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SOCIAL REHABILITATION FOLLOWING HIP FRACTURES

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A prospective 6 months' study of 518 patients with hip fractures was undertaken. The patients were classified into four social function groups on admission to hospital and again at the follow-up, according to their dependence on home-help and other services of the social welfare system. This dependency increased with the age of the patients. Life tables for the case material showed that the mortality depended more on pre-fracture social function than on age.

At the follow-up, the risk of death or increased social dependency among primarily independent patients was found to be 38 per cent compared with 48 per cent among slightly dependent patients and 62 per cent in moderately dependent patients. A total of 17 per cent of the surviving patients admitted from home became nursing home patients. The pre-fracture social assessment determined the end-result to a greater extent than the age at the time of fracture.

About 75 per cent of the patients discharged to their homes maintained their social function compared with 68 per cent of the patients discharged to a convalescent home and 47 per cent of the patients discharged to rehabilitation clinics.

Key words: fractures, rehabilitation; femoral neck fractures, rehabilitation; femoral neck fractures, mortality.

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During the past few decades the average age of the population in the Western countries has increased, resulting in an increased number of hip fractures (Jensen & Tøndevold, in press). According to Bauer (1977) the risk of sustaining a fracture of the hip doubles for every 5-year increment of age after the fifth decade. This means, that one woman out of five above the age of 80 years will sustain a hip fracture.

Much attention has been paid to the technical details concerning the treatment of hip fractures. In dealing with geriatric orthopaedics, however, it is important to realize, that in the elderly loss of function means loss of independence (Devas 1974). In spite of this the problem of social rehabilitation including the way hip fractures affect the quality of life in the elderly is rarely discussed (Cobey et al. 1976, Clark & Wainwright 1966, Katz et al. 1964 and 1967, Thomas & Stevens 1974). We have therefore analysed our experience of social rehabilitation following hip fractures.

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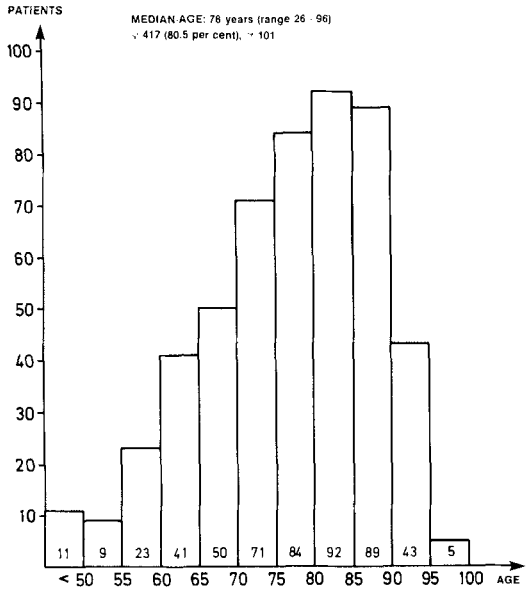

Figure 1. Age distribution of 518 patients with hip fractures.

PATIENTS AND METHODS

The present series consists of 518 patients admitted to hospital with a hip fracture in the period January 1st to December 31st, 1977, and prospectively followed for 6 months.

The age distribution is shown in Figure 1. The median age was 78 years (range 26–96 years) and 80.5 per cent (417/518) of the patients were females.

Femoral neck fractures were recorded in 43.1 per cent (223/518) of the patients with a median age of 77 years (range 26–96 years), whereas 56.9 per cent (295/518) had sustained trochanteric fractures. The median age in this group was 79 years (range 27–96). The methods of treatment are recorded in Table 1.

The physical rehabilitation programme consisted of 6 weeks of partial weight-bearing mobilization in both unstable trochanteric fractures treated by McLaughlin osteosynthesis and femoral neck fractures with sliding-nail fixation. Early weight-bearing was emphasized in all other cases. If the rehabilitation programme did not progress satisfactorily within the first 2–3 weeks the patients were discharged to a convalescent home with facilities for physical therapy or to a rehabilitation clinic with a highly developed socio-medical care system. This was determined solely by their municipal address. The patients were discharged from hospital or institutions as soon as they were able to walk and undertake activities of daily living.

