

BPCO e insufficienza renale misconosciuta: un problema prettamente geriatrico

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Perché parlare di BPCO e di
insufficienza renale?



- La BroncoPneumopatia Cronica Ostruttiva (BPCO) è una malattia respiratoria cronica caratterizzata da ostruzione al flusso persistente ed evolutiva legata a rimodellamento delle vie aeree periferiche ed enfisema.
- La BPCO è prevenibile ed efficacemente curabile ed è variabilmente associata a significativi effetti extrapolmonari e comorbidità, che possono contribuire alla sua gravità.
- L'ostruzione, il rimodellamento delle vie aeree periferiche e l'enfisema sono dovuti ad una abnorme risposta infiammatoria delle vie aeree e del parenchima polmonare all'inalazione di fumo di sigaretta o di altri inquinanti.



- Insufficienza cardiaca cronica
- Coronaropatia e Infarto miocardico
- Vasculopatia periferica
- Neoplasia polmonare
- Sindrome metabolica/Diabete mellito
- Osteoporosi
- Depressione
- Insufficienza renale cronica
- Embolia polmonare
- Aritmie

La BPCO si associa frequentemente ad altre malattie croniche, definite comorbidità.

Le comorbidità possono essere classificate come:

1. **con-causali**, quando condividono con la BPCO fattori di rischio, ad es. fumo ed età per la cardiopatia ischemica.
2. **complicanti**, quando rappresentano effetti extrapolmonari della BPCO, ad es. osteoporosi o depressione.
3. **concomitanti**, ovvero malattie croniche coesistenti senza relazione causale nota con la BPCO.

Tuttavia, in rapporto al livello di conoscenze attuali, è spesso difficile classificare una comorbidità in modo univoco.



Infiammazione sistemica (aumento di PCR, IL-6, IL-8, TNF- α ; cellule infiammatorie circolanti; stress ossidativo sistemico)

Alterazioni nutrizionali e cachessia (aumento del dispendio energetico e del catabolismo, alterata composizione del corpo, carenze di micronutrienti come la vit D o i folati)

Stato procoagulatorio

Sarcopenia

Patologie cardiovascolari (malattia aterosclerotica pluridistrettuale)

Ridotta densità minerale ossea (osteopenia, osteoporosi)

Alterazioni ematologiche (anemia, prevalentemente normocitica e normocromica)

Patterns of Comorbidities in Newly Diagnosed COPD and Asthma in Primary Care*

Joan B. Soriano, MD, PhD; George T. Visick, PhD; Hana Muellerova, PhD; Nassrin Payvandi, PhD; and Anna L. Hansell, MD, PhD

Table 2—Rate per 10,000 and RR by Major Organ Systems in COPD and Asthma

Disorders	COPD	RR (95% CI)	Asthma	RR (95% CI)
Blood and lymphatic system	277.8	1.74 (1.4–2.1)	216.9	1.61 (1.3–2.0)
Cardiac	2,256.3	4.01 (3.6–4.4)	648.1	3.52 (3.0–4.1)
Congenital, familial, and genetic	48.1	1.18 (0.8–1.8)	75.6	1.28 (0.9–1.8)
Ear and labyrinth	881.8	1.44 (1.3–1.6)	1,218.0	1.27 (1.2–1.4)
Endocrine	385.3	1.22 (1.1–1.4)	192.9	1.49 (1.2–1.9)
Eye	870.69	1.32 (1.2–1.5)	769.1	1.46 (1.3–1.6)
GI	2,756.5	1.69 (1.6–1.8)	1,995.9	1.49 (1.4–1.6)
General and administration site	2,252.6	1.75 (1.6–1.9)	1,457.6	1.78 (1.6–1.9)
Hepatobiliary	96.33	2.89 (1.9–4.3)	30.26	1.50 (0.8–2.6)
Immune system	481.6	1.78 (1.5–2.1)	822.1	2.54 (2.2–2.9)
Infections and infestations	3,923.6	2.13 (2.0–2.2)	3,995.7	1.52 (1.4–1.6)
Injury, poisoning	607.6	1.23 (1.1–1.4)	747.7	1.50 (1.3–1.7)
Metabolism/nutrition	485.3	1.66 (1.4–1.9)	177.8	1.72 (1.3–2.2)
Musculoskeletal and connective tissue	2,867.7	1.45 (1.4–1.5)	1,654.3	1.60 (1.5–1.7)
Neoplasms benign, malignant, and unspecified	385.3	1.09 (0.9–1.3)	363.1	1.40 (1.2–1.6)
Nervous system	1,207.8	1.48 (1.3–1.6)	800.7	1.54 (1.4–1.7)
Pregnancy, puerperium, and perinatal	11.1	0.43 (0.2–0.9)	148.8	1.27 (1.0–1.6)
Psychiatric	1,063.3	1.98 (1.8–2.2)	747.7	1.68 (1.5–1.9)
Renal and urinary	566.8	1.53 (1.3–1.7)	303.9	1.37 (1.1–1.6)
Reproductive system and breast	377.9	1.17 (1.1–1.4)	480.4	1.40 (1.2–1.6)
Respiratory, thoracic, and mediastinal	2,897.3	3.14 (2.9–3.4)	2,635.2	2.57 (2.4–2.8)
Skin and subcutaneous tissue	1,726.5	1.57 (1.4–1.7)	1,668.1	1.54 (1.4–1.7)
Social circumstances	292.7	1.80 (1.5–2.2)	184.1	2.12 (1.6–2.7)
Surgical and medical	2,315.6	1.51 (1.4–1.6)	1,480.3	1.35 (1.2–1.5)
Vascular	926.2	1.41 (1.3–1.6)	315.2	1.20 (1.0–1.4)

- **Elevated serum cadmium and lead levels in smokers resulting in glomerular dysfunction**
- **Nephropathies are accelerated by nicotine with an increased incidence of microalbuminuria progressing to proteinuria**
- **Cigarette smoke-induced renal damage is due, at least in part, to activation of the sympathetic nervous system resulting in an elevation in blood pressure**
- **Ethanol, nicotine, or concurrent intake significantly increases lipid peroxidation in liver, and decreased superoxide dismutase activity and increased catalase activity in the kidney**
- **Both active and passive smoking is toxic to renal function**

Chronic Renal Failure (CRF)

- CRF rises in prevalence with age and is frequently associated with chronic diseases such as congestive heart failure and diabetes mellitus
- When present as a comorbidity, CRF carries negative prognostic implications and impacts the therapeutic strategy

