

The Ageing Worker

G C T Chan,**MBBS, M Med, OM (S'pore)*, D S Q Koh,***MBBS, PhD (Birm), FFOM (Lond)*

Abstract

In Singapore, the age for retirement has increased from 55 years to 60 years, and will eventually reach 67 years. At the same time, the proportion of workers aged above 45 years will continue to increase. The World Health Organisation has reported that in 1980, 32% of the working population were older than 45 years of age in countries of the Organisation for Economic Co-operation and Development (OECD). This proportion is expected to rise to 35.5% in the year 2000 and 41.3% in the year 2055.

What are the implications of the emergence of an ageing workforce? This population represents a special group of individuals in the workforce that have special health, occupational and environmental needs. On the one hand, they have the problem of a reduction in physical work capacity, decreased adaptability, and a generally lower health status. On the other, ageing workers are more experienced and have greater expertise. They are also usually more motivated and may generally have a more positive attitude when compared with younger workers.

Society, as well as health care professionals, needs to respond to this issue of an ageing workforce. The response should be three pronged. Firstly, prevention of the premature decline of physical capacities and adaptability of the worker could be addressed by health promotion and continuing job training. Secondly, some measures for adjusting work demands in accordance with functional capacities of the individual are needed. Thirdly, employers and fellow workers should be educated on the strengths of the ageing worker, and the capacity of such workers to continue contributing because of their experience, motivation and skills.

If implemented, these measures would ensure a path towards productive ageing. The end results would be that ageing workers would have their functional capacity maintained, the concept of "age-adjusted workload" would be a reality, and ageing workers would not be discriminated against, but instead have their contributions to society maximised.

Ann Acad Med Singapore 1997; 26:781-6

Key words: *Functional capacity, Productive ageing, Work demands*

Introduction

Despite the rapid growth of the population by high birth rates in some regions of the world, there is a general trend of "ageing" in the population in both industrialised and developing countries with the increase in the elderly population being particularly marked in Asia. The growth of the total population between 1980 and 2020 will be about 95%, while the increase in the number of elderly people is estimated to be 240%.¹ The ASEAN countries are no different.² Singapore, for instance, will have a population age distribution similar to that of the Western counterparts, with an increase of the elderly population (aged 65 and above) from 4.7% in 1980 to 14.5% by the year 2020.

There has also been a corresponding increase in the proportion of ageing people in various occupations. While an estimated 32% of the workers were in the age

group between 45 and 60 years of age, the respective percentage will be 35.5% in the year 2000 and 41.3% in the year 2010.³ This is associated with a number of health, social and ethical implications.

An ageing population has also resulted in the following trends:

1. *Increase in total dependency ratio:*^{2,3} The total dependency ratio is a crude measure of the burden presented by the non-working population on the members of the workforce. Presently, the ratio is about 4 to 6 workers for every pensioner in developed countries, and this is expected to drop to 2 to 3 workers by the year 2030 at current trends.³
2. *Rising health care costs:*^{4,5} This is to be expected with increasing morbidity with ageing, the higher costs of medical treatment and diagnostic techniques and higher insurance premiums. Health care costs to the

* Occupational Health and Diving Physician
Naval Medicine & Hyperbaric Centre
Singapore Armed Forces Medical Corps

** Associate Professor
Department of Community, Occupational and Family Medicine
National University of Singapore

Address for Reprints: Dr Gregory Chan, Naval Medicine and Hyperbaric Centre, Sembawang Camp, Admiralty Road West, Singapore 669638.

Singapore government in 1994 was about S\$2.8 billion, and this will increase to about S\$14 billion by the year 2030.⁴

3. *Loss of human resources:*³ This is due to decrease of the size of the workforce as the older workers are being continually selected out of the workforce. This will affect both industrialised and developing countries and has been so for the period 1970 to 1989.³

The following sections will try to identify the problems and implications related to the changes in work capacities among the ageing workforce, and discusses the current concepts in the management of ageing and work.

Implications of Age and Work (Table I)

Who constitutes the ageing worker? The World Health Organisation (WHO) has set an arbitrary age as that of 45 years, as it believes that the functional capacity necessary for some jobs decrease from age 45.³ The International Labour Organisation (ILO) has referred to the ageing worker as one who is liable to encounter difficulties in employment and occupation due to advances in age.⁶

The essential problem between ageing and working is the imbalance of the functional capacities of the individual and the work demands.⁵ The functional capacity of the individual can be seen as a inter-relationship between physical, mental and social capacities. Ageing is related to a combination of lifestyle and disease factors and is associated with a decline in some aspects of functional capacity. Work demands however, do not systematically decline with age; instead higher expectations and demand may be placed on the older worker to commensurate with increased experience and higher salary.⁵ So just how does ageing affect one's job?