On admission to hospital the patients were assessed and classified into four social function groups according to their dependence on the social welfare system (Thomas & Stevens 1974), as defined in Table 2.

The patients were followed up prospectively in the outpatient clinics and were re-assessed 6 months after the fracture. In the case of death the exact survival time was obtained from the Danish Central Bureau of Personal Registration. No living patients were lost to follow-up.

RESULTS

On admission to hospital the patients were classified into social function groups as shown in Table 3. Dependence on the social welfare system was found to increase with age ($P < 0.0001$, Chi-square test).

A total of 383 patients were admitted from home. These included all patients in groups I, II and III as well as one patient assigned to group IV, who was being nursed at home.

The average hospitalization time was 23 days and the hospital mortality 5.8 per cent (30/518). As seen from Figure 2 the mortality among nursing home patients was only 5.1 per cent (7/136) but the hospitalization time for this group was as short as 7 days. The hospital mortality increased considerably with

Table 1. The treatment of hip fractures in 518 patients

	Femoral neck fractures 223 patients, median age 77 years			Trochanteric fractures 295 patients, median age 79 years				
Method of treatment	Sliding-nail	Hemiarthro-plasty	Non operative (impacted)	Jewett or McLaughlin nail-plate	Sliding screw-plate	AO 130° plate	Ender rods	Traction
Number	62 (27.8%)	117 (52.5%)	44 (19.7%)	154 (52.2%)	131 (44.4%)	6	1	3

Table 2. The assessment of social function

	Social function groups	Definition
I	Independent	Manages everything Possibly working
II	Slightly dependent	Manages household Meals-on-wheels, Home-help $\leqslant$ 4 hours/week Manages personal needs
III	Moderately dependent	Home-help $\geqslant$ 5 hours/week Possibly District Nurse
IV	Totally dependent	Living in nursing home or long-term nursing at home

Table 3. Assignment to social function groups on admission to hospital

Social function group	I	II	III	IV
Number	148	128	106	136
Percentage	28.6%	24.7%	20.5%	26.3%
Median age	69	79	81	84

increased dependence. Thus, the mortality among patients assigned to group III was twice as high as that occurring in group II, although the median ages were 81 and 79 years and the hospitalization times 33 and 30 days, respectively.

At the 6 months follow-up the mortality rate was 15.6 per cent (81/518). Figure 3 demonstrates that the mortality increased with increased dependence, as classified on admission, although the median age in the groups also increased. Applying a Cox regression analysis the mortality was found to depend more on the pre-fracture social function than on the age of the patients ($P < 0.001$). A six times higher mortality was

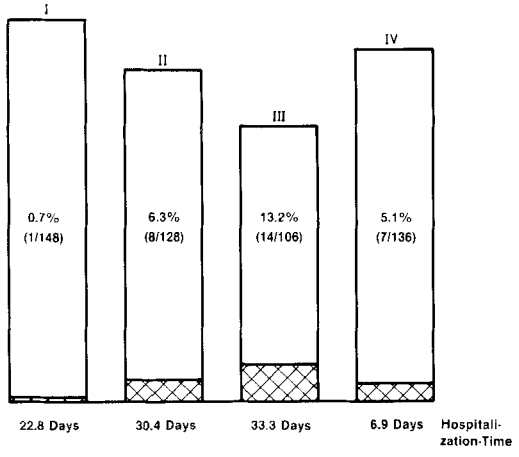

Figure 2. Mortality in hospital related to pre-fracture social groups. Mortality rate: 5.8 per cent (30/518).
The percentages listed in the columns indicate the mortality in the different social function groups.
The average hospitalization times for the four groups are listed below the columns.

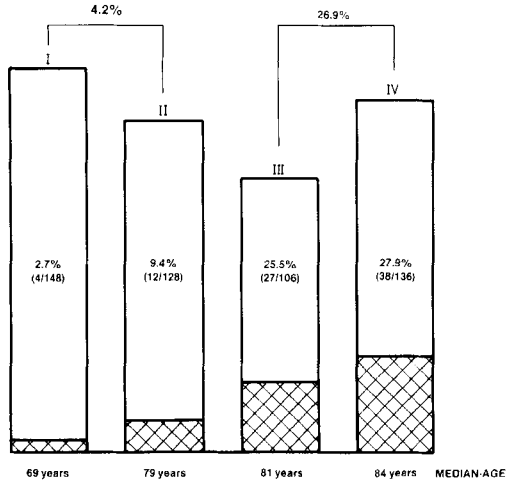

Figure 3. Mortality after 6 months related to pre-fracture social function groups. Mortality rate: 15.6 per cent (81/518).

