

Evaluation of Intensivists' Knowledge on Brain Death*

Avaliação do Conhecimento de Intensivistas sobre Morte Encefálica

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SUMMARY

BACKGROUND AND OBJECTIVES: Failure or delay to diagnose brain death leads to needless occupation of a hospital bed, emotional and financial losses, and unavailability of organs for transplants. The intensive care physician plays an essential role in this diagnosis. This study intended to evaluate intensivists' knowledge concerning brain death.

METHODS: Cross-sectional study in 15 intensive care units (ICU) in eight hospitals in the city of Porto Alegre, Brazil.

RESULTS: Two hundred forty-six intensivists were interviewed in a consecutive sample between April and December 2005. The prevalence of lack of knowledge regarding the concept was of 17%. Twenty per cent of the interviewees ignored the legal need for complementary confirmatory tests for their diagnosis. Forty-seven per cent considered themselves

as having the highest level of assurance to explain the concept to a patient's family members. Twenty-nine per cent erroneously determined the legal time of death for brain dead patients. Pediatric intensivists had less knowledge about the concept, when compared to intensivists for adults ($p < 0.001$).

CONCLUSIONS: Current knowledge of brain death is insufficient in Brazil, among the health care professionals who most often find patients in this situation. Education on the subject is needed to avoid unnecessary expenses, reduce family suffering and increase the offer of organs for transplant.

Key Words: Attitude, Death, ICU, Transplantation.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A falha ou atraso no diagnóstico de morte encefálica resulta na ocupação desnecessária de um leito hospitalar, em perdas emocionais e financeiras e na indisponibilidade de órgãos para transplante. O médico intensivista tem fundamental papel nesse diagnóstico. O objetivo deste estudo foi avaliar o conhecimento sobre morte encefálica entre os intensivistas.

MÉTODO: Estudo transversal em 15 unidades de terapia intensiva (UTI) em oito hospitais da cidade de Porto Alegre, Brasil.

RESULTADOS: Duzentos e quarenta e seis intensivistas foram entrevistados em uma amostra consecutiva entre abril e dezembro de 2005. Encontrou-se prevalência de desconhecimento do conceito de morte encefálica de 17%. Vinte por cento dos entrevistados desconheciam a necessidade legal de exame complementar para o seu diagnóstico. Quarenta e sete por cento se consideraram no nível máximo de segurança para explicar o conceito para a família de um paciente. Vinte e nove por cento desconheciam a hora do óbito legal para os pacientes em morte en-

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cefálica. Os intensivistas pediátricos tiveram menor conhecimento do conceito em relação aos intensivistas de adultos ($p < 0,001$).

CONCLUSÕES: O atual conhecimento sobre morte encefálica é insuficiente entre os profissionais que mais freqüentemente se deparam com pacientes nessa situação. Há necessidade de educação sobre o tema a fim de evitar gastos desnecessários, diminuir o sofrimento familiar e aumentar a oferta de órgãos para transplantes.

Unitermos: Atitude, Morte, Transplante, UTI

INTRODUCTION

The concept of brain death seems to be well established in most countries of the world, with some variation in the diagnostic protocols^{1,2}. Notwithstanding the broad acceptance of the concept, seemingly doubts persist among many health care professionals^{3,4}. Most cases of brain death occur in an intensive care unit (ICU), disclosing the fundamental role played by the intensive medicine specialist in correct diagnosis. Delay or failure at this point results in unnecessary cost, occupation of an ICU bed, additional suffering for the family and unavailability of organs for transplant^{5,6}.

Prevalence of adequate knowledge on the subject among professionals and students in the health area, according to the population under study, ranges from 39% to 88%^{3,5,7-14}. There is clearly a shortage of studies evaluating knowledge of intensive care specialists on the subject.

The purpose of this study was to survey knowledge on the concept of brain death among physicians working in ICUs in the municipality of Porto Alegre, Rio Grande do Sul, Brazil. This state had the country's highest rate of donors in brain death with 13.2 donors per million inhabitants per year (pmp/year) in 2005 whereas in Brazil the rate was of 6.3 pmp/year.

METHODS

After approval by the Ethics Committee for Research in the Hospital das Clínicas of Porto Alegre of the Universidade Federal do Rio Grande do Sul, under number 04-358 a questionnaire was formulated, translated and modified from a previous study³. It was administered by means of a personal interview with intensivists from eight hospitals of Porto Alegre

from April to December of 2005. Participants remained anonymous and the hospitals involved remained unidentified.