Functional Capacities

Human functional capacities change with age. It is not clear when these changes occur; but it is generally accepted that physical capacity (rather than mental or social capacities) starts to decline first, usually at 45

TABLE I: PROBLEMS ASSOCIATED WITH THE AGEING WORKER

A decrease in functional capacities comprising of physical, mental and work capacities with decrease job productivity and increase in occupational and work related diseases
A poorer health status with higher incidence of disease especially chronic diseases (diabetes mellitus, cardiovascular diseases and musculoskeletal problems) and cancers
Have lower rates of accidents at the workplace, but severity of accidents greater
Absenteeism
Job restrictions
Reassignment problems due to work conditions such as shift duties, fast production pace and time pressure, and new technologies
Poorer adaptability and having the need to adapt
Discriminated against

years of age. The ageing worker could then be described as one who is 45 years or older.³

The human physical capacity has been extensively researched and discussed in a number of studies,^{3,5,7,8} and it can start to decline earlier and faster than expected compared to mental and social capabilities; and it is influenced in part by the physical fitness and health of the individual.

Numerous theories have been put forward to describe the aetiology and the process of biological ageing.⁷ To date however, there is unfortunately still no satisfactory explanation for the phenomenon of ageing. It is also known that different jobs require varying amounts of these three abilities. For example, basic physical capacities are needed for some activities in daily life, but unrestricted physical capacity is required for higher demands of physical work.⁸

Health Status

The health status of the ageing worker is lower than that of younger workers. There is a definite increase in the prevalence and incidence rate of diseases.³ It is estimated that between one-third and two-thirds of workers aged 50 years and older have at least one diagnosed disease, mainly musculoskeletal or cardiovascular disease.⁵ In Singapore, there is also a high probability of certain chronic diseases in the elderly including diabetes mellitus⁹ and high mortality from cancers.¹⁰

These factors have important implications in the implementation of environmental and biological standards in the work-place with reference to that of occupational and work-related disorders. Having a lowered pulmonary function in the ageing worker will only have his lung function further diminish with exposure to respiratory toxicants, and may influence fitness for surgical intervention. Cardiotoxic agents such as methylene chloride and carbon disulphide, may not have significant cardiotoxic effects in the young, healthy worker; but may prove to be disabling in the older worker with coronary heart disease.

Being in different jobs also influenced the morbidity patterns in some situations. For instance, those workers who were involved in physical and manual labour tend to get musculoskeletal problems as they get older.¹¹ The prevalence rates of cardiovascular diseases were highest in physically demanding jobs and those who were involved in work associated with mental stress.¹¹

It is important to understand that having a disease does not need to be an obstacle for continuing in working life. The presence of disease should instead serve as a criterion for work redesign to adapt the workplace to the needs of the older worker.

Accidents in the Workplace

A decrease in functional capabilities has been blamed for some of the workplace accidents in the elderly. A comparison of workplace accidents between the ageing worker and the younger worker has been controversial; some studies have not shown any significant difference in the accident frequency, while others showed fewer accidents in the older worker. A study done to look at the effects of ageing on taxi drivers in Singapore showed that even though the older drivers had significantly poorer visual acuity and lower reaction times, there was generally no significant difference in road traffic accident rates.¹² It is generally agreed, however, that the injuries sustained by the older worker tends to be more severe.^{3,13} Older employees were also less willing to return to work after an accident.¹⁴

Absenteeism

Absenteeism rates usually increase with age, but its characteristics usually differ from that of younger workers.¹⁵ Sickness absence is due largely to the chronic disease, resulting in chronic sick leave of longer duration. With proper job placement and accommodation, these absenteeism rates are quite acceptable, and there is minimal compromise with productivity. Contrast this to the recurrent, short-term sickness absence spells of the younger worker, which often have strong non-medical reasons for absenteeism.

Job Restrictions

A number of occupational hazards have been identified in relation to the ageing worker.³ Some of these factors are listed in Table II and include factors such as exposure to severe thermal stress, heavy and continuous effort and enforced high work rates.

Reassignment Problems

The ageing worker, as mentioned above, has certain health and job restrictions (such as shift work and assembly line work) which may require them to be reassigned to more appropriate jobs for reasons of work productivity and safety; and the younger worker will then be required to fill up the vacancies.³ This is compounded by a relative shortage of younger people available to replace the older workers.

TABLE II: JOB RESTRICTIONS IN THE ELDERLY³

-
1. Exposure to severe thermal stress
 2. Heavy and continuous physical effort
 3. Disturbance of day and night rhythms
 4. Enforced high work rates
 5. Dangerous machinery or tasks which may have serious accident risks to self or others
 6. Compressed air-work
-

Two problems can be identified here: the first being the provision of suitable new types of work for the ageing worker (taking into consideration his adaptability); and the other being the relative shortage of younger people to replace the older age group. In our modern society, where machines and technology are utilised fully to maximise cost-benefits, shift-work will inevitably increase, along with the continuous perpetuation of pace-dictated, assembly line work and new technologies.

