

**HIGH BLOOD LACTATE LEVEL AND LOW O2 EXTRACTION RATIO AS A MARKER OF LIVER RETRANSPANTATION**

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Early graft dysfunction after liver transplantation (OLT) is often difficult to assess when only based on liver enzymes levels and bile production. High lactate level was evaluated as a marker of poor graft function. In 29 pts undergoing OLT simultaneous measurement (mes) of blood lactate levels, mVO2 (indirect calorimetry-Deltatrac<sup>®</sup>, Datex), DO2 (thermodilution) and O2 extraction ratio (EO2r) were performed within the first 48 postoperative hours. The pts were divided in 3 groups (G) according to their clinical evolution. GI (19 pts-28mes) : no postoperative hemorrhage (H), good graft function (GF); GII (5pts-8mes) : acute postoperative H, GF; GIII (5pts-9mes); no H, G dysfunction and early retransplantation (RT). Mean values of VO2, DO2, EO2r and lactates (L) are reported on the Table.

	n mes	VO2 ml/min/m <sup>2</sup>	DO2 ml/min/m <sup>2</sup>	EO2r %	L mmol/L
GI	28	152	783	20	1
GII	8	158	596*	28.3*	2.21*
GIII	9	158	759*	21.2*	3.29*

\* GI compared to GII ; ° GII compared to GIII ; p<0.05.

In GII high L levels with elevated EO2r indicates a relative tissue hypoxia due to reduced DO2 secondary to hemorrhage. In GIII, high L levels with EO2r<25% indicates graft dysfunction.

**Conclusion :** Simultaneous low EO2r (<25%) and high L (>2mmol/L) when present after the first 48 postoperative hours are specific and early markers of graft dysfunction. Normalization of EO2 (adequate DO2) is necessary to avoid the influence of tissue hypoxia on L levels. Residual hyperlactacidemia could be an early indication of retransplantation.

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**Organization and management I**

**THE USE OF TECHNOLOGY IN DEFINING CASE-MIX IN INTENSIVE CARE UNITS; RESULTS FROM A MULTI-CENTRE STUDY**

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From February through July 1990 data were pooled from 36 Dutch ICUs to evaluate their performance and cost-effectiveness. From each patient admitted in this period physiologic parameters were registered together with a daily TISS. This resulted in a database containing 11.665 patients and more than 37.000 patient-days.

This study reports on the ongoing research at our division on how patient characteristics, other than severity of illness, age, etc. can contribute to the development of a simplified case-mix scoring system on admission on the ICU.

An analysis was done on 8703 patients to identify a relationship between technology used on the day of admission and outcome (mortality), workload during the admission period (TISS) and length of stay (LOS).

Groups were formed based upon the used technology. **Group I:** mechanical ventilation; **group II:** pulmonary artery catheter; **group IV:** the use of more than one vaso-active drug. Patients who used none of these technologies were classified as **group I**. The results are listed in the table (MORT=mortality on the ICU, SURG=the percentage of surgical patients).

Characteristics of technology-based groups (n=8703)

	I	II	III	IV	II+III	II+IV	II+III+IV
(n)	5951	1210	179	232	232	286	485
APACHE	9.8±6.0	12.8±7.2	12.4±6.7	15.3±7.2	13.5±6.1	17.5±8.6	14.5 ± 6.5
TISS	15.6±6.7	28.8±7.1	29.3±7.2	22.3±7.0	40.5±6.4	34.6±7.0	45.2 ± 6.5
LOS	2.2±4.1	5.7±9.5	3.1±4.4	2.7±3.5	6.6±10.5	5.6±10.3	4.4±8.3
AGE	60.9±17.8	58.1±17.4	63.5±14.3	68.6±14.4	63.8±13.2	63.9±17.0	63.7±11.6
MORT.	3.7%	13.1%	10.1%	18.5%	12.9%	32.2%	15.9%
SURG.	51%	67%	58%	32%	80%	53%	85%

Mean age was, unlike the other variables, not significantly different between groups. Group I (n=5951), representing 65% of the admitted patients had the lowest mortality rate (3.7%), mean APACHEII-score (9.8 ± 6.0) and mean TISS-score (15.6 ± 6.7). The highest mortality was found in group II+IV (32.2%). The lower mortality (15.9%) observed in the group of patients utilizing all three technologies (II+III+IV) can be explained by the high percentage coronary artery bypass surgical patients (58%) compared to group II+III (8%).

