## INDIVIDUAL SEVERITY INDEX

ISI=0.032 (age-decade) − 0.086 (male) − 0.109 (nephrotoxic) + 0.109 (oliguria) + 0.116 (hypotension) + 0.122 (jaundice) + 0.150 (coma) − 0.154 (consciousness) + 0.182 (assisted respiration) + 0.210

Case example

A 55-year-old man was seen because of oliguria following pancreatic surgery. At that moment he was hypotensive and connected to a respirator, and jaundice was evident. He was diagnosed with acute tubular necrosis. His ISI was calculated as follows:

ISI=0.032(6) − 0.086 + 0.109 + 0.116 + 0.122 + 0.182 + 0.210 = 0.845

**FIGURE 8-32**

Individual severity index (ISI). The ISI was published in its second version in 1993 [36]. The ISI estimates the probability of death. *Nephrotoxic* indicates an ARF of that origin; the other variables have been defined in preceding figures. The numbers preceding these keys denote the contribution of each one to the prognosis and are the factor for multiplying the clinical variables; 0.210 is the equation constant. Each clinical variable takes a value of 1 or 0, depending, respectively, on its presence or absence (with the exception of the age, which takes the value of the patient's decade). The parameters are recorded when the nephrologist sees the patient the first time. Calculation is easy: only a card with the equation values, a pen, and paper are necessary. A real example is given.

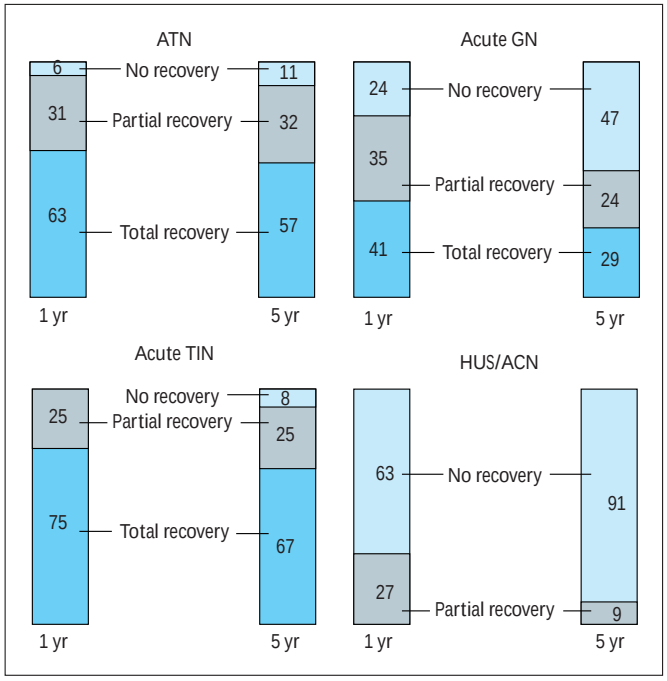



**FIGURE 8-33**

Outcome of acute renal failure (ARF). Long-term outcome of ARF has been studied only in some series of intrinsic or parenchymatous ARF. The figure shows the different long-term prognoses for intrinsic ARF of various causes. *Left*, The percentages of recovery rate of renal function 1 year after the acute episode of renal failure. *Right*, The situation of renal function 5 years after the ARF episode. Acute tubulointerstitial nephritis (TIN) carries the better prognosis: the vast majority of patients had recovered renal function after 1 and 5 years. Two thirds of the patients with acute tubule necrosis (ATN) recovered normal renal function, 31% showed partial recovery, and 6% experienced no functional recovery. Some patients with ATN lost renal function over the years. Patients with ARF due to glomerular lesions have a poorer prognosis; 24% at 1 year and 47% at 5 years show terminal renal failure. The poorest evolution is observed with severe forms of acute cortical necrosis or hemolytic-uremic syndrome. GN—glomerulonephritis; HUS—hemolytic-uremic syndrome; ACN—acute cortical necrosis. (*Data from* Bonomini *et al*. [37].)