Prevalence of Chronic Kidney Disease in the United States

Josef Coresh, MD, PhD

Elizabeth Selvin, PhD, MPH

Lesley A. Stevens, MD, MS

Jane Manzi, PhD

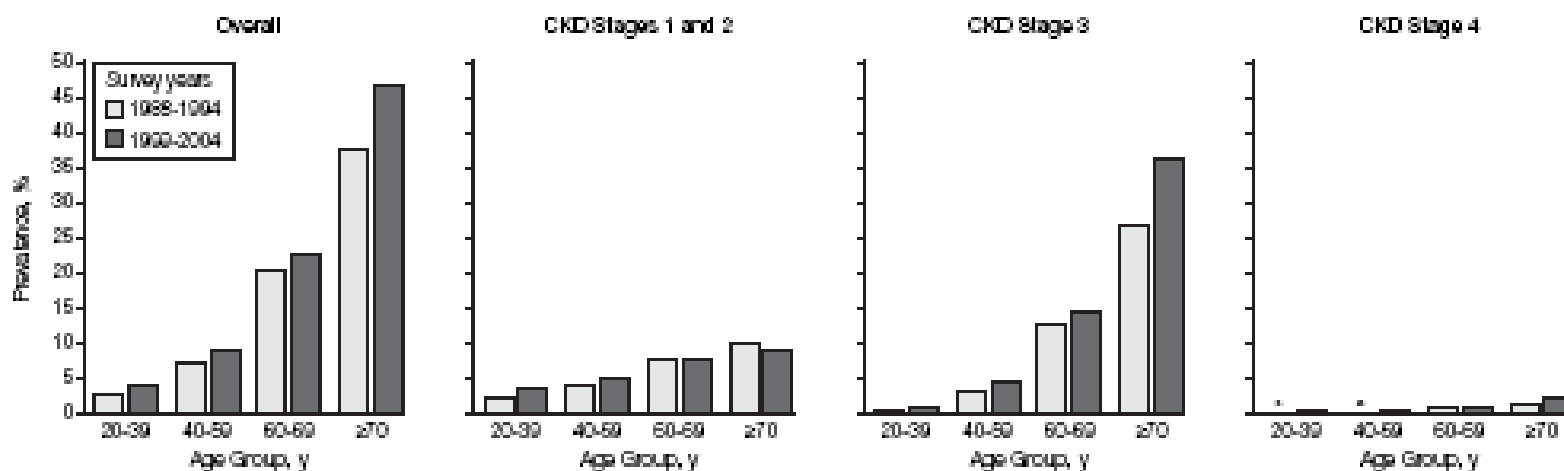
John W. Kusek, PhD

Paul Eggers, PhD

Frederick Van Lente, PhD

Andrew S. Levey, MD

Figure 2. Prevalence of Chronic Kidney Disease (CKD) Stages by Age Group in NHANES 1988-1994 and 1999-2004



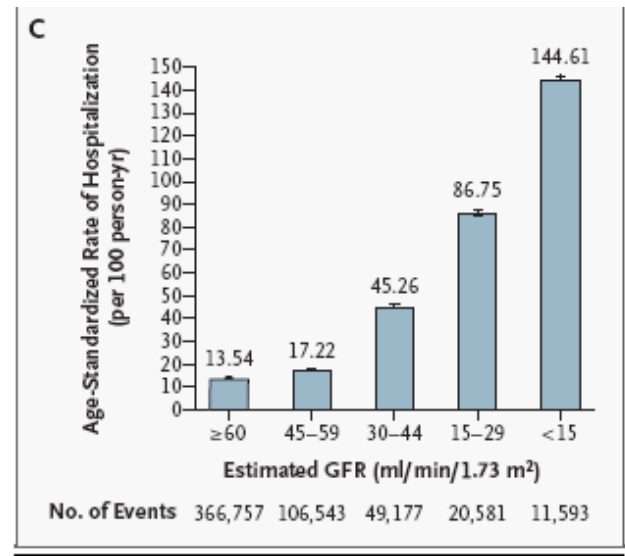
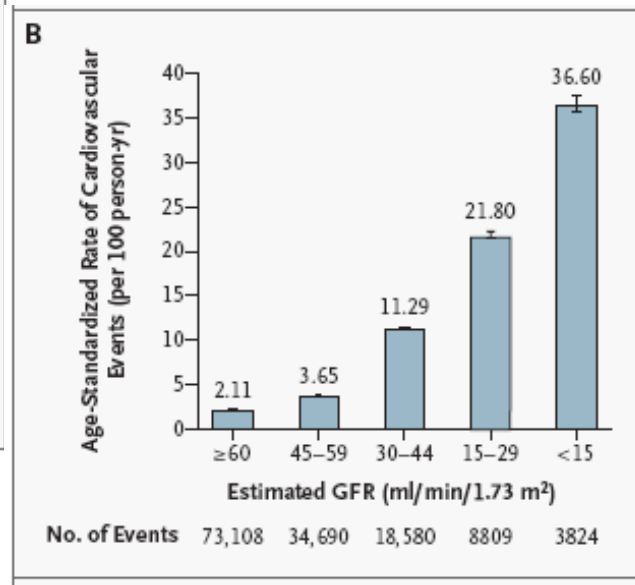
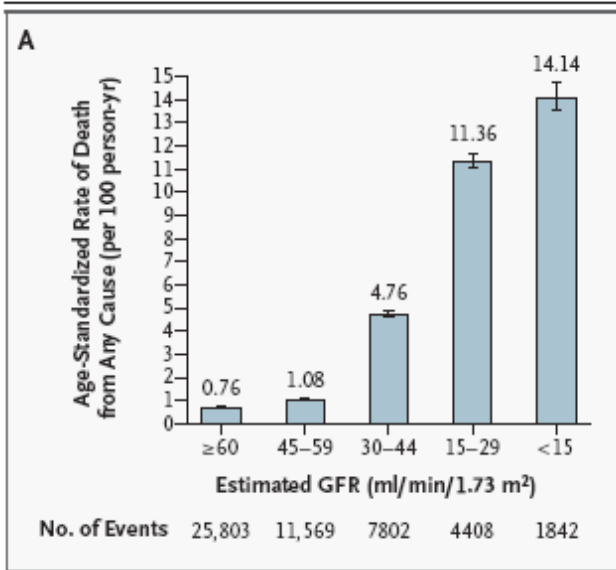
NHANES Indicates National Health and Nutrition Examination Surveys.

*There were no cases in 1988-1994.