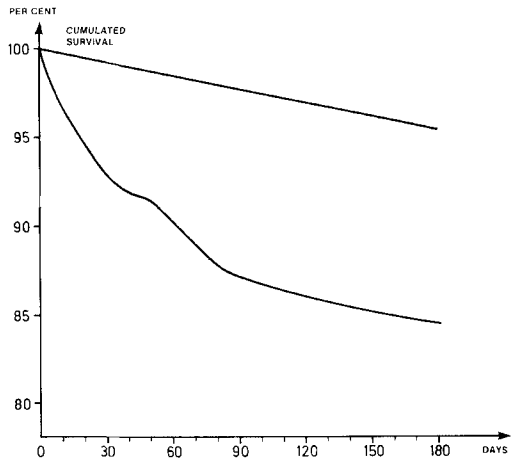

Figure 4. Life table for 518 patients with hip fractures. The lower curve is the life table for the case material. The upper curve is the life table for a population of the same age and sex distribution.

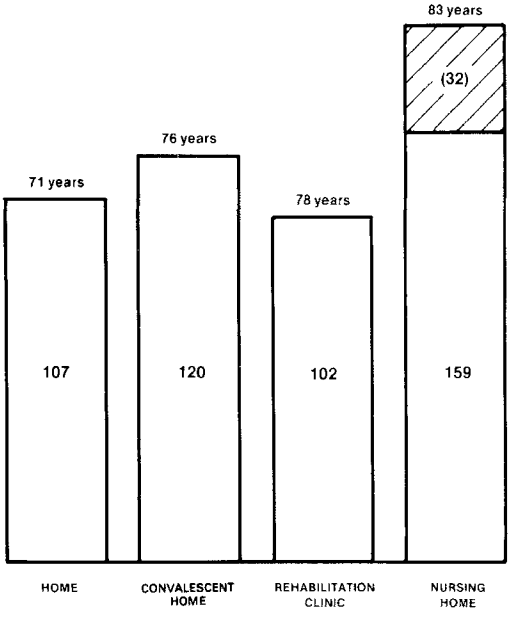

Figure 5. Placement after discharge from hospital after hip fracture in 488 patients (with indication of median age).
Admitted from home: 107 + 120 + 102 + 32 = 360 patients. (One nursing home patient, admitted from a rehabilitation clinic returned there.)
Discharged to a nursing home 32/360 = 8.9 per cent.

encountered among patients in groups III and IV compared with the two more independent groups.

The life table in Figure 4 illustrates that there was an initial high mortality rate within the first 3 weeks. After this the mortality rate decreased slowly with a temporary increase, however, between the 7th and the 11th weeks. This temporary increase was mainly caused by a cumulative high death rate among nursing home patients during the first 3 months after the fracture and also among patients in group III not yet discharged from hospital.

According to Figure 5, 488 patients were discharged from hospital. Among these were 360 patients admitted from home; 29.7 per cent (107/360) of the patients admitted from home returned directly home again, whereas 8.9 per cent (32/360) were discharged to nursing homes. Another 33.3 per cent (120/360) of the patients coming from home were discharged to a convalescent home, whilst 28.1 per cent (101/360) went to a rehabilitation clinic. There was a slightly significant difference between the age groups going to the two types of institutions ($P < 0.05$, Mann-Whitney test).

Figure 6 shows the placement of the patients after discharge from hospital in relation to the pre-fracture social function groups. The majority of the patients (27/32) admitted from home and discharged to nursing homes were assigned to group III on admission to hospital, whereas four were in group II and one in group I. There was no significant difference ($P > 0.05$, Chi-square test) in the composition of the social function groups between the two different types of institutions for after-treatment. Nearly two-thirds (66/107) of the patients discharged to their own homes were assigned to group I and only about 10 per cent (10/107) to group III.

