

# Predictive factors for success in surgery of the physically disabled

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## Summary

The following factors influencing vocational success or failure were selected and studied for their predictive value in a Rehabilitation Centre, age, family background, educational level, work history and work level, motivation, mental ability and physical disability. Graded numerical scores from 1 to 3 were assigned to these factors according to Lane et al.<sup>1</sup> A cut-off score was tested and found to distinguish the successful from the unsuccessful groups. The individual factors found to differ significantly in the two groups were work history and skill, motivation, and physical disability. Mental ability, however, could not be tested adequately.

*Key words:* Disability, rehabilitation, orthopaedic surgery.

## Introduction

The success or failure in surgical (and vocational) rehabilitation of the physically disabled depends upon multiple factors, a precise analysis of which is necessary to predict the final outcome. The evaluation of the end-results in a group of physically handicapped patients at a rehabilitation centre were studied over a three year period and results analysed in this paper. At the same time, a Predictive Index postulated by Lane et al<sup>1</sup> was tested and found to be consistent and valuable as a guide for future programmes. The most useful factors in the overall assessment of the disability of an individual were age, sex, educational level, work history and level of skill, degree of physical disability, intelligence and motivation. In this group, age, sex, educational level and family situation were uniform. The factors which were significant in determining the final outcome were the level of physical disability, motivation, work history, work level and to a lesser extent the mental level of the patients. Lane et al studied a group of patients using the Scoring System, but this group was in an open community and considered to be socio-economically disadvantaged.

The present study directs its attention to the final outcome in a group of patients who should be considered specially advantaged, having had a domiciliary training programme and the services of an Orthopaedic Surgeon, and has implications in the value of such undertakings and expenditure and effort involved therein.

## Patients and Methods

During the three year period from January 1981 to December 1983, a total of 84 patients were available for studying having completed their surgical procedures and training programmes. Ten patients under 16 years were schooling and hence, excluded from the study. Of the remaining 74 patients reviewed, 43 were considered a success and 31 as failures. A patient was considered a success if he or she was gainfully employed or if he or she had completed the training programme with the expectation of employment.

Failures were patients who were classified unsuccessful in their vocational rehabilitation programmes and discharged from the centre or transferred to appropriate institutional care.

**Age and sex distribution:** There were 49 males and 14 females between 16 years and 30 years while one patient was 35 years old (Table 1). Older patients are not usually admitted, except under special circumstances. The admission procedure was through the State Welfare Boards using the social, economic and educational backgrounds. Despite the ethnic differences they were mainly from semi-urban areas.

**Table 1**  
Number of Patients: Distribution by age and sex (Total 74 cases)

	Males	Females
Under 16 years	9	1
16 years – 30 years	49	14
31 years – 40 years	1	–
41 years – 55 years	–	–
Over 60 years	–	–
<b>Total</b>	<b>59</b>	<b>15</b>

**Clinical diagnoses:** Forty-five patients had post-polio disabilities and these included paralysis of both lower limbs, severe contractures and joint deformities. Fifteen patients are included under cerebral palsy, but this group also includes patients with spastic conditions due to other conditions, for example hereditary spastic paralysis, post-encephalitic conditions and head injuries. The 11 patients included under congenital conditions included ring constrictions, congenital amputations, arthrogryphosis and some bone dysplasias. There was one case of traumatic paraplegia, one of muscular dystrophy and one of spinal cord atrophy, all included under the heading: Other Conditions (Table 2).

**Table 2**  
Clinical Diagnoses – Distribution

Post Polio Disabilities	45
Cerebral Palsy	15
Congenital Deformities	11
Other Conditions	3
<b>Total</b>	<b>74</b>

**Factor categories and scores:** The following eight factors were studied retrospectively: age, sex, family situation, educational level, work history, work level, motivation and physical disability. During the rehabilitation process, all patients were seen by the physical and occupational therapist, social worker and the centre's Medical Officer. They were periodically evaluated in team conferences and the basic data obtained from the notes. Patients were then assigned scores 1, 2, or 3 in each of the eight factors. A score of 1 was given to the least disabled in that category and a score of 3 generally indicated the highest level of disability (Appendix).

