J. Hyg., Camb. (1986), **97**, 501–502
Printed in Great Britain

Apparent improvement in the outcome of hip or knee-joint replacement operations over the period of a prospective study

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(*Received 31 July 1986; accepted 1 August 1986*)

SUMMARY

The apparent reduction in the incidence of subsequent joint sepsis and of re-operation without evidence of infection during the course of a prospective study was an artifact of the analysis method.

INTRODUCTION

In a regression analysis of the factors that might have influenced the outcome of joint replacement operations on the hip or knee (Lidwell *et al.* 1984) the timing of the operation was included as one of the factors. The data at each hospital were divided into three groups, corresponding, approximately, to those operations performed in the first, second and third year of participation in the study. These were then combined into three so-called epochs, comprising, respectively, operations during the first, second and third years at each hospital. The analysis showed a significant reduction in the frequency of re-operation, related both to septic and to non-infected joints, for the later epochs. The apparent effect was unexpectedly large. On re-examination of the procedure it became apparent that effective account had not been taken of the duration of follow-up. A full discussion of this failure need not be given here. It arose primarily from the fact that a patient's record was terminated after any major second operation on the joint. Consequently the duration of recorded follow-up was not independent of outcome and, for example, all such re-operations within the first 12-months post-operatively were associated with that group of patients with a recorded follow-up duration of less than 1 year.

METHOD AND RESULTS

Generally at each hospital operations were recorded during a period of 3 years and follow-up was continued for at least 2 years or until 1 year after the last recorded operation, when the study was terminated. In consequence of this, operations included in epoch no. I would have been followed-up for 2 years, according to the protocol or, as seems more probable, until the end of the study,

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Table 1. *Comparative rates of re-operation and joint sepsis*

Epoch ...	I	II	III
Number of operations ...	2724	2787	2541
With joint sepsis (%)			
Up to 1 year	0·48	0·65	0·51
Up to 2 years	0·95	1·04	(0·75)*
Total in study	1·32	1·08	0·79
Non-infected (%)			
Up to 1 year	1·69	2·22	1·38
Up to 2 years	2·46	3·27	(1·89)*
Total in study	3·34	3·70	1·93

* These operations in epoch III were not usually followed-up for as long as 2 years.

i.e. between 3 and 4 years. For epoch II the protocol called for 2 years follow-up, but in the event this was probably 2–3 years. For epoch III, however, the follow-up was no more than 1–2 years. It follows that true comparisons between the outcome of operations performed during the three epochs can be made only by considering re-operations up to a follow-up time common to the epochs being compared, i.e. epochs I, II and III can be compared up to 1 year after the primary operations and epochs I and II up to 2 years. The data have been analysed in this way and the results are shown in the table.

The comparisons between epochs are balanced for hospital differences and for the use of ultraclean air by the method used to construct them. They are not necessarily balanced in respect of other factors. However, the use of prophylactic antibiotics, the factor with the greatest effect on joint sepsis, increased slightly during the course of the study. Any allowance for this would increase slightly the standardized rate in the later epochs. No other factor is likely to have been correlated with recorded follow-up time and to have had a sufficiently strong effect on the outcome of the primary operation to exert any significant influences on comparisons within the table.

DISCUSSION

It is clear that, while the frequency of re-operation is indeed less in the later epochs when all the observed re-operations are included, there is no significant trend in incidence over the first year nor any fall between epoch I and II over the first 2 years after the primary operation. The only consistent difference is a tendency for the rates following operations during epoch II to be rather higher than for others. The apparent improvement in the outcome of joint replacement operations over the 3-year period must therefore be regarded as an artifact of the analysis method. No other numerical values or conclusions derived from the regression analysis are affected.

REFERENCE

LIDWELL, O. M., LOWBURY, E. J. L., WHYTE, W., BLOWERS, R., STANELY, S. J. & LOWE, D. (1984). *Infection and sepsis after operations for total hip or knee-joint replacement: influence of ultraclean air, prophylactic antibiotics and other factors. Journal of Hygiene* **93**, 505–529.