Re-assessment of social function after 6 months was performed in 437 cases, as shown in Table 4. In group I we found 21.1 per cent (92/437) of the patients with a median age of 65 years, whereas 22.9 per cent

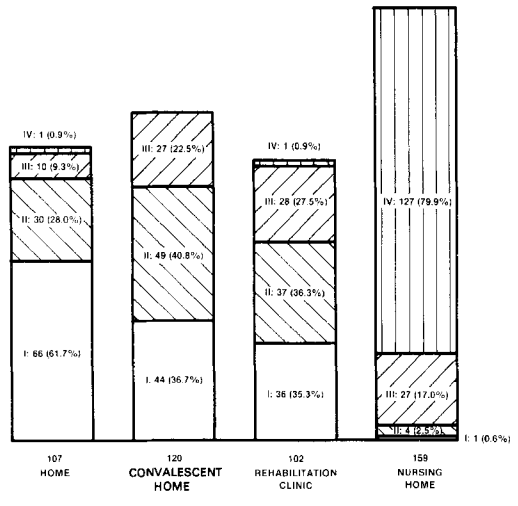

Figure 6. Placement after discharge from hospital related to pre-fracture social function groups in 488 patients with hip fractures.

(100/437) with a median age of 76 years were assigned to group II, 20.1 per cent (88/437) with a median age of 76 years to group III and 35.9 per cent (157/437) with a median age of 83 years to group IV. The dependence on the social welfare system at follow-up thus increased with age ($P < 0.0001$, Kruskall-Wallis test).

The deterioration of social function is also shown in Table 4. Of the 148 patients in group I pre-fracture 2.7 per cent (4/148) had died; 63.9 per cent (92/144) of the survivors had maintained their pre-fracture level of social function. 23.6 per cent (34/144) had dropped one group and 11.1 per cent (16/144) two groups. Two patients (1.4 per cent) became nursing home patients. The total risk of death or deterioration in group I was thus 37.8 per cent (56/148).

In group II 9.4 per cent (12/128) of the patients had died; 56.9 per cent (66/116) of the survivors maintained their pre-fracture level of social function. 27.6 per cent (32/116) had dropped one group and 15.5 per cent (18/116) became nursing home patients. The risk of death or deterioration was thus 48.4 per cent (62/128).

In group III the mortality was 25.5 per cent (27/106). Deterioration in this group meant nursing home placement, which was necessary in 49.4 per cent (39/79) of the survivors. The total risk of death or deterioration among patients primarily assessed in group III was thus 62.3 per cent (66/106).

Among patients admitted from home the risk of death was 11.2 per cent (43/383) and the risk of social deterioration 41.6 per cent (141/340) among survivors. The risk of death or deterioration among patients admitted from home was thus 48.0 per cent (184/383).

Among 383 patients admitted from home, 340 survived for 6 months; 82.4 per cent (280/340) of these were back in their homes at the follow-up, although 29.3 per cent (82/280) were more dependent on the social welfare system than before the fracture.

A multivariate logistic analysis has revealed that the pre-fracture social function groups determined the end-result to a greater extent than the age at the time of fracture. The social function groups as assessed at the 6

Table 4. The deterioration of social function and the mortality 6 months after hip fracture

Pre-fracture assessment into social function groups		No. of deaths	Social function groups at 6 months follow-up				Risk of death or Deterioration of social function
			I	II	III	IV	
Group I	148	4 (2.7%)	92 (63.9%)	34 (23.6%)	16 (11.1%)	2 (1.4%)	56/148 = 37.8%
Group II	128	12 (9.4%)		66 (56.9%)	32 (27.6%)	18 (15.5%)	62/128 = 48.4%
Group III	106	27 (25.5%)			40 (50.6%)	39 (49.4%)	66/106 = 62.3%
Group IV	136	38 (27.9%)				98	38/136 = 27.9%
Total	518	81 (15.6%)	92 (21.1%)	100 (22.9%)	88 (20.1%)	157 (35.9%)	222/518 = 42.9%