**Appendix**  
**Factor Categories and Scores**

Category	Grade	Score
Age	16 – 30 years	1
	31 – 40 years	2
	41 – 55 years	3
	Over 60 years	4
Family Situation	Supportive	1
	Supportive with help	2
	Absent or destructive	3
Education	High School	1
	Std 8	2
	Primary only	3
	No schooling	4
Work History	Good	1
	Fair	2
	Poor	3
Work Level	Skilled	1
	Semi-skilled	2
	Unskilled	3
Motivation	Good	1
	Fair	2
	Poor	3
Physical Disability	Minimal	1
	Moderate	2
	Severe	3
Mental Disability	Minimal	1
	Moderate	2
	Severe	3

A combined score of disability was then given at the end of the individual scoring process by adding the eight individual scores. The lowest or most favourable combined score possible was 8 and the highest or most unfavourable was 24. The patients were then divided into a successful group and an unsuccessful group. The individual scores were added to give two sets of mean combined scores and the individual as well as the combined scores were tested for statistical significance (Lane et al<sup>1</sup>).

**Final grouping of the patients:** The 74 patients in the study were divided into two groups: those who succeeded in their vocational restoration (N:43) and those who failed (N:31).

These patients are not distinguished by a specific diagnosis but by the severity of their disability. The number of patients who underwent surgery is shown in Table 3. Of the 43 successful patients, 22 underwent single or multiple operations and of the 31 unsuccessful patients 14 underwent surgery.

**Table 3**  
**Number of patients operated**

Successful Group		Unsuccessful Group	
Operated	22	Operated	14
Unoperated	21	Unoperated	17
Total	43	Total	31

A decision to operate and the appropriate procedure was arrived at, after careful clinical assessment and discussion at weekly conferences in the department. On completion of the surgical procedures a final disability score was given and included in the combined score for the patient. Many were given both surgery and an orthopaedic appliance and the unoperated were prescribed only orthopaedic appliances, at times, a wheelchair when indicated. One of the difficulties faced in both groups was the inordinate delay in the fitting of the appliances, an unfortunate fact, due to the enormous work load on the appliances section of the department.

## Results

The group means of factors which did not differ significantly were age, sex, family situation, educational level and mental ability. Mental ability was initially included in the scoring system, but when it was discovered that practically all the patients were in the same grade, this factor was excluded from consideration. In an out-patient situation, this factor should be included. The means of the combined scores for the successful and unsuccessful groups differed significantly. (Table 4). Graphically represented as in Figure 1, they support Lane et al's hypothesis that a numerical scoring system could be established to predict success or failure of vocational rehabilitation in patients. A numerical cut-off point of 14 which differentiates the successful from the others in the group was established. None of the subjects in the successful group received a score of more than 14. The lowest average score obtained in the failure group was 12, even though there were four patients at eleven and one each at nine and ten. This I believe is a characteristic of the specialised centre and may represent the "Welfare Syndrome". Fear of losing

**Table 4**  
**Tests of combined mean scores**

Successful group, mean	Unsuccessful group, mean T	
X : 10.6	X : 15	P : 0.001

Mean scores for success group is considerably lower compared to unsuccessful group. The difference is significant.

the security of the welfare centre before private income is assured has been responsible for the reluctance of many disabled persons to seek vocational placement. Significantly, it is this group who have refused any kind of surgical treatment and have not used their appliances.

