlson Index, n (%)	2.1±2.1	2.9±2.0	3.0±1.9	4.1±2.4
Albumin serum levels	3.3±1.0	3.2±1.1	3.0±1.5	3.2±1.2
ASA score	2.4±0.5	2.7±0.6	2.8±0.5	2.9±0.5
Dementia before fracture, n (%)	1 (1.5)	1 (1.3)	55 (53.9)	72 (54.5)
Post-op delirium, n (%)	7 (10.8)	13 (16.7)	50 (40.9)	71 (53.8)
LOS of post-surgery, days	11.0±5.3	11.9±4.8	11.1±4.5	11.8±5.7
Discharge to rehab, n (%)	65 (100)	76 (97.4)	72 (70.6)	103 (78.0)
Discharge to NH, n (%)	0	0	25 (24.5)	17 (12.9)
Discharge to home with support	0	2 (2.6)	5 (4.9)	12 (9.1)

Figure. 1-year cumulative survival, according to delay in surgical intervention and ADL impairment (n=377 pts)



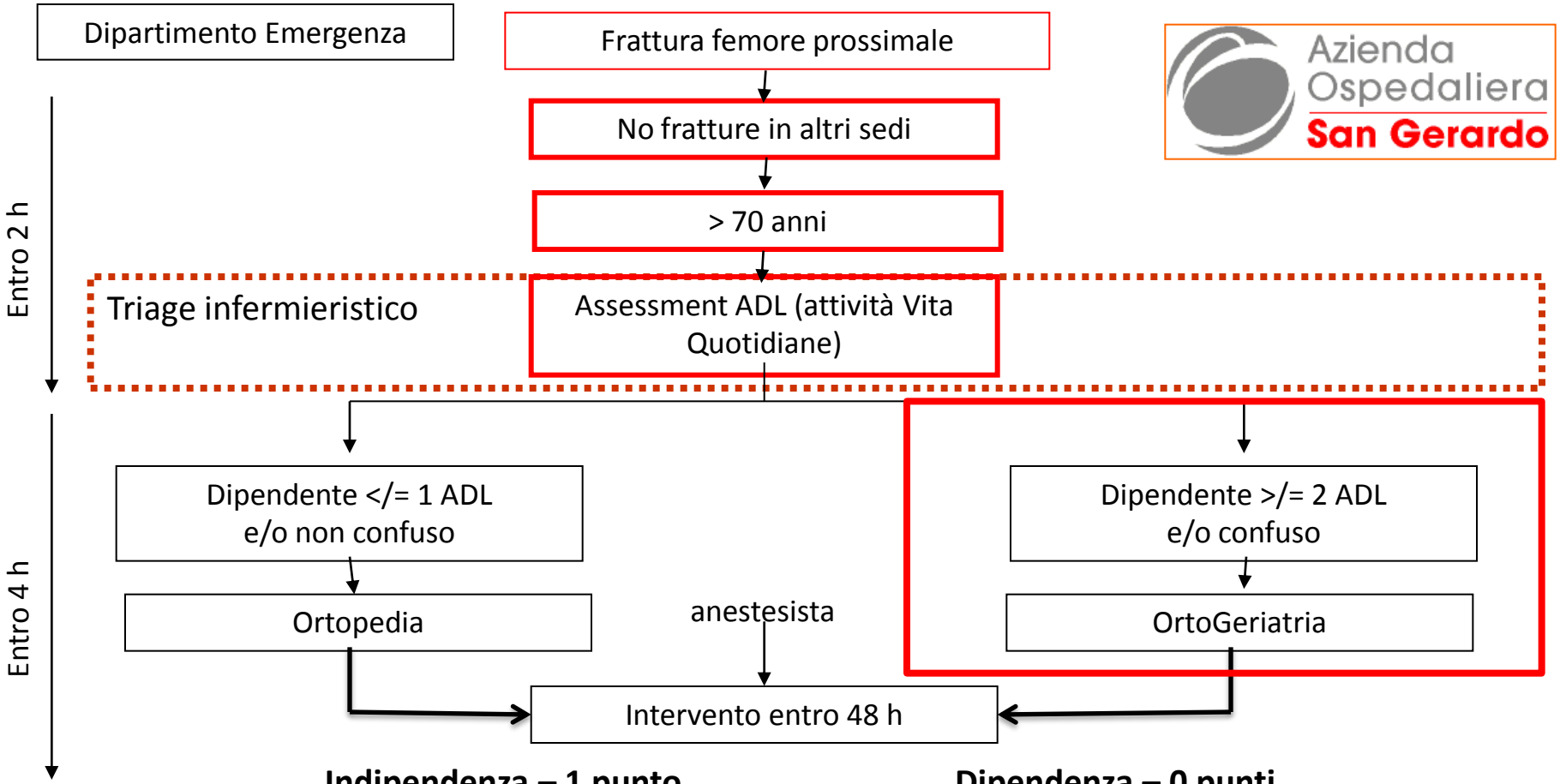
Legend: black solid line = no dealy-no ADL impairment; black dotted line = delay- no ADL impairment
grey solid line = no dealy- ADL impairment; grey dotted line = delay-ADL impairment