ORIGINAL ARTICLE

Chronic Kidney Disease and the Risks of Death, Cardiovascular Events, and Hospitalization

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**BPCO e
INSUFFICIENZA RENALE
CRONICA**

Molti studi che considerano la comorbidità della BPCO spesso si riferiscono a popolazioni selezionate (con esclusione dei pazienti affetti da insufficienza renale), non specificano in che modo è stata posta la diagnosi di insufficienza renale, o non includono l'insufficienza renale tra le diagnosi self-reported

Co-morbidity contributes to predict mortality of patients with chronic obstructive pulmonary disease

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Co-morbidity contributes to predict mortality of patients with chronic obstructive pulmonary disease. R. Antonelli Incalzi, L. Fuso, M. De Rosa, F. Forastiere, E. Rapiti, B. Nardec-

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ABSTRACT
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tion or ischaemia (HR 1.42; 95% CI 1.02–1.96), FEV₁ <590 mL (HR 1.49; 95% CI 0.97–2.27). A score based upon these variables predicted mortality at 5 yrs with a sensitivity of 63% and a specificity of 77%.

Selected co-morbid diseases and electrocardiogram signs of right ventricular hypertrophy play a major prognostic role in advanced chronic obstructive pulmonary disease. The clinical assessment of patients with chronic obstructive pulmonary disease should include these important and easily measurable variables.

Eur Respir J 1997; 10: 2794–2800.

Unico lavoro che correla l'insufficienza renale cronica e la mortalità. La prevalenza di insufficienza renale cronica è del 6% e predice la mortalità a lungo termine in modo indipendente. Insufficienza renale valutata con creatininemia (sottostimata)

Table 3. – Survival of patients with chronic obstructive pulmonary disease, according to various characteristics

Variables significantly correlated with mortality	Survival yrs		Gehan's Wilcoxon	p-value
	Presence of risk	Absence of risk		
$PA-a,O_2^+$	1.76 (0.29–4.25)	3.29 (1.46–5.04)	3.071	0.001
Chronic renal failure	0.84 (0.25–2.35)	3.17 (1.29–4.99)	2.917	0.002
ECG signs of RVH or overload	2.62 (0.89–4.35)	3.50 (1.06–5.53)	2.371	0.009
FEV ₁ [†]	2.88 (0.73–4.79)	3.89 (2.35–5.80)	2.235	0.012
Length of hospital stay ⁺	2.23 (0.65–4.57)	3.36 (1.39–5.04)	2.195	0.014
ECG signs of ischaemic heart disease	2.19 (0.69–3.97)	3.26 (1.27–5.21)	1.913	0.027
Chronic liver disease	1.45 (0.33–3.76)	3.11 (1.04–5.04)	1.839	0.033
ECG evidence of ventricular arrhythmias	2.39 (0.48–3.45)	3.12 (0.98–5.04)	1.822	0.034
History of myocardial infarction	0.84 (0.50–3.20)	3.12 (1.14–5.02)	1.738	0.041

Survival values are presented as median values with interquartile ranges in parentheses. $PA-a,O_2$: alveolar-arterial oxygen difference; ECG: electrocardiogram; RVH: right ventricular hypertrophy; FEV₁: forced expiratory volume in one second. †: lowest quartile *versus* other quartiles; +: highest quartile *versus* other quartiles.

Table 4. – Results of the multivariate Cox regression analysis

Variables	β coefficient	Hazard rate (95% CI)	t-value	p-value
Age (per year)	0.038	1.04 (1.02–1.05)	4.88	0.00001
ECG signs of RVH or overload	0.565	1.76 (1.30–2.38)	3.67	0.0003
Chronic renal failure	0.580	1.79 (1.05–3.02)	2.16	0.032
ECG signs of ischaemic heart disease	0.349	1.42 (1.02–1.96)	2.10	0.037
FEV ₁ [†]	0.398	1.49 (0.97–2.27)	1.97	0.049
Chronic liver disease	0.508	1.66 (0.95–2.88)	1.80	0.073
ECG evidence of ventricular arrhythmias	0.470	1.60 (0.93–2.75)	1.70	0.089
$PA-a,O_2^+$	0.231	1.26 (0.92–1.72)	1.44	0.149
Length of hospital stay ⁺	0.124	1.13 (0.83–1.55)	0.77	0.441
Year of recruitment	-0.016	0.98 (0.94–1.03)	-0.72	0.471
Female gender	-0.031	0.97 (0.67–1.41)	-0.16	0.869
History of myocardial infarction	0.053	1.05 (0.54–2.05)	0.15	0.876

95% CI: 95% confidence intervals; ECG: electrocardiogram; RVH: right ventricular hypertrophy; FEV₁: forced expiratory volume in one second; $PA-a,O_2$: alveolar-arterial oxygen difference. †: lowest quartile *versus* other quartiles; +: highest quartile *versus* other quartiles.

Nell'anziano fragile affetto da comorbilità,
l'insufficienza renale cronica è spesso
associata a normali valori di creatininemia, una
condizione conosciuta come **INSUFFICIENZA
RENALE MISCONOSCIUTA o OCCULTA**

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Results. Creatinine and albuminuria were measured in the preceding 2 years in 82.3 and 55.2% of subjects, respectively. In patients with CKD, normoalbuminuria was present in 48.8%, and serum creatinine was normal ($\leq 120 \mu\text{mol/l}$) in 54.7%. An abnormal serum creatinine ($\geq 120 \mu\text{mol/l}$) had a sensitivity and specificity of 45.3 and 100%, respectively, to identify CKD. The combination of abnormal creatinine and albuminuria had an improved performance but still failed to detect a large number with CKD (sensitivity 82.4%, specificity 75.4%). Serum creatinine failed to identify CKD more often in females (OR 8.22, CI 6.56–10.29).

earlier in the natural history of the disease and enable early effective treatment to delay progression of CKD.

Come identificare l'insufficienza renale con creatininemia normale

- La creatinina sierica non è affidabile nell'anziano a causa delle alterazioni età-correlate della composizione corporea, che porta alla progressiva perdita di massa magra, e forse anche del ridotto apporto proteico
- E' quindi sempre consigliabile ricorrere alla misurazione della clearance della creatinina oppure della velocità di filtrazione glomerulare
- I metodi per la valutazione diretta della funzione renale non sono tuttavia facilmente applicabili e presentano dei grossi limiti (soprattutto nel paziente anziano)

Come identificare l'insufficienza renale con creatininemia normale

- Nella pratica clinica la funzione renale è comunemente valutata utilizzando delle equazioni che partendo dalla creatinina sierica forniscono una stima della clearance della creatinina (formula di Cockcroft Gault) o della velocità di filtrazione glomerulare (MDRD)
- L'affidabilità di queste formule è molto discussa ed i risultati ottenuti sono influenzati da numerosi fattori
- Nonostante nessuna formula sia ottimale nel predire la funzione renale soprattutto nei pazienti anziani, l'utilizzo di queste equazioni sono un metodo di facile utilizzo che permette di individuare con buona affidabilità i pazienti con ridotta funzione renale in presenza di creatinina sierica normale

Does concealed chronic kidney disease predict survival of older patients discharged from acute care hospitals?

