

Downloaded from UvA-DARE, the institutional repository of the University of Amsterdam (UvA)
<http://hdl.handle.net/11245/2.46069>

File ID	uvapub:46069
Filename	amc2006.71.pdf
Version	unknown

SOURCE (OR PART OF THE FOLLOWING SOURCE):

Type	article
Title	Hospital volume and outcomes of mechanical ventilation
Author(s)	O.A. Arah
Faculty	UvA: Universiteitsbibliotheek
Year	2006

FULL BIBLIOGRAPHIC DETAILS:

<http://hdl.handle.net/11245/1.426499>

Copyright

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content licence (like Creative Commons).

Hospital Volume and Outcomes of Mechanical Ventilation

TO THE EDITOR: In the article by Kahn et al. (July 6 issue),¹ the number of patients receiving mechanical ventilation per hospital bed was about 0.7 per year in hospitals in the lowest quartile of hospital volume (≥ 150 patients per year), as compared with 1.6 per year in hospitals in the highest quartile of volume (> 400 patients per year). The decision to initiate mechanical ventilation in a given patient rests on the course of the disease, the quality of nursing, and the availability of ventilators. Thus, among patients with identical Acute Physiology and Chronic Health Evaluation (APACHE) scores, the proportion admitted to an intensive care unit (ICU) may vary among hospitals. In equally good units, the number of deaths will be the same, given a low threshold and good clinical judgment. However, mortality will fall as the number of patients who undergo mechanical ventilation rises, as suggested by Figure 2 in the article.

Tom Hughes-Davies, F.R.C.P.

Breamore Marsh
Fordingbridge SP6 2EJ, United Kingdom
thhd@thhd.fsnet.co.uk

1. Kahn JM, Goss CH, Heagerty PJ, Kramer AA, O'Brien CR, Rubenfeld GD. Hospital volume and the outcomes of mechanical ventilation. *N Engl J Med* 2006;355:41-50.

TO THE EDITOR: The article by Kahn et al. can be used to illustrate a few additional points relevant to policy. First, on the basis of crude estimates (Table 1, next page), the 356 total or 25 annual deaths avoided in the ICU owing to the use of regionalization policies¹ (in which patients are transported to the highest-volume hospitals) are less than the 501 total and 36 annual deaths prevented by a 10% improvement in outcomes across all hospitals. The same applies to in-hospital mortality. To attain across-the-board improvement in outcomes, we need to figure out how to optimize recent advances in mechanical ventilation.² Second, although regionalization may benefit patients undergoing some procedures,³ it is not yet clear how regionalization could be made more cost-effective. Third, the policies based on volume-outcome relationships must involve strong causal assumptions.⁴ One causal assumption is that whatever it is about high-volume hospitals that makes them have better outcomes must always be pre-

served and incentivized by policies such as regionalization and local quality initiatives.

Onyebuchi A. Arah, M.D., Ph.D.

Academic Medical Center
1100 DE Amsterdam, the Netherlands
o.a.arah@amc.uva.nl

1. Epstein AM. Volume and outcomes — it is time to move ahead. *N Engl J Med* 2002;346:1161-4.
2. Tobin MJ. Advances in mechanical ventilation. *N Engl J Med* 2001;344:1986-96.
3. Dudley RA, Johansen KL, Brand R, Rennie DJ, Milstein A. Selective referral to high-volume hospitals: estimating potentially avoidable deaths. *JAMA* 2000;283:1159-66.
4. Urbach DR, Baxter NN. Does it matter what a hospital is “high volume” for? Specificity of volume-outcome associations for surgical procedures: analysis of administrative data. *BMJ* 2004;328:737-40.

THE AUTHORS REPLY: Hughes-Davies suggests that the lower mortality rate observed at high-volume hospitals may be due to variation in the use of mechanical ventilation, with higher-volume hospitals using ventilation in a broader group of patients who may be less likely to die. Our data show that the reverse is true: the APACHE III score and unadjusted mortality rate were higher in the hospitals in the higher quartiles according to volume. In addition, our multivariate model controlled for APACHE score. Thus, the odds ratios for mortality can be interpreted as the relative odds of death for patients with equally severe illness, regardless of how many such patients are in each quartile.