The same analysis was done concerning these technologies used during the whole admission. The results from this second analysis were not different from those presented above. In other words, the technology used on the day of admission was representative for the whole length of stay.

It can be concluded that there is a strong relationship between the used technology on the day of admission on the ICU and APACHEII, TISS, LOS and mortality.

The use of technology on admission may contribute to identifying case-mix categories, providing better insight into the cost-effectiveness analysis of ICUs.

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**PASSIVE STRETCHING EFFECTS THE WASTING OF MUSCLE IN THE CRITICALLY-ILL**

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This study examines whether the muscle wasting in the catabolic intensive care patient can be prevented by passive stretching alone in the absence of any contractile activity. Five critically ill patients (2F:3M, ages 28-61) who required complete neuromuscular blockade for seven days of ventilator support were studied. On each patient one leg was placed in a "Straumann" lower limb continuous passive motion (CPM) unit for three 3 hour periods per day to produce about 25% functional stretch of the anterior tibialis muscle at 10 cycles per minute. Percutaneous muscle biopsies were taken from both limbs at the start and after seven days.

**Results:** Prevention of fibre atrophy could be seen in the more severely ill patients (admission APACHE scores 19, 21, 22) with a slight gain in fibre area, mean +15% (-10% to +27%) in the CPM limb compared with the control leg which decreased by a mean -36% (-32% to -42%) over seven days (p=0.027, n=3). Changes in fibre size were not significant in the less severely ill patients (APACHE= 11 & 13). The preservation of fibre area was seen in both fibre types but was more pronounced in type 1 muscle fibres (CPM +8%, control -36%, p=0.02, n=3). There was no change in the proportion of type 1 fibres (mean 75%). Qualitative changes were varied, but apparent between the two limbs. In one patient type 2 fibre atrophy in the CPM limb matched the increase in type 1 fibre area. In one of the patients in renal failure passive motion prevented the development of marked atrophy and necrosis seen in the control limb. The loss of protein (g% wet wt) was significantly less in the CPM limb -2.7g% v control -5.4g%, (n=5,p=0.004). There was a significantly greater increase in the wet wt per mg DNA in the control limb (33% v 10%,p=0.03, n=5). However, as an index of wasting, the protein/DNA ratio decreased similarly in both limbs (CPM -8.4% v control -12.1%, n=5, N.S.). There was no change in the RNA/protein ratio which suggests that the protein synthetic capacity was unaltered.

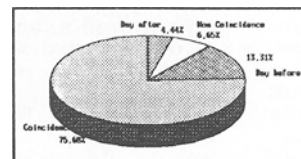
**Conclusion:** Passive stretching can preserve the architecture of muscle fibres. Whether it can prevent muscle protein loss remains uncertain. In the critically-ill the presence of oedema, necrotic, de/regenerating fibres and leukocytes confuse the interpretation of the biochemical markers of wasting. Protein synthesis could be masked by a stimulation of satellite cells increasing DNA in the CPM limb. or conversely these changes may be due to a reduction in tissue oedema.

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**MONITORING THE CORRESPONDENCE BETWEEN RESOURCE UTILIZATION AND SEVERITY WHEN SEVERITY IS MAXIMUM**  
Ruiz, J. ; Garcia, L. ; González, Y. ; Boix, A. ; Asejo, M.A.

The purpose of this study was to investigate the correspondence between resource consumption, as indicated by TISS (Keene R. and Cullen D.J., C.C.M., January 1983; 11, 1:1-3), and severity, as indicated by SAPS (Le Gall J.R. et al., The Lancet, 1983; II:741) when severity was maximum. Consecutive and prospective determinations of SAPS and TISS were made on a daily basis during a period of 20 months for a total of 541 patients.

At weekends the ICU is attended only by physicians - on - call, hence an analysis was also done to see if there were variations in the correspondence depending on the variable weekend / week day. A Chi square statistical test was used to measure the difference (p< 0.05). DBase III plus and SPSS 3.0. software were using. The study was performed in the medical & surgical ICU of a general hospital.



**RESULTS**  
Coincidence.....75.60%  
Non coincidence..... 6.65%  
Max TISS the day before max. SAPS.....13.31%  
Max TISS the day after max. SAPS..... 4.44%  
% of coincidence in regard to weekends (115 cases):  
During week days ..... 70.4 %  
During weekends ..... 77.2%(X<sup>2</sup>=2.28;p=0.1312)

**DISCUSSION:** If greater resource utilization is significantly related to greater severity, TISS could be used to monitor the correspondence of resource consumption when severity is maximum. It can thus be used to monitor intrinsic quality. Rather than indicating a "failure" of TISS to respond adequately to severity variations, the 25 % deviation found in this study is the result of inappropriate utilization of resources; though, at least, this phenomenon was not found to increase significantly at weekends.

