Hospital doctors' assessment of baseline spirometry

Nichola Stephenson, Rosemary Morgan, Elmagzoub Abdel-Rahman-Abdel-Wahab, Christopher J Turnbull

Summary

Baseline spirometry is useful in diagnosing and managing pulmonary disease. In a questionnaire survey of 100 hospital doctors in two hospitals in the Mersey region, their views and ability to interpret baseline spirometry was assessed. Of the 70 doctors who responded, 65% felt they could accurately interpret baseline spirometry. However, only 12% accurately interpreted all five vitalographs in the questionnaire. The majority (72%) felt they had not had adequate teaching in interpretation of spirometry, and 63% would prefer a report from a respiratory technician. These result suggest that improvement needs to be made in interpretation of baseline spirometry.

Keywords: spirometry; vitalograph; hospital doctors

Baseline spirometry, with measurement of forced expiratory volume in one second (FEV₁) and forced vital capacity (FVC), is an important investigation. It is of value in distinguishing between one type of respiratory disorder and another as well as in providing an index of its severity.¹ As interpretation of the results is often left to the individual doctor, this study was set up to investigate the ability of hospital doctors to interpret spirometric data.

Methods

A total of 100 hospital doctors working in the Departments of Medicine for the Elderly and

Key to abbreviations used in figures:

A. T.S BEST: ambient temperature setting (best of three)
B. T.P.S: body temperature, ambient pressure, saturated with water vapour
FEF: forced expiratory flow
FEV₁: forced expiratory volume in 1s
FMTF: forced mid-expiratory flow time
FVC: forced vital capacity
K: Knudson
MEAS: measured
MVV IND: maximum voluntary ventilation - indirect
PEF: peak expiratory flow
PRED: predicted
VC: vital capacity

Box 1

General Medicine at two hospitals in the Mersey region were circulated with a questionnaire which included five vitalographs for interpretation. (The vitalographs are reproduced here in figures 1–5, with an explanation of abbreviations used in box 1. The correct interpretation of the figures is given in box 2 below.) The vitalographs used had been reviewed by a respiratory technician and two consultant physicians in respiratory medicine (at two separate hospitals) who were all in concordance with their interpretation. The survey was anonymous and therefore non-responders could not be reminded.

Department of Medicine for the Elderly, Wirral NHS Trust Hospital, Arrowe Park Road, Upton, Wirral, Merseyside L49 5PE, UK
N Stephenson
R Morgan
C J Turnbull

Department of Medicine for the Elderly, Broadgreen and Royal Liverpool University Hospital, Liverpool L14 3LB, UK
E Abdel-Rahman-Abdel-Wahab

Correspondence to Dr Morgan

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Vitalograph PFT II			
DATE:			
NAME:			
REF NO:			
AGE: 35		SEX: FEMALE	
HEIGHT: 157 CM			
RACE: C		PRED: K	
VALUES AT B. T. P. S. :-			
A.T.S. BEST			
	PRED.	MEAS.	%
VC	3.18	-	-
FVC	3.18	3.03	95
FEV ₁	2.72	2.69	99
FEV ₁ /VC	85	-	-
FEV ₁ /FVC	85	89	+4
FEF ₂₅₋₇₅	3.21	3.78	118
FMFT	0.47	0.40	118
PEF	367	403	110
MVV IND	103	101	97

Figure 1

Vitalograph PFT II			
DATE:			
NAME:			
REF NO:			
AGE: 72 SEX: MALE			
HEIGHT: 67 INCHES			
RACE: C PRED: K			
VALUES AT B. T. P. S. :-			
A.T.S. BEST			
	PRED.	MEAS.	%
VC	3.39	-	-
FVC	3.39	1.52	45
FEV ₁	2.72	1.49	55
FEV ₁ /VC	80	-	-
FEV ₁ /FVC	80	98	+18
FEF ₂₅₋₇₅	2.74	2.54	93
FMFT	0.61	0.29	210
PEF	500	284	57
MVV IND	106	56	52

Figure 2

Vitalograph PFT II			
DATE:			
NAME:			
REF NO:			
AGE: 77 SEX: MALE			
HEIGHT: 165 CM			
RACE: C PRED: K			
VALUES AT B. T. P. S. :-			
A.T.S. BEST			
	PRED.	MEAS.	%
VC	2.81	-	-
FVC	2.81	1.76	63
FEV ₁	2.23	0.67	30
FEV ₁ /VC	79	-	-
FEV ₁ /FVC	79	38	-41
FEF ₂₅₋₇₅	2.26	0.39	17
FMFT	0.61	2.17	28
PEF	475	125	09
MVV IND	95	25	26