Arah succinctly summarizes our results and notes some of the important policy implications of our study. Although these data support the need for an investigation of regionalization of critical care, it is unknown how regionalization will ultimately affect patient outcomes. Regional care centers may not be able to maintain high-quality care practices if faced with even greater numbers of patients, and the act of transferring patients to high-volume hospitals may itself cause harm. As we noted in our Discussion, the improvement of the quality of care at all hospitals is the best approach to reducing critical care mortality.

Research on knowledge transfer, the science of implementing effective practice, is in its infancy in critical care. An important part of this research agenda is the identification of the processes of care at high-volume hospitals that ac-

Table 1. Deaths Potentially Avoided Owing to the Regionalization of Mechanical Ventilation.*

Characteristic	Quartile of Hospital Volume				Total No. of Potentially Avoidable Deaths during Study Period (Maximum No./Yr)
	1	2	3	4	
No. of hospitals	10	9	9	9	
Maximum no. of patients/yr	150	275	400	617	
Total no. of patients	2221 (A)	3668 (F)	5830 (K)	8522 (P)	
Mortality rate in ICU (%)	25 (B)	22 (G)	23 (L)	27 (Q)	
In-hospital mortality rate (%)	33 (C)	32 (H)	33 (M)	37 (R)	
Odds ratio for death					
ICU	1.00 (D)	0.75 (I)	0.67 (N)	0.63 (S)	
Hospital	1.00 (E)	0.86 (J)	0.72 (O)	0.66 (T)	
ICU deaths avoided					
By moving patients in quartile-1 hospitals to quartile-4 hospitals					205 (14)†
By moving patients in quartile-2 hospitals to quartile-4 hospitals					97 (7)‡
By moving patients in quartile-3 hospitals to quartile-4 hospitals					54 (4)§
Total					356 (25)
Total no. of potentially avoidable deaths owing to 10% reduction in mortality (maximum no./yr)	56 (4)¶	81 (6)‖	134 (9)**	230 (17)††	501 (36)
In-hospital deaths avoided					
By moving patients in quartile-1 hospitals to quartile-4 hospitals					249 (17)‡‡
By moving patients in quartile-2 hospitals to quartile-4 hospitals					235 (18)§§
By moving patients in quartile-3 hospitals to quartile-4 hospitals					115 (8)¶¶
Total					599 (43)
Total no. of potentially avoidable deaths owing to 10% reduction in mortality (maximum no./yr)	73 (5)‖‖	117 (9)***	192 (13)†††	315 (23)‡‡‡	697 (50)

* The values used in the equations for calculating the numbers of potentially avoidable deaths are labeled with the letters A through T in parentheses; these letter labels are used in the equations.

† The value was calculated according to this equation: $A \times B \times (D - S) \div 100$.

‡ The value was calculated according to this equation: $F \times G \times (I - S) \div 100$.

§ The value was calculated according to this equation: $K \times L \times (N - S) \div 100$.

¶ The value was calculated according to this equation: $0.10 \times A \times B \div 100$.

‖ The value was calculated according to this equation: $0.10 \times F \times G \div 100$.

** The value was calculated according to this equation: $0.10 \times K \times L \div 100$.

†† The value was calculated according to this equation: $0.10 \times P \times Q \div 100$.

‡‡ The value was calculated according to this equation: $A \times C \times (E - T) \div 100$.

§§ The value was calculated according to this equation: $F \times H \times (J - T) \div 100$.

¶¶ The value was calculated according to this equation: $K \times M \times (O - T) \div 100$.

‖‖ The value was calculated according to this equation: $0.10 \times A \times C \div 100$.

*** The value was calculated according to this equation: $0.10 \times F \times H \div 100$.

††† The value was calculated according to this equation: $0.10 \times K \times M \div 100$.

