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INDEX FOR MEASURING HEALTH

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Summary: A health index is described which expresses health numerically between 0 and 1. Each patient scores 0, 1/2, or 1 for each of ten "questions" relating to well-being, the index being the total score divided by 10. Twenty seven patients were assessed by more than one observer, and good agreement between scores was obtained. It is suggested that the index could be used to allot priorities in treatment and research and to apply cost-benefit techniques to health.

INTRODUCTION

MEDICINE – the study, prevention, and treatment of ill-health – is one of the largest industries there is. In 1968 – 69, the United Kingdom spent 4.69% of her gross national product on health care, while the United States spent 6.71%.[1] Despite the size of this industry we have as yet no rational basis upon which to organise and distribute our resources. This must in part be attributed to the absence of any method of measuring efficacy: we have no method of measuring a patient's health before and after treatment. If we had, we might be able to allocate limited treatment resources to areas where they would be most beneficial and research to areas where it is most required, and we could also apply cost-effectiveness calculations to much medical work.

This paper reports the development and assessment of a health index which measures health and allows severity of disease, efficacy of treatment, and cost to be compared.

DEVELOPMENT

Medical care includes frequent evaluation of the patient's health, but the measurement is practical or relative and is expressed in such terms as "fit for light duty" or "better than yesterday". Such assessments serve the patient and his doctor fairly well but they do not lend themselves to numerical representation. Indeed, such representation is impossible without first having a suitable definition of health upon which to base the score. The World Health Organisation[2] defines health as a state of physical, mental, and social well-being, and this definition was used as a basis for some early trials. However, it soon became apparent that although it was a reasonable definition, it did not encourage precise scoring. What one observer considered "mental" another considered 'social", and what one observer felt was minor social ill-health was major to another.

After this experience, we examined the activities and aspects which together comprise the pattern of daily life; many of these appeared to overlap or encompass each other, and a cumbersome and inefficient method of scoring would have been the result. However, by elimination of some items, and grouping of others, the list was reduced to ten which were comprehensive but without obvious redundancy:

(1) Work
(2) Recreation
(3) Physical suffering
(4) Mental suffering
(5) Communication
(6) Sleep
(7) Dependency on others
(8) Feeding
(9) Excretion
(10) Sexual activity

These ten factors were used as the basis for scoring a patient's health, each factor being considered in the same way: "Is there any impairment due to the patient's ill-health?". This approach corresponds to a definition of health as: "No impairment in the ten aspects of life listed." Although not an elegant definition, it seemed likely to lend itself to unambiguous scoring.

The scoring system selected was to allocate for each factor 1, 1/2, or 0, according to whether the patient was normal, impaired, or incapacitated. The total was then divided by ten to yield the health index. The score for a normal person was thus 1, ill health causing a reduced score and extreme ill-health scoring 0. This method of scoring health was evaluated.

ASSESSSMENT

The ten questions were printed as a list (see figure), with space for recording details of patient and observer, and room for several scores to be made. The interviewer was provided with instructions (see legend to figure) on the interpretation and scoring of some of the questions.

Twenty observers made 180 assessments on twenty seven patients. The observers included consultants, registrars, housmen, and students, and the patients were volunteers with a variety of complaints who were chosen when an opportunity presented for several observers to see the patient.

The scores were made quickly and easily, much of the information being already obtained from a normal consultation. The scores in this series ranged from 0.25 scored by a man with severe asthma to 1.0 scored by a man awaiting admission for excision of a tongue papilloma.

There is no accepted alternative measurement against which the accuracy of the scoring system can be gauged, but when the patients were ranked according to score, there did not seem to be any striking anomalies (see table).

The variation between observers was slight, with scores usually differing by no more than 0.05. This reproducibility was assessed in this series in the following way. All the scores obtained on any patient at one session were paired in an arrangement based on the alphabetical order of the names of the observers, any unpaired score being discarded. This yielded 72 pairs of observations for which the correlation coefficient was 0.883, with a standard error of 0.118.

HEALTH INDEX SCORE SHEET

Date:	Observer:

Patient:	Age:	Sex:	Hosp. No.