Authors, co-authors and supervisors as well as members of Ethics Committees on research who participated in the evaluation of this study, were excluded. Questions addressed the definition of the concept of brain death, the need to carry out a complementary exam for diagnosis, time of death in the brain death patient and the self-appointed assurance in explaining the concept of brain death to a patient's family members.

1) What brain functions must be absent in the person for a declaration of brain death?

- a) Irreversible loss of all cortical cerebral functions;
- b) Irreversible loss of all cortical and brain stem functions;
- c) Varies according to the law;
- d) Does not know.

"b" was considered the correct reply.

2) Is there a legal need for a complementary exam to establish the diagnosis of brain death?

- a) Yes;
- b) No.

In Brazil, the law requires a complementary exam for diagnosis of brain death. Therefore "a" was considered the correct reply.

3) An adult patient starts the protocol of brain death at 12 o'clock, is submitted to a second clinical exam and the complementary exam at 6:00 P.M. of the same day. Becomes an organ donator. What is the time of death?

- a) Opening of protocol (12 o'clock);
- b) Closure of protocol (6:00 P.M.);
- c) Time of organ withdrawal.

"b" was considered the correct reply.

4) How do you view your assurance to explain what is brain death to a patient's family members?

- | | |
|-------------------------------|-------------------|
| (no assurance) | (great assurance) |
| 1 2 3 4 5 | |

Information regarding the main activity performed in the ICU was recorded: if on duty physician, daily rounds, professor or resident; time of work in intensive care and the type of ICU, pediatric or adult.

Statistical Analysis

All statistical tests were bilateral with a 0.05 alpha level of significance. Measurements of central and

dispersion tendencies were reported with the mean and the confidence interval of 95% when frequency distribution behaved normally and the median and the first and last and third quartile in the other cases. When comparing both groups in relation to the mean, the Wilcoxon-Mann-Whitney U test (WMW) was used, because frequencies did not follow a normal distribution. Efforts to verify association between two quantitative characteristics were made by means of the Spearman's (r_s), rank correlation coefficient, because the variables used violated normality and homocedasticity assumptions. When groups were compared in relation to qualitative variables, the Chi-square test for comparisons of proportions (χ^2) was used. In tables 2 x 2, the Yates (χ^2_y), correction was utilized.

RESULTS

A total of 248 questionnaires was administered; however two were excluded as incomplete. The profile of the interviewed intensivists is shown in table 1. Two hundred and forty six professionals were effectively interviewed. Sixty four percent worked with adults. The majority (56%) of interviewed intensivists, essentially were on duty physicians.

Table 1 – Overall Data of the State

Total of the Sample	246
Time of action in ICU (years)	
Median [Q ₁ - Q ₃]	9 [4 - 16.25]
Time since graduation (years)	
Median [Q ₁ - Q ₃]	14 [7 - 21]
ICU	
Adult	157 (63.8%)
Pediatric	89 (36.2%)
Main function	
On duty physician	139 (56.5%)
Daily rounds	60 (24.4%)
Resident	38 (15.4%)
Teacher	9 (3.7%)

Q₁ - Q₃: first and third quartiles

Eighty three percent (204/246) of the intensivists correctly defined the concept of brain death. Eighty percent (198/246) were familiar with the Brazilian legal requirement to perform a complementary exam for diagnosis. Seventy one percent (172/246) correctly established time of death of the hypothetical patients. Most interviewees (194/246) judged themselves in the two higher levels of assurance to explain what brain

death is to the patient's family members. None judged themselves as totally insecure on the subject. The level of assurance was not statistically different between those that had the right reply and those that failed the three previous questions. (χ^2 p = 0.40; 0.83; 0.19).

A small positive correlation was found ($r_s = 0.191$, p = 0.003) between time of experience and level of self-assigned assurance. That is to say, 3.6% of variation in the assurance level is explained by the variation in the time of experience.

When interviewees were separated in two groups (a) intensivists working in pediatric ICU and (b) intensivist in adult ICU (Table 2), it was noted that 89% (140/157) of intensivists with adults correctly defined brain death, while 72% (64/90) of pediatric intensivists did (χ^2_y p < 0.001). Difference in prevalence of the right reply among these groups for question 2 and 3 were not statistically significant. Alternative (c) of question 3 was chosen by 31% (49/157) of intensivists for adults versus 11% (10/89) of pediatric intensivists (χ^2_y p < 0.001).