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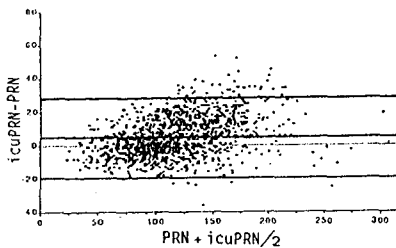
MANAGEMENT OF ICUs. A SIMPLIFIED INDEX TO ASSESS THE NURSE WORKLOAD :  
icuPRN

F Saulnier, J.M. Descamps, G. De Pourville, A. Durocher, B. Blettery, J. Carlet, F. Fraisse, F. Nicolas, Ph. Lardet, H. Hubert, S. Loyez, D. Sion.

An appropriate number of nurses to achieve required care is essential to develop quality of care in ICUs. The PRN system, developed in Canada, is based on the daily collection of 249 parameters spreaded over 118 nursing acts classified in 8 groups. Each PRN point requires 5 minutes of work. This system is specific, but too time consuming to be routinely collected. A multicentric study (25 ICUs, 735 patients) collected daily detailed PRN data from admission to discharge. A simplified index (icuPRN) has been elaborated : 35 nursing acts were selected and weighted by using a principal components analysis and a multiple regression analysis . The aim of this study was to validate icuPRN among another sample of ICUs patients.

**Methods :** Both indexes, PRN and icuPRN, were prospectively recorded for each patient every day in 6 ICUs. Nurses did not know the values of icuPRN acts. The indexes were compared with a linear regression and agreement was evaluated by the Bland and Altman method.

**Results :** 141 consecutive patients were studied : mean age 57±17,5 years ; length of stay 9±9,6 days ; SAPS 13±5,9. Daily PRN (113±37,4) and icuPRN (117±42,4) were strongly correlated (r=0,96, p<0,0001;1388 days). The average difference between data pairs (icuPRN-PRN) was 4±11,9. The plot of the bias and mean values shows that nearly all data points

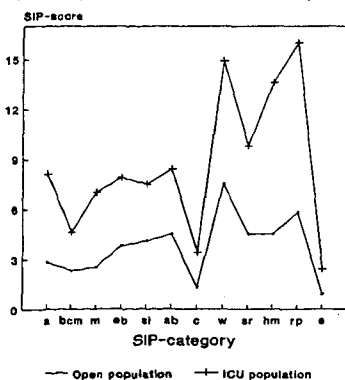


(> 97%) fall within the 95% confidence interval (±2SD of the bias).  
**Conclusion :** The icuPRN provides an accurate assessment of the nurse workload in ICU. This index is simpler than the PRN system and could be routinely used.  
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COMPARISON OF QUALITY OF LIFE SIX MONTHS AFTER ICU WITH A STRATIFIED RANDOM SAMPLE OF A DUTCH POPULATION  
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Assessment of 'quality of life' is important for determining outcome of ICU-patients. Opposite to mortality, 'quality of life' is dependent on social standards. During six months of 1990, 36 ICU's participated in a multidisciplinary study to evaluate their performance and cost-effectiveness. Six months after discharge from ICU all patients who were still alive received the Sickness Impact Profile (SIP); recovery patients were excluded. This study reports the comparison of 'quality of life' after ICU with a stratified random sample of a Dutch population (n=594) <sup>2)</sup>. SIP was used self-administered in both populations in age-group 18-75 years. ICU-results concern 3146 patients; 57.3 ± 14.2 years of age, 65% men, 32% medical and 68% surgical (22% unscheduled, 78% scheduled) with mean severity of illness (APACHE II) of 9.5 ± 5.0 and length of stay of 2.7 ± 4.4 days. Mean SIP-score was 7.8 ± 8.9 (min. 0, max. 60.5). Femalee scored higher than males (8.9 ± 9.8 vs. 7.3 ± 8.3; p=0.00) while mean age was lower (55.8 ± 16.0 vs. 58.0 ± 13.2; p=0.000). Mean SIP-score in the open population was 3.4 (female 3.7, male 3.1; not significantly different). Mean SIP-scores by category are presented below.