Diagnosis:

Score 1, 1/2 or 0
(i.e normal scores 1)

	Date							
1. Work: Normal, impaired or reduced, prevented								
2. Hobbies and recreation: Normal, impaired or reduced, prevented								
3. Is patient free from malaise, pain or suffering?								
4. Is patient free from worry or unhappiness?								
5. Does patient communicate satisfactorily?								
6. Does patient sleep satisfactorily?								
7. Is patient independent of others for acts of daily living (.e.g washing, feeding, dressing, moving)?								
8. Does patient eat and enjoy his food?								
9. Is micturition and defaecation normal?								
10. Has patient's state of health altered his sex life?								
Total (÷ 10)								

Notes and comments:

Health index record form

The following notes apply to individual questions:

(1) Medical advice leading to light duty or absence from work (e.g., hospitalization) will result in a score of 1/2 or 0, even if the patient feels he has a greater capacity. Someone able to work while in hospital (e.g., an author) may score normally. When retirement is compulsory due to age, the maximum score is still 1. This score is to be awarded on the basis of ability to do tasks associated with everyday life.

(5) Language barrier alone should not produce a reduced score.

(7) The score should be reduced when the assistance of others is required on medical grounds or on medical advice.

(8) Patients on a diet may have a reduced score if they dislike it.

(9) If there is a *major* abnormality of either micturition or defaecation the appropriate score is 0.

(10) Infants, children, and the celibate would normally score 1 on the basis that their behaviour is regarded as normal and not as requiring therapy. In these groups this score will normally remain as 1 even during disease, since no deprivation occurs. However, enforced celibacy (e.g., hospitalization) which causes a feeling of deprivation may result in a reduced score.

Table:

DIAGNOSES OF PATIENTS PLACED IN RANK ORDER ACCORDING TO HEALTH INDEX SCORED.

Score	Diagnosis
1.00	Benign Tongue Papilloma
0.95	Varicose veins Vaginal prolapse Vulval warts
0.90	Controlled diabetes Varicose veins Infertility for investigation
0.85	- -
0.80	- -
0.75	Fistula-in-ano Pregnancy for termination
0.70	Hernia Carpal tunnel syndrome Hodgkin's disease
0.65	Carcinoma of stomach Myocardial infarction Lumbar pain for investigation
0.60	- -
0.55	Hiatus hernia
0.50	- -
0.45	Gout in a patient with coarctation and alcoholic neuropathy Diabetic neuropathy
0.40	- -
0.35	Heart failure
0.30	Acute cholecystitis
0.25	Status asthmaticus

Many patients were seen more than once. For example, a woman with asthma was treated for five days; one observer judged her score to have risen from 0.4 to 0.55, compared to 0.45 to 0.70 for a second observer. In such cases the change in score was calculated and comparison was again made on an arrangement based on the alphabetical order of observers, any unpaired score being discarded. This yielded 25 pairs of observations. On all but one occasion the observers agreed on the direction of change, and there was good agreement on the magnitude of the change. The correlation coefficient was 0.884 with a standard error of 0.196.

DISCUSSION

The development of this health index was stimulated by consideration of the statistics in current use. For example, the mean bed occupancy has been widely used in the United Kingdom. This provides a very inadequate representation of efficiency and tends to encourage such practices as keeping a patient in hospital until the next operating-list. To run a factory on "mean warehouse occupancy" would be commercial suicide, for it would encourage overcrowding, stagnation, and buildings of inadequate size.

Other measurements, although useful, have only limited applicability. For example, the benefit of influenza vaccination may be inferred from the percentage of factory staff off work. However, to extend this measurement to the general assessment of health services would be inappropriate; apparent "efficiency" might result from various measures ranging from fining absentees to compulsory sterilisation of the female labour force. A satisfactory measure of efficiency must be applicable to a wide range of problems and should produce no anomalies in the society in which it is to be used.

The health index described here may be used as a weighting factor giving a value in health terms to any period of time. The product is conveniently expressed in "health years". Thus, one year in full health is one health-year, one year with a health index of 0.5 is 1/2 health year, one month at full health is 1/12 health-year, and one month with a health index of 0.5 is 1/24 health year. Benefit from medical treatment can thus be expressed as health years or parts of a health year gained to the patient as a result of the measures under consideration. In the same way the impact of a disease can be expressed as health-years lost to an individual or to the community. Such knowledge could be used in allocating resources available for treatment and research.

If the health index is combined with satisfactory measurements of cost it should be possible to apply cost-benefit analysis to health. Hitherto the appropriate information about cost has not been available, but the massive collection of data now being undertaken in the Hospital Activity Analysis project could provide a basis for satisfactory costing.

REFERENCES

[1] Office of health Economics Information Sheet no. 9. London, 1970.

[2] World Health Organisation. Constitution of the World Health Organisation: annex 1. World Health Organisation, 1958.