Figure 3

Vitalograph PFT II			
DATE:			
NAME:			
REF NO:			
AGE: 35 SEX: MALE			
HEIGHT: 177 CM			
RACE: C PRED: K			
VALUES AT B. T. P. S. :-			
A.T.S. BEST			
	PRED.	MEAS.	%
VC	5.08	-	-
FVC	5.08	4.51	89
FEV ₁	4.25	3.52	83
FEV ₁ /VC	84	-	-
FEV ₁ /FVC	84	78	-6
FEF ₂₅₋₇₅	4.47	2.95	66
FMFT	0.61	0.76	80
PEF	577	453	79
MVV IND	144	132	91

Figure 4

Figure 5

Table Interpretation of vitalographs by grade of doctor

	Normal		Restrictive		Combined		Normal		Obstructive	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Junior House Officer	13	6	10	9	5	14	8	11	15	4
Senior House Officer	26	4	21	9	6	24	12	18	19	11
Registrar/Senior Registrar	13	3	13	3	8	8	10	6	13	3
Consultant	12	1	9	4	9	4	8	5	11	2

Results

The response rate was 78%, of whom 19 (24%) were house officers, 30 (38%) senior house officers, 16 (21%) registrars/senior registrars, and 13 (17%) consultants. Most responders (65%) felt that they could interpret spirometry, although 77% admitted that they had had a problem at some stage in understanding spirometry results. There was a significant trend (Chi-square test for trend $p < 0.0001$) for the more senior doctors to be more confident in interpretation (Pearson correlation coefficient 0.52). However, this was significantly non-linear ($p = 0.023$), probably because there were more registrars than consultants.

Most responders (63%) indicated that they would prefer to have a verbal report from the respiratory technician if given the choice. Few (11%) would feel too embarrassed to ask for help if they were unable to interpret results; 33% would consult another doctor on their own team, 13% would go to the respiratory technician, 23% would go to their consultant and 18% would go to a respiratory consultant for help.

Doctors requesting spirometry included house officers (4/19), senior house officers (23/30), registrars/senior registrars (16/16), and consultants (13/13). Most doctors (78%) had requested spirometry at the request of another doctor, however, although interpretation in more than half (38) of these cases was left to

the doctor requesting spirometry rather than to the doctor who initiated the request.

The majority of responders (72%) felt they had not had adequate teaching in interpretation of spirometry. Only nine (12%) doctors interpreted all five vitalographs accurately (table), three consultants, three registrars, two senior house officers and one house officer. There was a trend for more senior doctors to interpret the vitalographs accurately (Chi-square trend 2 by $k p = 0.006$).

Discussion

Doctors cannot identify obstructive or restrictive patterns reliably from a history or examination alone.^{2,3} This study suggests that some hospital doctors experience difficulty in interpreting spirometry, some of whom are not aware that they have a problem in interpretation. Although 65% of respondents in our study felt they could interpret spirometry correctly, only 12% accurately interpreted all five vitalographs, and 72% felt they had not had adequate teaching. This is of concern, since patients may be mismanaged due to misinterpretation. There is nothing to suggest that all results are reviewed by a senior doctor, since most of the requests initiated by another doctor were interpreted by the doctor directly responsible for requesting it.

Variability (noise) is greater in pulmonary function tests than in most other clinical tests

Correct interpretations of the vitalographs

Figure 1: normal subject
 Figure 2: subject with a restrictive defect
 Figure 3: subject with a combined defect
 Figure 4: normal subject
 Figure 5: subject with an obstructive defect

Box 2

because of inconsistency of efforts by patients.⁴ High quality spirometric tests require accurate equipment, good test procedures, an ongoing programme of quality control, appropriate reference values and good algorithms for

interpretation of results.¹ Because of this potential for 'noise', doctors need to be able to assess accurately the quality of the vitalograph recording and its interpretation. Ongoing education for doctors of all grades would help. In addition, a report by the respiratory technician and/or respiratory physician, or computer analysis if available, would improve the service for patients. This would not negate the responsibility of the doctor who must still check the results. However, if there were a discrepancy between the report and the doctor's interpretation, the doctor would be aware of a problem and could seek further guidance.

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Medical Anniversary

WALTER REED, 13 September 1951

Walter Reed (1851—1902) was born at Gloucester, Virginia, USA, son of a Methodist minister. He graduated MD from the University of Virginia, Charlottesville (1869), became a doctor in the US Army, and eventually Professor of Bacteriology in the Army Medical College, Washington DC. He will be remembered primarily for bringing yellow fever under control. He died on 23 November 1902 from amoebic dysentery contracted in Cuba. — *D G James*