Corsonello A, Pedone C, Lattanzio F, Garasto S, Corica F, Bustacchini S, Guffanti, EE, Abbatecola AM, Mari V, Fimognari FL, Incalzi RA.

Rejuvenation Res. 2010 Oct;13(5):539-45.

We aimed at verifying whether unrecognized chronic kidney disease (CKD) (i.e., reduced estimated glomerular filtration rate in spite of normal serum creatinine) has prognostic significance in an unselected population of older patients discharged from 11 acute care hospitals located throughout Italy. Our series consisted of 396 participants aged 70 and older. Estimated glomerular filtration rate (eGFR) was calculated by the Modification of Diet in Renal Disease (MDRD) study equation. We compared three groups: Normal renal function (normal serum creatinine levels and normal eGFR), concealed (normal serum creatinine levels and reduced eGFR), or overt (increased creatinine levels and reduced eGFR) renal failure. The relationship between renal function and 1-year mortality was evaluated using Kaplan-Meier curves and Cox regression analysis including potential confounders. Overall, 56 patients died over a cumulative follow-up time of 335 months, with an estimated incidence rate of 16.7/100 person-year (PY). The corresponding figures in patients with normal renal function, concealed CKD, and overt CKD were 9.8/100 PY (95% CI, 5.7-15.7), 28.3/100 PY (95% CI, 13.6-52.1), and 23.0 (95% CI, 15.4-33.0), respectively (log rank test $p = 0.006$). According to the fully adjusted model, both concealed (hazard ratio [HR], 2.35; 95% CI, 1.09-6.01) and overt CKD (HR, 2.09; 95% CI, 1.05-5.34) were significantly associated with the outcome. Concealed CKD contributes to profile the elderly patient at greater risk of death after being discharged from acute care medical wards. If confirmed in broader populations, this finding might have both clinical and epidemiological implications.

Concealed Renal Insufficiency and Adverse Drug Reactions in Elderly Hospitalized Patients

Andrea Corsonello, MD; Claudio Pedone, MD; Francesco Corica, MD; Chiara Mussi, MD; Pierugo Carbonin, MD; Raffaele Antonelli Incalzi, MD; for the Gruppo Italiano di Farmacovigilanza nell'Anziano (GIFA) Investigators

Table 1. Sociodemographic and Clinical Characteristics of Patients Divided According to Their Renal Function*

Characteristic	Normal Renal Function, % (n = 7195)	Concealed Renal Insufficiency, % (n = 1631)	Overt Renal Insufficiency, % (n = 2861)	P Value
Age ≥80 y	22.6	44.5†	42.1§	.001
Male sex	47.1	52.7†	64.5§	.001
Alcohol consumption >0.5 L	11.0	6.7†	9.9	.001
Dependent in at least 1 ADL	12.5	15.7‡	15.5§	.001
Cognitive impairment	22.3	32.6†	29.7§	.001
Medicine ward	38.2	33.3†	33.4§	.001
>4 Prescribed drugs	58.1	69.3†	72.9§	.001
>4 Diagnoses	28.5	33.6†	41.1§	.001
Length of stay >14 d	33.3	33.8	37.2§	.01
Serum albumin <3.5 g/dL	23.2	42.5†	35.0§	.001
BMI <20	9.3	10.0	7.6 ¶	.01
Diabetes	16.2	21.0†	22.6§	.001
CHF	7.9	13.5†	18.9§	.001
Hypertension	29.2	32.4	37.0§#	.001

Abbreviations: ADL, activities of daily living; BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters); CHF, congestive heart failure.

*Normal renal function: estimated glomerular filtration rate (GFR) higher than or equal to 60 mL/min × 1.73 m² body surface area (BSA) and serum creatinine level lower than or equal to 1.2 mg/dL (≤106 μmol/L); concealed renal insufficiency: estimated GFR lower than 60 mL/min × 1.73 m² BSA and serum creatinine level lower than or equal to 1.2 mg/dL (≤106 μmol/L); overt renal insufficiency: estimated GFR lower than 60 mL/min × 1.73 m² BSA and serum creatinine level higher than 1.2 mg/dL (>106 μmol/L). P values in the last column refer to the 3 (groups) by 2 (level) χ² test

†P<.001 (concealed renal insufficiency vs normal renal function).

‡P<.01 (concealed renal insufficiency vs normal renal function).

§P<.001 (overt renal insufficiency vs normal renal function).

||P<.001 (overt renal insufficiency vs concealed renal insufficiency).

¶P<.01 (overt renal insufficiency vs normal renal function).

#P<.01 (overt renal insufficiency vs concealed renal insufficiency).

Concealed Renal Insufficiency and Adverse Drug Reactions in Elderly Hospitalized Patients

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Table 4. Summary Regression Models of Selected Risk Factors to the Occurrence of ADR During Hospital Stay*

Demographic/Clinical Characteristic	Any ADR (n = 941)	ADR to Hydrosoluble Drugs (n = 301)	ADR to Any Other Drugs (n = 640)
Age, y			
<65	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
65-79	0.96 (0.80-1.16)	1.18 (0.84-1.65)	0.90 (0.73-1.11)
≥80	0.93 (0.76-1.14)	1.27 (0.89-1.82)	0.83 (0.66-1.05)
Male sex	0.83 (0.72-0.95)	0.80 (0.63-1.01)	0.85 (0.72-1.0)
Serum albumin <3.5 g/dL	1.12 (0.97-1.30)	1.12 (0.88-1.43)	1.12 (0.94-1.33)
Medicine ward	0.82 (0.71-1.01)	0.94 (0.73-1.21)	0.79 (0.70-1.01)
Length of stay >14 d	1.85 (1.61-2.12)	2.08 (1.64-2.63)	1.70 (1.45-2.0)
>4 Diagnoses	1.50 (1.31-1.73)	1.62 (1.28-2.06)	1.44 (1.22-1.71)
>4 Prescribed drugs	2.65 (2.20-3.19)	2.46 (1.77-3.42)	2.61 (2.10-3.24)
Renal function			
Normal renal function	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Concealed renal insufficiency	0.97 (0.78-1.19)	1.61 (1.15-2.25)	0.83 (0.65-1.08)
Overt renal insufficiency	1.26 (1.08-1.48)	2.02 (1.54-2.65)	1.01 (0.83-1.23)

Abbreviations: ADR, adverse drug reaction; BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

*Data are given as odds ratio (95% confidence interval) (calculated by entering all variables simultaneously in logistic regression model).