Results of Multivariate Proportional Hazards Analysis of 1-Year Mortality

Variable	H.R.	95% Confidence Intervals	P
Age, years	1.03	1.00 to 1.07	.006
Male/female	1.81	1.11 to 2.96	.001
Charlson Comorbidity Index (2-3)	1.15	1.04 to 1.28	.006
Drugs	0.98	0.90 to 1.07	.70
Post-operative delirium	1.64	1.03 to 2.61	.03
ASA score	0.95	0.60 to 1.52	.83
Dementia (present/absent)	0.66	0.38 to 1.15	.14
Delay-No ADL impairment	2.96	0.80 to 10.89	.10
No Delay-No ADL impairment	5.46	1.52 to 19.70	.009
Delay-ADL impairment	8.93	2.55 to 31.28	.0006

Comments

- Delayed surgery is associated with late mortality (1-year follow-up)
- The effect of delayed surgery on 1-year mortality is magnified in HF patients with ADL impairment before fracture
- Delirium & comorbidity are also independent predictors of mortality
- How to speed time of intervention among ADL-impaired patients (with delirium & comorbidity)?



	Indipendenza – 1 punto	Dipendenza – 0 punti
Bagno	Fa il bagno autonomamente o aiuto solo per l'igiene delle parti intime e/o fondoschiena	Ha bisogno di aiuto per lavare una o più parti del corpo. Deve essere lavato completamente
Vestizione	Sceglie i vestiti e li indossa autonomamente. Può necessitare di aiuto per allacciare le scarpe	Ha bisogno di aiuto per vestirsi o deve essere completamente vestito
Toilette	Usa autonomamente la toilette, si lava e si riveste senza aiuto	Ha bisogno di aiuto per i trasferimenti ai servizi igienici, per lavarsi, o utilizza padella/comoda
Trasferimenti	Si sposta dentro e fuori dal letto/sedia senza assistenza (incluso trasferimento da carrozzina)	Ha bisogno di aiuto per spostarsi dal letto alla sedia o è completamente dipendente
Continenza	Autonomo nella minzione e defecazione	Parzialmente- totalmente incontinente (vescica o feci)
Alimentazione	Si alimenta autonomamente. I piatti possono essere preparati da altri	Ha bisogno di aiuto per alimentarsi o richiede alimentazione parenterale/enterale

In che modo il delirium impatta sullo stato di salute a lungo termine?

Table. 1-year predictors of mortality in OGU patients

	Univariate model			Multivariate model		
	OR	95% CI	P	OR	95% CI	P
Age, <81 years	reference	-	-	reference	-	-
Age, 81-87 years	0.6	0.4 to 1.1	.088	-	-	-
Age, >87 years	2.4	1.4 to 3.9	.001	2.3	1.3 to 4.0	.006
Female gender (yes/no)	1.6	0.9 to 2.8	.108	2.1	1.1 to 4.1	.025
Charlson Comorbidity Index, 0-1	reference	-	-	reference	-	-
Charlson Comorbidity Index, 2-4	1.1	0.7 to 2.8	.742	-	-	-
Charlson Comorbidity Index, >4	2.9	1.7 to 4.8	<.001	2.2	1.2 to 4.1	.011
Drugs assumed	1.1	1.0 to 1.2	.020	1.0	0.9 to 1.1	.454
Cognitive impairment (yes/no)	2.1	1.3 to 3.3	.003	1.1	0.6 to 2.0	.730
Length of post-operative delirium, absence	reference	-	-	reference	-	-
Length of post-operative delirium, <50% of the time	0.6	0.4 to 1.0	.035	-	-	-
Length of post-operative delirium, >50% of the time	4.0	2.2 to 7.0	<.001	2.5	1.3 to 4.8	.004
Functional status, ADL 5-6	reference	-	-	reference	-	-
Functional status, ADL 0-4	5.0	2.7 to 9.2	<.001	3.2	1.5 to 6.7	.002
Cardio-pulmonary complications (yes/no)	1.4	0.7 to 2.7	.356	-	-	-
Cerebro-vascular complications (yes/no)	2.9	0.2 to 47.6	.446	-	-	-
Urinary tract infections (yes/no)	0.7	0.4 to 1.2	.202	-	-	-
Surgical site infections (yes/no)	4.0	0.9 to 18.3	.071	1.6	0.3 to 8.2	.542

Mazzola P, Bellelli G, Annoni G, unpublished data

Acknowledgments

- Paolo Mazzola
- Lucio Carnevali
- Maurizio Corsi
- Adriana Bruni
- Pamina Baccella
- Giovanni Zatti
- Donatella Bonaiuti
- Giorgio Annoni