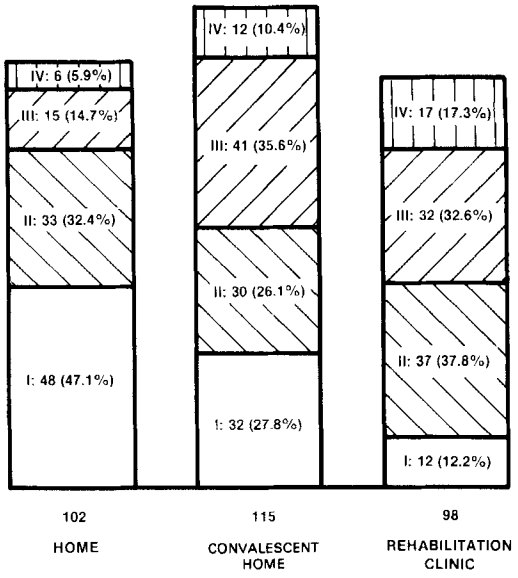

Figure 7. Social function groups at the 6 months follow-up of 315 hip fracture patients related to the placement after discharge from hospital.

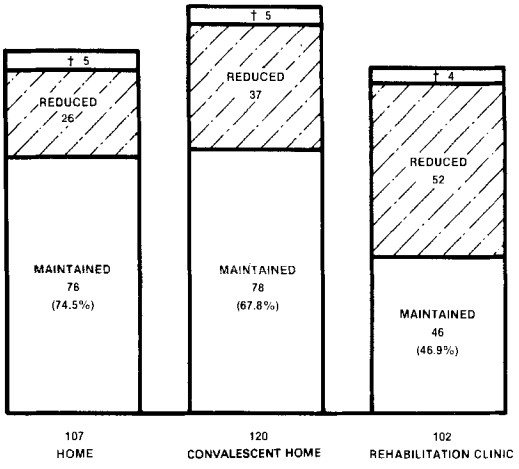

Figure 8. The social function at the 6 months follow-up related to the pre-fracture assessment and to the placement after discharge from hospital.

months follow-up are related to the placement of the patients after discharge from hospital in Figure 7. Only six of the patients discharged to their homes were nursing home patients at the follow-up, including one patient who was assigned to group IV on admission to hospital. Thus 5.0 per cent (5/101) of the patients discharged to their homes had become nursing home patients during the 6 month period. Among the patients discharged to convalescent homes 10.4 per cent (12/115) became nursing home patients compared with 16.5 per cent (16/97) of the patients discharged to rehabilitation clinics, into which group one patient was already assigned pre-fracture. The risk of becoming a nursing home patient was thus found to be significantly higher ($P < 0.0001$, Chi-square test) for patients discharged to rehabilitation clinics.

The risk of social deterioration related to placement after discharge from hospital is summarized in Figure 8. Among survivors discharged from hospital directly to their homes 74.5 per cent (76/102) had maintained their social function at follow-up 6 months after the fracture. By comparison, 67.8 per cent (78/115) of the patients discharged to convalescent homes maintained their function but this applied to only 46.9 per cent (46/98) of those discharged to rehabilitation clinics. These differences are highly significant ($P < 0.005$, Chi-square test).

Technical failures after the treatment of femoral neck fractures were encountered in 15.2 per cent (34/223) of cases. The risk of social deterioration among survivors was 51.5 per cent (17/33) compared with 27.3 per cent (44/161) in uncomplicated cases ($P < 0.01$, Chi-square test). Following the treatment of trochanteric fractures a technical failure rate of 5.8 per cent (17/295) was recorded. The risk of social deterioration was 37.5 per cent (6/16) among survivors following technical failures compared with 32.5 per cent (74/228) in uncomplicated cases, which is not statistically different ($P > 0.05$, Chi-square test).

DISCUSSION

The average hospitalization time of 23 days after hip fracture agrees well with figures given in other recent studies (Ceder et al. 1977, Jansson 1977, Jensen & Tøndevold 1979). The mortality rates seems to be slightly lower

than stated in previous studies (Alffram 1964, McCown & Miller 1976, Jensen & Tøndevold 1979); however, in the present series all adults with hip fractures were considered, resulting in a slightly lower median age. In a former report (Jensen & Tøndevold 1979) the mortality after hip fracture was found to be related to age and sex. In this series, however, the pre-fracture social function was included and found to influence the mortality to a greater extent than the age and sex.

As found by others (Beals 1972, Jensen & Tøndevold 1979) a secondary increase in mortality was observed between the 7th and 11th weeks after the fracture. In earlier series this could not be explained, but in the present series this secondary increase was found to be caused by a prolonged high mortality among patients assigned to groups III and IV.