Prevalence and significance of unrecognized renal insufficiency in patients with heart failure

Aims

Renal insufficiency (RI) is a strong predictor of adverse outcome in patients with heart failure (HF). We aimed to determine the prevalence of RI being unrecognized and its significance in patients hospitalized with HF.

Methods and results

We analysed data from a prospective survey of 4102 hospitalized patients with HF. RI [defined as estimated glomerular filtration rate (eGFR) < 60 mL/min/1.73 m²] was present in 2145 (57%) patients but, based on medical records, was unrecognized in 872 [41%, 95% confidence interval (CI) 39–43%] of them. Patients with unrecognized RI were more likely to be women, elderly, and with better functional class, compared with patients with recognized RI. In-hospital and 1 year mortality was significantly higher among patients with recognized and unrecognized RI compared with patients without RI: 6.5 and 7.1 vs. 2.1%, and 38.8 and 30.9 vs. 18.8% ($P < 0.001$), respectively. After adjustment, recognized and unrecognized RI comparably predicted increased in-hospital mortality: odds ratio (OR) and 95% CI of 2.34 (1.43–3.87), $P < 0.001$, and 2.30 (1.45–3.72), $P < 0.001$. After 1 year, recognized RI remained an independent predictor for mortality: OR 1.79 (1.45–2.20), $P < 0.001$, whereas there was a trend for increased mortality predicted by unrecognized RI: OR 1.22 (0.97–1.53), $P = 0.08$.

Conclusion

A high proportion of RI remains unrecognized among hospitalized patients with HF. As co-morbid RI has important prognostic and therapeutic implications, patients with HF may benefit from routine assessment of GFR.

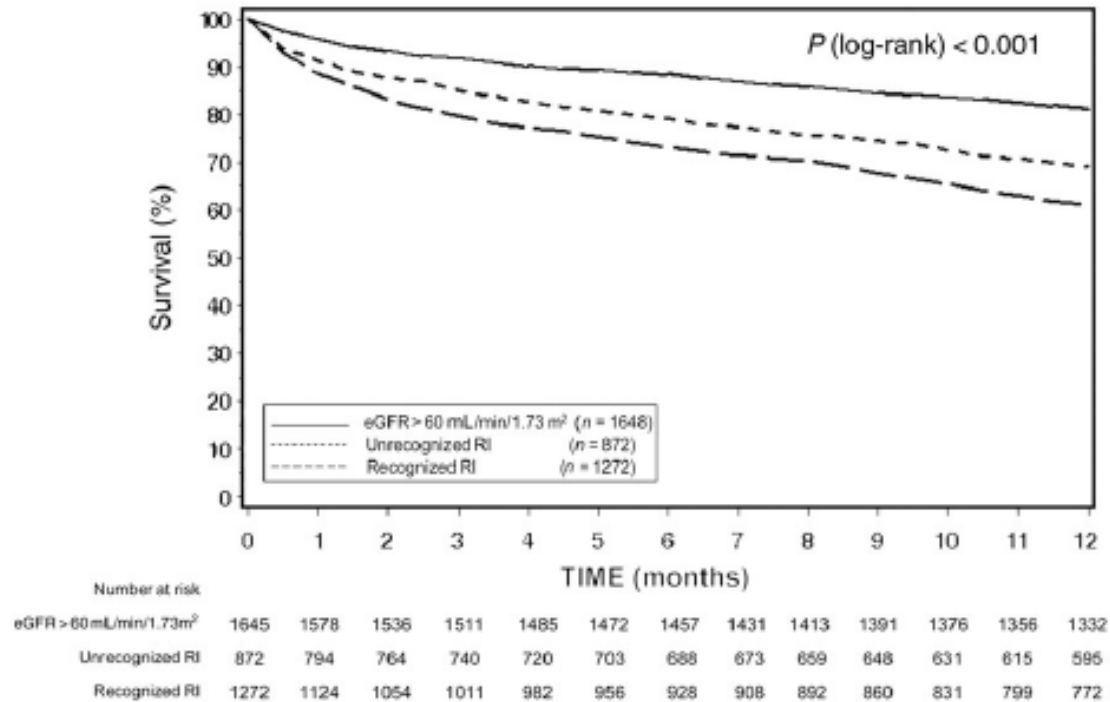


Figure 2 Kaplan–Meier survival curves of patients with recognized renal insufficiency, unrecognized renal insufficiency, and patients with estimated glomerular filtration rate ≥ 60 mL/min/1.73 m².

Summary and implications

Among hospitalized patients with HF, unrecognized RI is a common, independent predictor of increased mortality. However, a high proportion (41%) of RI remains clinically unrecognized. With the expanding population of HF patients, it is important to identify the subset of patients with HF who are at the highest risk for poor outcomes, so that clinicians can treat modifiable risk factors. The ability to identify chronic RI may promote early implementation of treatment that might arrest or delay the progression of renal damage, enable effective treatment of its complications, and reduce the risk of drug-induced nephrotoxicity. Thus, we suggest the routine use of calculated eGFR, preferably routinely reported by the local laboratory along with serum creatinine, to enhance early recognition of RI in HF patients.



Chronic Renal Failure

A Neglected Comorbidity of COPD

*Raffaele Antonelli Incalzi, MD; Andrea Corsonello, MD; Claudio Pedone, MD; Salvatore Battaglia, MD; Giuseppe Paglino, MD; and Vincenzo Bellia, MD, FCCP; on behalf of the Extrapulmonary Consequences of COPD in the Elderly Study Investigators**

Background: To the best of our knowledge, the association between COPD and chronic renal failure (CRF) has never been assessed. Lean mass is frequently reduced in COPD, and the glomerular filtration rate (GFR) might be depressed in spite of normal serum creatinine (concealed CRF). We investigated the prevalence and correlates of both concealed and overt CRF in elderly patients with COPD.