Table 2 – Results According to Intensive Therapy Unit of Action

ICU	Time of Action (md) ¹	Questions with Correct Replies ²		
		1	2	3
Adult n = 157	10 years	140 (89.2%)	124 (79.0%)	104 (66.2%)
Pediatric n = 89	8 anos	64 (71.9%)	74 (83.1%)	71 (79.8%)
p	0.084	0.001	0.532	0.035

¹Wilcoxon-Mann-Whitney U test.

² χ^2_y Pearson's for comparison of proportions with the Yates correction.

Thirty nine percent (35/89) of pediatric intensivists considered themselves at the highest level of assurance to explain the concept of brain death to the patient's family members. This prevalence was of 52% (81/157) among intensivists for adults (χ^2 p = 0.054).

DISCUSSION

This study endeavored to assess the knowledge on brain death among intensivists in the capital city of the State of Rio Grande do Sul. Supposedly experienced and exemplary on the subject, the highest knowledge regarding organ donation and brain death is expected from these physicians⁵. Along this line of reasoning, among intensivists the expectation is even greater. It is noteworthy that the tool used is

artificial and may not reflect the knowledge and attitude of physicians when faced with real patients in clinical situations³.

No differences were observed, capable of establishing a relationship between the self-assigned level of assurance and the correlation of replies to the remaining questions. Perhaps if the sample size had been larger, some significance could have been obtained, but an exaggerated self-assurance may exist, which is usually is at the root of problems in Medicine.

The high prevalence (24%) of intensivists who believe that the time of organ withdrawal is the time of the donor's death continues to be surprising. Where it so, the ethical axiom based on withdrawal of vital organs would be violated. That is to say, denying the dead donor rule that brain death means death. This would violate the Brazilian law of organ transplant and possibly risk murder.

The tendency that intensivists for adults feel more assured to explain the matter to the family members of a patient was also observed, together with the greater knowledge on the matter

Perhaps the early definitions of brain death that excluded children, may have influenced this result? Acceptance of the concept in children more than 7 days old was established in literature in 1987. In Brazil, a resolution of 1991 excluded children with less than 2 years – a prevalent age bracket in pediatric ICU¹⁵ – who were only included as from 1997. Possibly, this information has not yet become the rule in the practice of all pediatric intensivists. This difference does not seem to be related to the fact of acting in intensive care before or after Brazilian ruling. When intensivists with over nine years of work in ICU are subtracted from this analysis, the difference remains marginal in the prevalence of correct replies among the two groups. Although probably because of the smaller size of the sample (124), this difference has a $p = 0.06$ (χ^2).

A high prevalence of error still remains in the definition of the time of donor's death in brain death. Although it seems a prosaic doubt, the statement that legal death takes place at the time of organ withdrawal, in addition to being incorrect can jeopardize the entire process of organ retrieval.

CONCLUSION

Prevalence found in this studied is a matter of concern. Fortunately, the intensivists' lack of knowled-

ge concerning the obligatory protocol that must be followed does not result in a false-positive diagnosis. That is to say there is apparently no risk of some patients having a diagnosis of brain death without indeed being dead. However there is the possibility of omitting a diagnosis in patients that meet the criteria, which in addition to other damages brings about the unnecessary occupation of an ICU bed and the failure to retrieve organs.

Porto Alegre is the largest city of the Rio Grande do Sul state and where most diagnoses of brain death and transplantations are carried out. Rio Grande do Sul is a Brazilian State that has the highest rate of effective donors in brain death. As such, it may be supposed that results of the other Brazilian states would not easily disclose a higher level than that of the current study, thereby warranting the statement that the level of knowledge on brain death among Brazilian intensivists is still lacking.

The factors responsible for this relatively high prevalence of lack of knowledge were not analyzed and may be the subject of future research. It is known that brain death diagnosis is criticized in literature. Maybe this criticism influenced conduct of intensivists, or is there a blatant lack of knowledge on the subject?

Brazilian intensivists are in need of educational improvements. This required knowledge, in addition to the obvious increase in the number of diagnoses, brought about by more uniform medical procedures, probably will lead to greater well being for society as well as in the specific case of the family members who are suffering from the demise of a cherished family member.

A higher prevalence of lack of knowledge of the concept was observed, also a tendency towards a lower level of assurance among physicians that act in a pediatric ICU. This justifies additional education for this group.

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