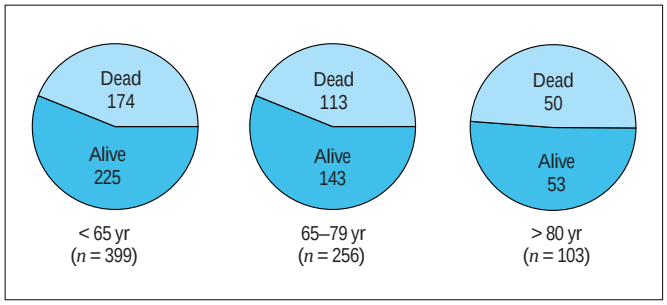



**FIGURE 8-34**

Age as a prognostic factor in acute renal failure (ARF). There is a tendency to treat elders with ARF less aggressively because of the presumed worse outcomes; however, prognosis may be similar to that found in the younger population. In the multicenter prospective longitudinal study in Madrid, relative risk for mortality in patients older than 80 years was not significantly different (1.09 as compared with 1 for the group younger than 65 years). Age probably is not a poor prognostic sign, and outcome seems to be within acceptable limits for elderly patients with ARF. Dialysis should not be withheld from patients purely because of their age.

## VARIABLES ASSOCIATED WITH PROGNOSIS: MULTIVARIATE ANALYSIS (16 STUDIES)

| | |
|---|---|
| Assisted respiration | 11 |
| Hypotension or inotropic support | 10 |
| Age | 8 |
| Cardiac failure/complications | 6 |
| Jaundice | 6 |
| Diuresis volume | 5 |
| Coma | 5 |
| Male sex | 4 |
| Sepsis | 3 |
| Chronic disease | 3 |
| Neoplastic disease | 2 |
| Other organ failures | 2 |
| Serum creatinine | 2 |
| Other conditions | 12 |
| Summary | |
| Clinical variables | 20 |
| Laboratory variables | 6 |

**FIGURE 8-35**

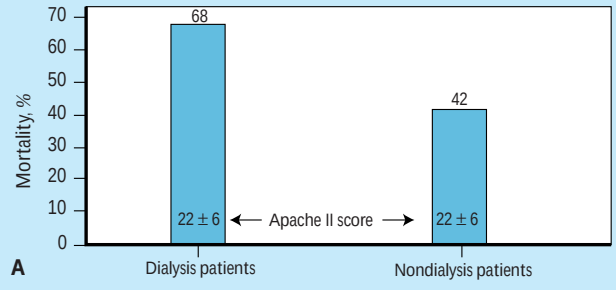
Outcome of acute renal failure (ARF). A great number of variables have been associated with outcome in ARF by multivariate analysis. This figure gives the frequency with which these variables appear in 16 ARF studies performed with multivariable analysis (all cited in [30]).

## PROGNOSIS IN ACUTE RENAL FAILURE

| | 1960–1969 | P | 1980–1989 |
|---|---|---|---|
| No. | 119 | | 124 |
| Mortality (%) | 51 | NS | 63 |
| Mean age (y) | 50.9 | < 0.0001 | 63 |
| Median APACHE II score | 32 | < 0.0001 | 35 |
| Range | (22–45) | | (25–49) |

**FIGURE 8-36**

Prognosis in acute renal failure (ARF). This figure shows the utility of a prognostic system for evaluating the severity of ARF over time, using the experience of Turney [38]. He compared the age, mortality, and APACHE II score of ARF patients treated at one hospital between 1960 and 1969 and 1980 and 1989. In the latter period there were significant increases in both the severity of the illness as measured by APACHE II and age. Although there was a tendency to a higher mortality rate in the second period, this tendency was not great enough to be statistically significant.




A

| Time | Nonsurvivors | Survivors |
|---|---|---|
| Admission in ICU | 24 | 22 |
| Before dialysis | 22 | 22 |
| 24 h after dialysis | 25 | 22 |
| 48 h after dialysis | 24 | 22 |

B

**FIGURE 8-37**

APACHE score. The APACHE II score is not a good method for estimating prognosis in acute renal failure (ARF) patients. **A**, Data from Verde and coworkers show how mortality was higher in their ICU patients with ARF needing dialysis than in those without need of dialysis, despite the fact that the APACHE II score before dialysis was equal in both groups [39]. **B**, Similar data were observed by Schaefer's group [40], who found that the median APACHE II score was similar in both the surviving or nonsurviving ARF patients treated in an intensive care unit. Recently Brivet and associates have found that APACHE II score influences ARF prognosis when included as a factor in a more complex logistic equation [2]. Although not useful for prognostic estimations, APACHE II score has been used in ARF for risk stratification.