Methods: We evaluated 356 consecutive elderly outpatients with COPD enrolled in the Extrapulmonary Consequences of COPD in the Elderly Study and 290 age-matched outpatients free from COPD. The GFR was estimated using the Modification of Diet in Renal Disease Study Group equation. Patients were categorized as having normal renal function ($\text{GFR} \geq 60 \text{ mL/min/1.73 m}^2$), concealed CRF (normal serum creatinine and reduced GFR), or overt CRF (increased serum creatinine and reduced GFR). Independent correlates of CRF were investigated by logistic regression analysis.

Results: The prevalence of concealed and overt CRF in patients with COPD was 20.8% and 22.2%, respectively. Corresponding figures in controls were 10.0% and 13.4%, respectively. COPD and age were significantly associated with both concealed CRF (COPD: odds ratio [OR] = 2.19, 95% CI = 1.17-4.12; age: OR = 1.06, 95% CI = 1.04-1.09) and overt CRF (COPD: OR = 1.94, 95% CI = 1.01-4.66; age: OR = 1.06, 95% CI = 1.04-1.10). Diabetes (OR = 1.96, 95% CI = 1.02-3.76), hypoalbuminemia (OR = 2.83, 95% CI = 1.70-4.73), and muscle-skeletal diseases (OR = 1.78, 95% CI = 1.01-3.16) were significant correlates of concealed CRF. BMI (OR = 1.05, 95% CI = 1.01-1.10) and diabetes (OR = 2.25, 95% CI = 1.26-4.03) were significantly associated with overt CRF.

Conclusions: CRF is highly prevalent in patients with COPD, even with normal serum creatinine, and might contribute to explaining selected conditions such as anemia that are frequent complications of COPD.

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Abbreviations: CRF = chronic renal failure; GFR = glomerular filtration rate; OR = odds ratio

Table 2—Demographic and Clinical Characteristics of Patients Divided According to Renal Function

Characteristics	Normal Renal Function, n = 203	Concealed Renal Dysfunction, n = 74	Overt Renal Dysfunction, n = 79	P Value
Age, y	74.3 ± 6.2	76.3 ± 5.8	75.8 ± 6.0	.026
Gender, males	170 (83.7)	54 (73.0) ^a	62 (78.5)	.122
FEV ₁ , %	54.9 ± 18.1	57.3 ± 17.2	56.5 ± 17.2	.565
Pack-years	47.0 ± 40.0	40.7 ± 44.4	50.7 ± 36.5	.330
Barthel score, self-care	47.4 ± 6.4	48.0 ± 4.8	46.2 ± 7.8	.219
Barthel score, mobility	42.2 ± 8.2	42.9 ± 7.1	41.8 ± 7.7	.668
Barthel score, total	89.4 ± 13.6	90.9 ± 10.5	87.9 ± 14.1	.381
6WD, m	330 ± 143	303 ± 118	291 ± 123	.090
6WD, %	76.2 ± 31.6	73.9 ± 24.1	70.5 ± 26.3	.453
pH	7.42 ± 0.04	7.42 ± 0.03	7.41 ± 0.04	.051
nPaco ₂ , mm Hg	43.0 ± 9.4	39.1 ± 5.2 ^a	41.2 ± 6.2	.011
PaO ₂ , mm Hg	72.4 ± 12.7	76.8 ± 14.8	76.3 ± 11.7	.037
Sao ₂ , %	94.1 ± 2.9	94.8 ± 2.4	94.1 ± 2.8	.215
Respiratory drugs, n	1.7 ± 1.2	1.4 ± 0.9	1.7 ± 1.6	.150
Comorbidities, n	3.5 ± 2.4	4.2 ± 2.7	5.2 ± 3.2 ^b	.001
Hypertension	111 (54.7)	47 (63.5)	53 (67.1)	.115
Cardiovascular diseases	51 (25.1)	19 (25.7)	19 (24.1)	.972
Muscle-skeletal diseases	52 (25.6)	29 (39.2) ^a	20 (25.3)	.068
Gastrointestinal diseases	59 (29.1)	20 (27.0)	24 (30.4)	.899
Diabetes	34 (16.7)	19 (25.7)	28 (35.4) ^a	.003
Cerebrovascular diseases	14 (6.9)	6 (8.1)	10 (12.7)	.292

Data are number of cases (percentage) or mean ± SD. Cardiovascular diseases: heart failure, coronary heart disease, history of pulmonary embolism, venous thrombosis, arrhythmias, valvular diseases, peripheral vascular disease. Muscle-skeletal diseases: osteoporosis, arthritis, kyphosis, scoliosis, fractures, myasthenia. Gastrointestinal diseases: gastroesophageal reflux disease, peptic ulcer, liver diseases, inflammatory and/or vascular bowel diseases, chronic pancreatitis. Cerebrovascular diseases: transient ischemic attack, stroke, chronic cerebrovascular disease. 6WD = 6-min walk distance; Sao₂ = arterial oxygen saturation.

^aP < .05 vs normal renal function.

^bP < .01.

^cP < .001.

Table 4—Backward Stepwise Logistic Regression Models of Selected Variables to Concealed or Overt Renal Dysfunction vs Normal Renal Function