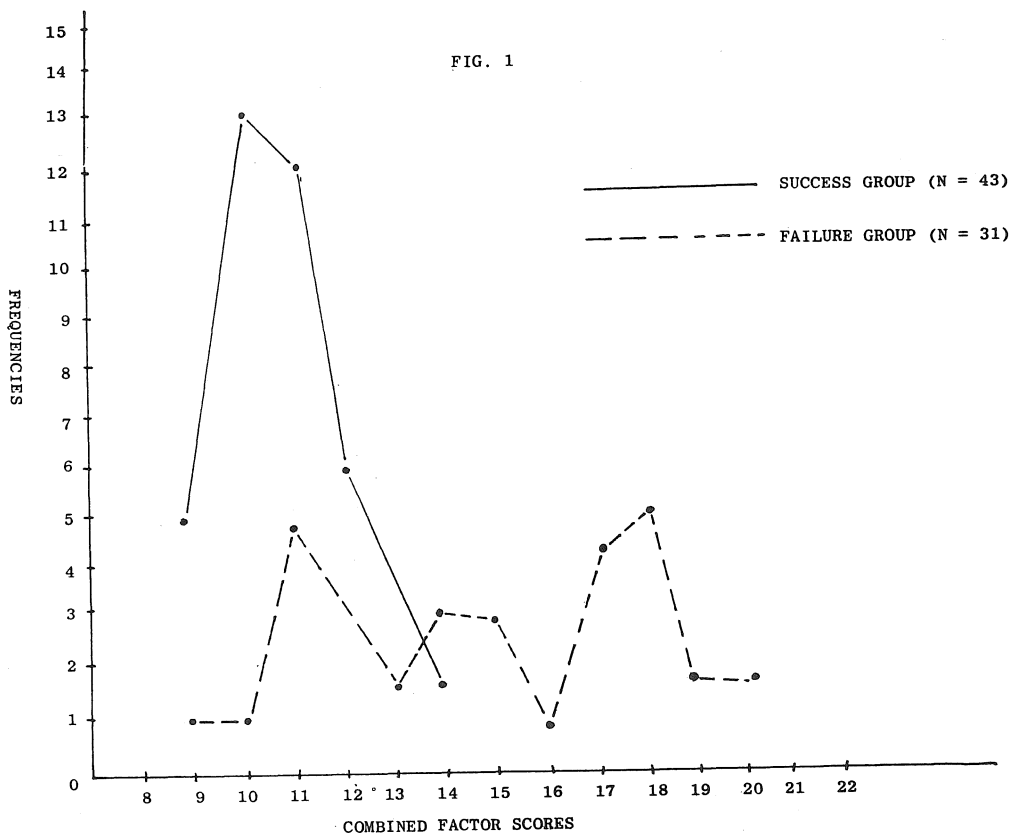


Fig. 1: Graph showing mean scores of the successful and unsuccessful patients in terms of final rehabilitation. Note cut-off point at score of 14.

### Discussion

Lane et al<sup>1</sup> in a study of 50 physically disabled patients in New York, described the Combined Scoring System and quantitated their end-results in a numerical scoring system. The present study excluded the IQ tests from the scoring system as it was felt that this was not very reliable in our context and environment. The main characteristics of their method has however been retained.

The work history and work level, physical disability and motivation were significant in this study also.

The combined score allows for individual variance and still permits the individual's vocational potential to be compared (Lane et al<sup>1</sup>).

Age, family situation, educational level and mental ability were not significant factors in this study because of the common characteristic extended to all, being in institutional care with high

selectivity in admission. In the study of Weisbroth et al,<sup>2</sup> age failed to be a distinguishing feature. Lesser and Darling<sup>3</sup> found a favourable family stability and educational background to be good predictors. Lane et al<sup>1</sup> in their study done in non-institutional community showed a high failure rate (62%) while the present study records a lower failure rate (40.3%). Surgical intervention in our successful and unsuccessful group is the same (50%, Table 3) and thus could not be a factor of significance altering the outcome. However, in a number of patients the Disability Score has been lowered, thus lowering the combined score, but the benefit has been only marginal. Another feature of surgical intervention has been, that, where Disability Score is low, no further lowering of the combined score has been achieved because of surgery. It thus can be concluded that surgery is not indicated for minimal disabilities while it should be undertaken only in a small and carefully selected number of cases with severe disability.

## Conclusion

Surgical intervention is not a significant factor and requires careful evaluation within the framework of the above mentioned parameters, even when facilities at a specialised rehabilitation centre are available. The role of the Orthopaedic Surgeon, however, is not diminished, but his place as a member of the rehabilitation team is emphasised. Predictive Index is a practical method which should be more often employed in selection of cases for surgical correction as well as vocational rehabilitation, so that extended and expensive programmes can be rationalised.

## References

1. Lane ME. Predictive factors for Success of the Physically Disabled; Study of a socio-economically disadvantaged group. Archives of Physical Medicine and Rehabilitation 1974, 55: 65-70.
2. Weisbroth S, Esibill MS, Zuger RR. Factors in the Vocational Success of Hemiplegic Patient. Archives of Physical Medicine and Rehabilitation 1971, 52: 441-446.
3. Lesser MS, Darling RC. Factors prognostic for vocational rehabilitation among physically handicapped. Archives of Physical Medicine & Rehabilitation 1953; 34: 73-81.