‡‡‡ The value was calculated according to this equation: $0.10 \times P \times R \div 100$.

count for improved performance. These processes might include the implementation of protocolized weaning and lung-protective ventilation, optimal staffing ratios for nurses and respiratory therapists, and a culture of collaboration between representative disciplines in the ICU, among others. Regionalization is just one, and perhaps not the most efficient, method to ensure that every pa-

tient requiring mechanical ventilation has access to the best available care.

Jeremy M. Kahn, M.D.
Gordon D. Rubinfeld, M.D.

University of Washington
Seattle, WA 98104
nodrog@u.washington.edu

Intensive Care of Patients with HIV Infection

TO THE EDITOR: Huang et al. (July 13 issue)¹ suggest several factors to consider before the initiation of antiretroviral therapy in critically ill patients with HIV infection, but they do not discuss the implications of such therapy regarding adherence issues. Although adherence approaches 100% during hospitalization, a subgroup of patients will not take their medications after discharge. Factors associated with decreased adherence (substance abuse, depression, a lack of social support, and a lack of insurance coverage to pay for medications) should be addressed before antiretroviral therapy is begun.² It is extraordinarily difficult to try to resolve these issues during hospitalization for a critical illness. Patients who are critically ill are usually unable to express commitment and readiness to begin antiretroviral therapy, which leads to suboptimal adherence. Many patients are unable to assimilate the information provided during adherence counseling. Without convincing data that antiretroviral therapy has beneficial effects in the setting of critical illness, we should apply the same guidelines regarding adherence that are used in the clinic. This approach should reduce both the risk of treatment failure and selection for drug-resistant viruses.

Michael Saccente, M.D.

University of Arkansas for Medical Sciences
Little Rock, AR 72205
saccetemichael@uams.edu

1. Huang L, Quartin A, Jones D, Havlir DV. Intensive care of patients with HIV infection. *N Engl J Med* 2006;355:173-81.
2. AIDSinfo. Guidelines for the use of antiretroviral agents in HIV-1 infected adults and adolescents. Rockville, MD: Department of Health and Human Services. (Accessed September 21, 2006, at <http://www.AIDSinfo.nih.gov>).

TO THE EDITOR: In reviewing the treatment of patients with HIV infection in the intensive care

unit (ICU), it is important to mention adrenal insufficiency as an important condition that can easily be overlooked. The adrenal gland is the endocrine organ that is most commonly involved in patients with HIV infection.¹ Adrenal insufficiency is common in critically ill patients with HIV infection² and is associated with increased mortality if the condition is not properly recognized and treated.³ Careful clinical evaluation and laboratory assessment of adrenal function should be considered in the intensive care of patients with HIV infection.

Mohsen S. Eledrisi, M.D.

King Abdulaziz National Guard Medical Center
Alahsa 31982, Saudi Arabia

Abraham C. Verghese, M.D.

University of Texas
San Antonio, TX 78229

1. Eledrisi MS, Verghese AC. Adrenal insufficiency in HIV infection: a review and recommendations. *Am J Med Sci* 2001;321:137-44.
2. Marik PE, Kiminyo K, Zaloga GP. Adrenal insufficiency in critically ill patients with human immunodeficiency virus. *Crit Care Med* 2002;30:1267-73.
3. Annane D, Sébille V, Charpentier C, et al. Effect of treatment with low doses of hydrocortisone and fludrocortisone on mortality in patients with septic shock. *JAMA* 2002;288:862-71.

THE AUTHORS REPLY: In critically ill patients with HIV infection, both the principal goal and the urgency of initiating antiretroviral therapy differ from those in outpatients. In outpatients, the primary goals of antiretroviral therapy are to reduce HIV-related morbidity and mortality, improve the quality of life, restore and improve immunologic function, and maximally and durably suppress the viral load.¹ In an asymptomatic patient with preserved immune function, the initiation of antiretroviral therapy can be deferred for weeks, months, and occasionally years until the patient