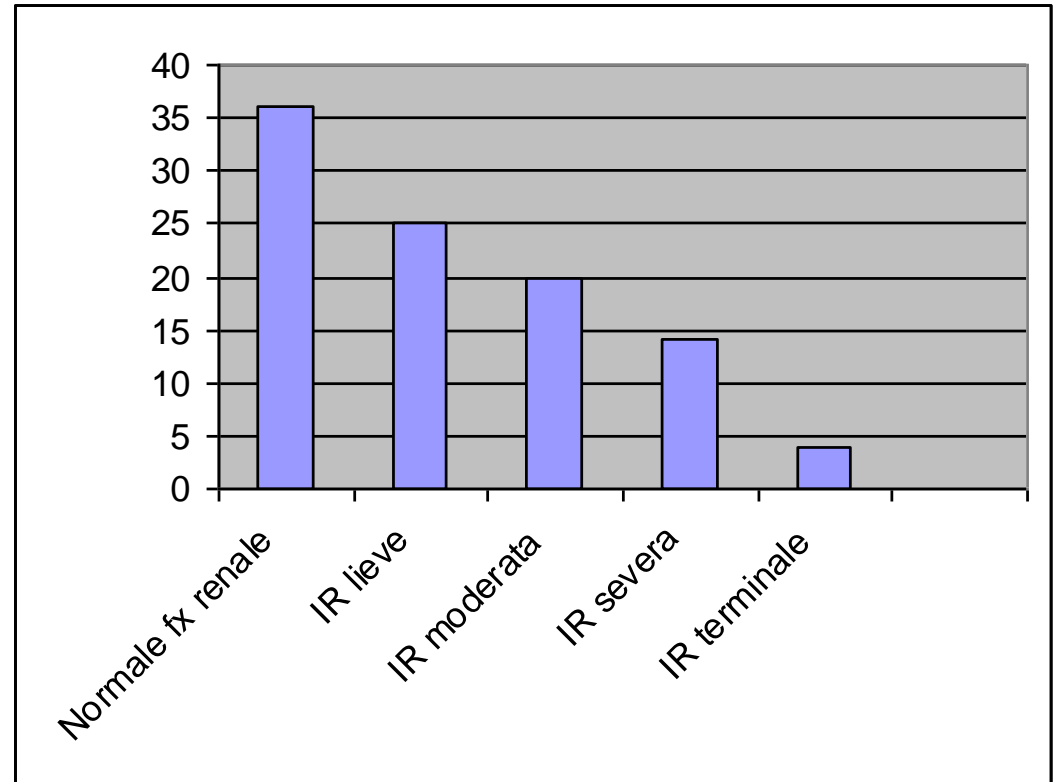
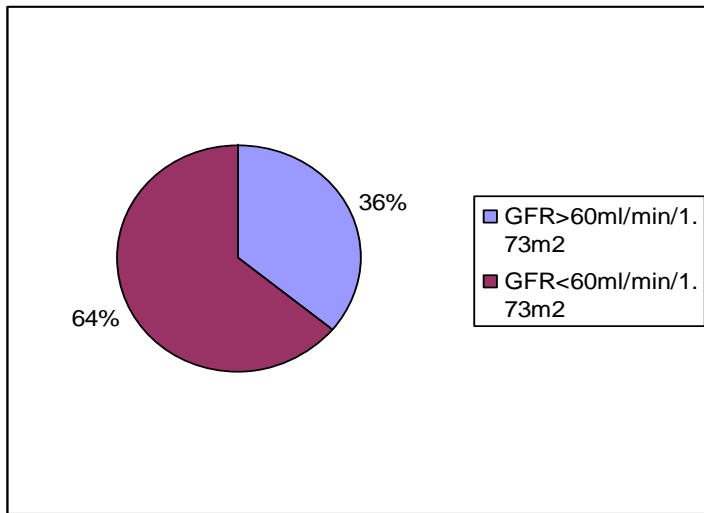
Variables	OR	95% CI
Concealed renal dysfunction ^a		
Age, y (for each 1-y increase)	1.06	1.04-1.09
COPD	2.19	1.17-4.12
Serum albumin < 3.5 g/dL	2.83	1.70-4.73
Muscle-skeletal disease	1.78	1.01-3.16
Diabetes	1.96	1.02-3.76
Overt renal dysfunction ^b		
Age, y (for each 1-y increase)	1.06	1.04-1.10
BMI	1.05	1.01-1.10
COPD	1.94	1.01-4.66
Diabetes	2.25	1.26-4.03

OR = odds ratio.

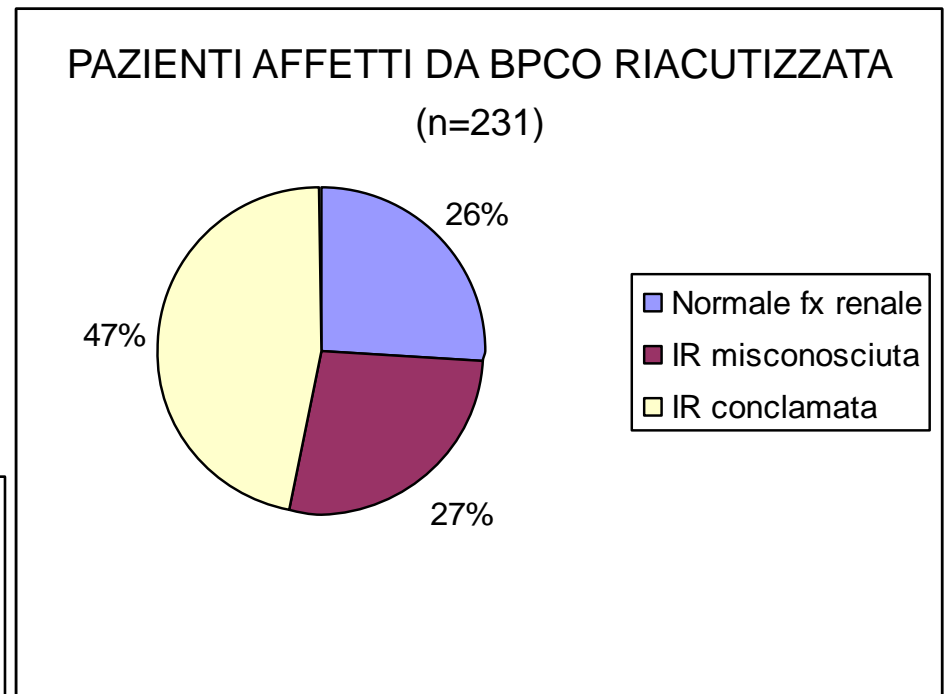
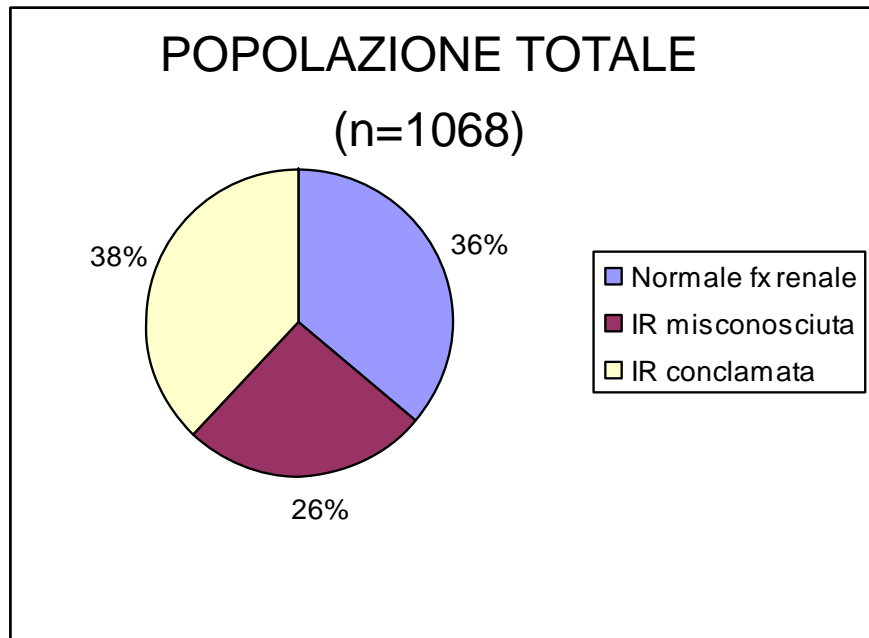
^aCardiovascular disease and gender were removed on step 2, hypertension and BMI were removed on step 3, and cerebrovascular disease was removed on step 4.