(a: ambulation, bcm: body care and movement, m: mobility, eb: emotional behavior, si: social interaction, ab: alertness behavior, c: communication, w: work, sr: sleep and rest, hm: household management, rp: recreation and pastimes, e: eating)  
ICU-patients have higher scores in all categories but curves have the same characteristics. However differences are small in bcm, c and e; largest in w, hm and rp. In the open population dysfunction in sr, hm and physical dimension (a, bcm, m) rises with increasing age. In the ICU-population this relation does not exist. Overall correlation between age and SIP-score is 0.03 (p=0.045). Age-groups of 31-40 and 41-50 years have highest psychosocial dimension (si, eb, ab, c) scores in both studies. Scores of patients with nonspecific abdominal complaints and patients in the least severe class of rheuma are comparable with ICU-patients.

**Conclusions:** ICU-patients showed minor to medium behavioral dysfunction. Type of dysfunction in ICU-patients and the open population are comparable. Dysfunction related to age and sexe is different.

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WITHDRAWAL OF LIFE SUPPORT: THE DEVELOPMENT AND EVALUATION OF A QUESTIONNAIRE. DJ Cook.

The decision to withdraw life support is one of the most difficult to face the intensive care unit (ICU) physician. A questionnaire was developed and tested to determine the factors which influence the decision to withdraw life support amongst ICU health care providers.

Sixteen realistic scenarios describing difficult decisions regarding withdrawal of life support were developed on the basis of discussion with ICU attendings, housestaff, nurses and a review of the literature. The questionnaire was administered to 5 ICU attendings, 5 ICU housestaff and 5 ICU nurses. Two scenarios were administered to each respondent. Realism of the scenarios and clarity of the questions were confirmed.

Clinical sensibility of the questionnaire was evaluated by 28 methodologists and health care providers. 87% of respondents felt that the questionnaire was directed at important elements in the decision making process and 74% felt the questionnaire was likely to elicit candid information.

Reliability was tested by administering the same questionnaire to 25 ICU health care workers 2 weeks apart. For items that were not highly skewed (religious affiliation, sexual orientation, and gender of the patient), the intraclass correlations ranged from 0.68 to 0.96.

A clinically sensible, reliable method of measuring the factors and attitudes that influence the decision to withdraw life support has been developed. This questionnaire may be useful to researchers, educators, ethicists and intensivists.

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PREVALENCE OF MECHANICAL VENTILATION IN INTENSIVE CARE UNITS (ICU'S). SPANISH MULTICENTER STUDY.  
Spanish collaborative group for the study of respiratory failure.

**BACKGROUND :** Mechanical ventilation (MV) is one of the most common therapeutic interventions in ICU's. However, few studies have investigated the number of critically ill patients on MV at a particular time and the ventilatory modes most commonly used.

**OBJETIVE :** To investigate the number of patients that are admitted to general ICU's and are on MV, and the ventilatory modes utilized.

**DESING :** A descriptive multicenter study.

**METHOD :** Questionnaires containing information pertaining to demographic data, indication for ICU admission, indication for MV, and ventilatory mode used, were sent to the different ICU's participant in the study. The survey was repeated 6 months later.

**SETTING :** 52 spanish ICU's participated in the study. 72 % were ICU's from 100-400 bed hospitals, 19 % from > 400 bed hospitals, and 9 % from > 1000 bed hospitals.

**PATIENTS :** All patients that were on MV in 5/20/1991 (day 1) at 10.00 AM hours, and in 1/20/1992 (day 2) at 10.00 AM hours.

**RESULTS :** 272 and 290 patients were on MV days 1 and 2, respectively (47 % and 46 % of all patients admitted to ICU's). Age and Apache II score (mean ± SD) were 51 ± 20 and 17 ± 8 on day 1, and 55 ± 19 and 15 ± 8 on day 2. The percent of patients admitted because of chronic respiratory disease increased significantly (p < 0.01) from 10 % to 20 % between days 1 and 2, whereas that of polytraumatized patients decreased from 30 % to 19 % (p < 0.001). The most frequently ventilatory mode used was assist/control (62 % and 55 %, for days 1 and 2, respectively) and IMV with or without pressure support (27 % and 34 %). Other modes such as pressure support, pressure controlled ventilation and CPAP were used less often. No PEEP was used in 43 % of patients on day 1, and in 46 % on day 2.

**CONCLUSIONS :** Around half of patients admitted to ICU's in our spanish multicenter study are mechanically ventilated at any given moment. Most of them are ventilated using classical ventilatory modes, such as assist/control and IMV, whereas more modern modes are used more sparingly at the present time.

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