About 30 per cent of the patients admitted from home returned directly to their homes. Similar results were stated by Gylling (1960), while Ceder et al. (1977) claimed 60 per cent, Clark & Wainwright (1966) 86 per cent and Ødegård & Unsgård (1978) 48 per cent. As in other series from urban districts (Campbell 1976, Gylling 1960), we used rehabilitation clinics or convalescent homes to a great extent, which is not as possible in rural areas. The total consumption of resources is dealt with in another paper (Jensen et al. 1979).

The number of patients admitted from home but discharged to nursing homes is obviously of greater interest. In our series this applied to about 9 per cent of the patients, which is slightly less than the 12–20 per cent stated by others (Campbell 1976, Clark & Wainwright 1966, Gylling 1960). Ceder et al. (1977) and Ødegård & Unsgård (1978), however, needed nursing home facilities in about 40 per cent of cases, but did not use rehabilitation institutions.

Very little has been published about the effects of hip fractures on social function. In our series about 83 per cent of the surviving patients coming from home were back there 6 months after the fracture, whereas the remainder were in nursing homes. These figures agree with those of Ceder et al. (1977), whose series is from a rural district. Among these patients about two-thirds maintained their social function, as also mentioned by Thomas & Stevens (1974), while the remainder became more dependent on the social welfare system. This is in accordance with the results of others (Campbell 1976, Ceder et al. 1977, Clark & Wainwright 1966, Dolk & Westerborn 1977, Gylling 1960). In the present study, however, we found that the patients discharged directly to their homes were younger and less dependent on the social welfare system. The risk of deterioration of social function was thus only about 25 per cent.

Surprisingly enough we found the risk of deterioration of social function among patients discharged to rehabilitation clinics to be 53 per cent compared with 32 per cent for those discharged to a convalescent home with facilities for physical therapy. The median age of the patients was however 78 years for those discharged to rehabilitation clinics compared with 76 years for those going to a convalescent home, but the composition of pre-fracture social groups was not significantly different.

The rehabilitation clinics offer a significantly higher level of socio-medical care than do convalescent homes. The costs of running the rehabilitation clinics are higher and the rehabilitation course is, in addition, considerably prolonged (Jensen et al. 1979). This social care system leads obviously to more support from home-help, meals-on-wheels and even the district nurse, which the patients are to a marked degree still dependent on 6 months after the fracture. As stated by Devas (1974) loss of function in the elderly means loss of independence, and we are not sure that the increased dependence on social support, as encountered in the patients discharged from rehabilitation clinics, improves the quality of life. As also mentioned by Jansson (1977) we feel that the goal for our treatment should be to bring the patient back to the pre-fracture level of function. We therefore feel that the extended socio-medical care system as applied by the

rehabilitation clinics is of less benefit to patients with hip fractures and that more general benefit can be obtained from ordinary convalescent homes with facilities for physical therapy; other categories of patients can benefit more from the rehabilitation clinics and their facilities. Whether the increased number of patients requiring nursing home care following a stay at a rehabilitation clinic is a secondary effect of an increased passivity is of course an open question. There is, however, no doubt that the need for some sort of rehabilitation institution is mandatory in the post-fracture treatment of these rather feeble patients suffering from hip fractures. It is also obvious that it is extremely important to consider the entire rehabilitation course in dealing with patients in this category.

The assessment system applied in this series, however, does not consider the walking ability or activities of daily living as is the case in assessment systems suggested by others (Cobey et al. 1976, Katz et al. 1964 and 1967). This might therefore favourably influence the results in comparison with those presented by Cobey et al. (1976) and Katz et al. (1967), who found that only 25–50 per cent of the patients maintained their function. There is, however, a clear relationship, using our assessment system, between a reduced independence at admission and the risk of death or deterioration of social function after fracture. The assessment system presented here, as originally described by Thomas & Stevens (1974), is thus found to be applicable in the evaluation of the patients' future needs and it can easily be applied by any member of the hospital staff.

In conclusion we found, based on a simple assessment system, that risk of death or deterioration of social function for patients admitted from home with hip fractures can be estimated to be about 54 per cent.

ACKNOWLEDGEMENTS

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