^bHypoalbuminemia and muscle-skeletal disease were removed on step 2, cardiovascular disease was removed on step 3, and gender was removed on step 4; hypertension and cerebrovascular disease were removed on step 5.

Prevalenza e gravità di insufficienza renale nella popolazione totale di pazienti ricoverati in U.O Medicina S'Anna (1068 pz)



Prevalenza di insufficienza renale misconosciuta e conclamata



Characteristics of study population stratified for the presence of chronic renal failure (CRF) in AECOPD patients (229 pts).

Variables	No CRF (n=60)	Occult CRF (n=61)	p*				Occult CRF (n=61)	Overt CRF (n=108)	p*
	Age (years)	78,0±7.2	83,6±6.7	,000			83,6±6.7	82.4±6.6	n.s.
Gender (Female)	40	62	,011			62	61	n.s.	
Body Mass Index (Kg/m ²)	23.7±4.8	24.8±5.5	n.s.			24.8±5.5	26.0±5.5	n.s.	
Mini Mental State Examination (MMSE)	23.1±3.9	19.9±6.2	,002			19.9±6.2	20.0±7.3	n.s.	
Geriatric Depression Scale (GDS)	5.2±3.0	5.0±3.0	n.s.			5.0±3.0	4.3±3.0	n.s.	
IADL (functions lost)	2.5±2.5	4.5±3.1	,000			4.5±3.1	4.6±2.9	n.s.	
Barthel index (BI) pre-admission	82.8±24.2	76.2±26.1	n.s.			76.2±26.1	72.8±26.4	n.s.	
Barthel index at admission	60.9±32.5	51.6±34.9	n.s.			51.6±34.9	51.5±32.8	n.s.	
Barthel index at discharge	78.0±26.0	68.4±28.2	,05			68.4±28.2	65.8±30.6	n.s.	
Numbers of medications at admission	4.8±2.7	4.9±3.0	n.s.			4.9±3.0	6.3±2.8	,003	
Numbers of medications at discharge	5.8±2.4	5.9±2.5	n.s.			5.9±2.5	6.9±2.2	,004	
Apache II score	9.0±4.0	8.3±2.8	n.s.			8.3±2.8	10.7±4.1	,000	
Adverse events	20	39	,02			39	35	n.s.	

Characteristics of study population stratified for the presence of chronic renal failure (CRF) in AECOPD patients (229 pts).

Variables	No CRF (n=60)			Occult CRF (n=61)		
	No CRF (n=60)	Occult CRF (n=61)	p*	Occult CRF (n=61)	Overt CRF (n=108)	p*
Charlson Index	3.4±1.9	3.7±1.2	n.s.	3.7±1.2	4.4±1.8	,002
Ischemic Heart disease	17	18	n.s.	18	14	n.s.
Congestive Heart Failure	28	56	,002	56	52	n.s.
Cerebrovascular disease	30	21	n.s.	21	43	,004
Dementia	21	15	,04	21	14	n.s.
Diabetes mellitus	17	29	,07	29	28	n.s.
Diabetes complicated	3	3	n.s.	3	13	,03
Serum cholesterol (mg/dl)	183.6±35.6	171.4±44.0	,09	171.4±44.0	172.2±44.4	n.s.
Serum albumin (mg/dl)	3.6±0.5	3.4±0.4	,02	3.4±0.4	3.4±0.4	n.s.
Hemoglobin (gr/dl)	13.3±1.6	12.6±1.4	,02	12.6±1.4	12.0±2.0	,03
Urea (mg/dl)	35.1±10.7	47.3±15.5	,000	47.3±15.5	78.7±39.6	,000
Creatinine (mg/dl)	0.8±0.1	1.0±0.1	,000	1.0±0.1	1.7±0.9	,000
e-GFR (MDRD)	72.8±15.1	52.1±5.3	,000	52.1±5.3	31.6±9.7	,000
ESR (mm/h)	32.3±23.0	40.7±26.3	,06	40.7±26.3	43.3±28.4	n.s.
CRP (mg/dl)	52.2±47.0	55.6±51.1	n.s.	55.6±51.1	52.9±47.8	n.s.
FEV1 (% of pred.)	67.7±25.6	68.3±25.1	n.s.	68.3±25.1	68.6±28.0	n.s.
Length of stay (days)	8.4±5.3	7.8±3.1	,08	7.8±3.1	8.8±3.9	,09

In una regressione logistica multivariata l'insufficienza renale misconosciuta (rispetto alla funzione renale normale) risultava essere associata in modo indipendente a:

	O.R.	95%CI	p
Età	1.09	1.01-1.18	.020
Scompenso Cardiaco	3.58	1.35-9.47	.010
Complicanze Diabete	2.92	0.96-8.82	.058
Eventi Avversi	3.68	1.17-11.59	.026

CONCLUSIONI

- Questi dati confermano l'alta prevalenza di IR misconosciuta nella popolazione anziana ospedalizzata, in particolare nei pazienti ricoverati per BPCO riacutizzata
- La presenza di IR misconosciuta identifica una categoria di pazienti "più fragili" (dal punto di vista cognitivo, funzionale e somatico) che non possono essere identificati dalla semplice valutazione della creatininemia
- La presenza di IR misconosciuta risulta associata in modo indipendente alla comorbilità cardiaca e diabetica ed a un aumentato rischio di sviluppare reazioni avverse intraospedaliere
- L'IR dovrebbe comunque essere considerata come una comorbilità frequente della BPCO e bisognerebbe implementare nella pratica clinica routinariamente il suo riconoscimento attraverso la valutazione del filtrato glomerulare, essendo la creatininemia un parametro non attendibile

Spunti di discussione

- L'alta prevalenza di insufficienza renale nei pazienti affetti da BPCO potrebbe avere importanti implicazioni cliniche
- Tale associazione potrebbe aiutare a capire e spiegare meglio il legame tra BPCO ed anemia
- L'associazione con le reazioni avverse da farmaci andrebbe sempre presa in considerazione nei pazienti affetti da BPCO riacutizzata che necessitano frequentemente di polifarmacologia (soprattutto corticosteroidea ed antibiotica)