Adaptability of the Older Worker

With technology moving at such a rapid pace, the worker who does not have the necessary skills may become obsolete and be discriminated in the company; skills training and continuous upgrading thus plays an important role.^{3,16} Adaptability has been described as a myriad of factors and this can be seen in Table III.¹⁷

In most organisations, training is directed especially at younger employees. Some of the older workers are negatively reinforced because they may feel nervous about being trained and uncertain about their ability to adapt and learn.¹⁷

This does not mean that it is not worthwhile to train the older worker. Older workers may have limitations which may affect their adaptability in some ways, but they can generally learn; the difficulty sometimes arises when these individuals are taught skills using techniques meant for younger workers.¹⁸

Job Performance and the Ageing Worker

A number of studies on job performance concluded that performance deteriorates with age in situations that place high demands on mental functioning such as sensory and perceptual activities, selective attention, working memory and swift information processing.¹⁹

On the other hand, older workers have a similar, if not better, productivity rates as their younger counterparts in certain tasks which place stronger emphasis on experience and expertise. For example, in sales and marketing, older workers have a distinct advantage in greater experience and knowledge of the products, and combined with better social skills,¹⁹ they generally perform better than their younger counterparts.

Older workers have also been found to be more consistent in their job performance compared to younger

TABLE III: FACTORS WHICH CONTRIBUTE TO ADAPTABILITY¹⁸

-
1. The ability to grasp new ideas
 2. The ability to adapt to change
 3. Being able to accept introduction of new technology
 4. Able to learn quickly
 5. Has the interest to be trained
-

workers. There is a steady increase in consistency of job performance in older age groups from 25 to 60 years of age.¹⁹ For instance, it was found that British shoe leather cutters belonging to the older age groups, though slower, tend to produce consistently high quality work, more so than the younger workers.²⁰

General Work Effectiveness

The older worker scores higher in other areas too. These areas have been given the blanket term of “general work effectiveness”. For example, older employees tend to have a lower overall absenteeism, fewer accidents and lower staff turnover.²¹ They may also have specific strengths (such as a greater dedication to work, better routine skills, a more stable character due to experience and age-related intellectual and personality development) that make them particularly suitable for certain demanding jobs.⁵ Society should make better use of these assets which are often lacking in younger workers.

Ethical Considerations

Discrimination may be made by employers against those elderly workers present at work and during pre-employment screening. This could be due to the belief that they will only increase production costs in terms of health care bills and higher insurance premiums.

The Concept of Productive Ageing (Table IV)

The aged worker constitutes a special group in the labour force with characteristics that require special attention from the occupational health point of view. Removing ageing workers from the workforce by means of early retirement legislation is not the answer: In Finland, for instance, workforce participation rates tended to decrease as a result of legislative requirements.⁵ This was the result of having an early retirement system in which individual disability pensions were granted during impairments, disabilities, handicap, or when a poor work environment could be established. This has cost the Finnish government more than US\$10 billion per year for its 5 million inhabitants. The concept of productive ageing was adopted by the government in 1993. It involves first of all, a preparation for a new society of senior citizens by making social, retirement and health policy appropriate for a nation in which almost every third citizen will be more than 60 years by the year 2030. It also supports various programmes to

TABLE IV: THE CONCEPTS OF PRODUCTIVE AGEING

The Concept of Maintaining Functional Capacity

- 1. Health promotion
- 2. Adjustment in the workplace and ergonomics
- 3. Upgrading skills and training

The Concept of Age-adjusted Workload

- 1. Adjustment of work demands and job redesign

maintain work capacity, motivation and skills in a workforce that is ageing rapidly.

With an increasingly ageing workforce, Singapore has also recognised the importance and potential of the ageing worker. It has been estimated that the corresponding increase in health care expenditure could rise to 7% of the Gross Domestic Product, and this translates to an increase in total health spending to S\$14.3 billion in 2030 from S\$2.8 billion in 1994.⁴ It has in recent years raised the retirement age from 55 years to 60 years, and has encouraged programmes designed to re-train older workers with additional skills that they may continue to contribute to various fields. Younger workers are also educated and reminded constantly of the importance of upgrading themselves that they may be more able to have greater flexibility in jobs as they grow older. On a more individual note, tax relief is given to companies who employ ageing workers.

The main problem in ageing and work is the incompatibility between the functional capacity of the worker and his job demands. The work demands usually do not increase with time but his work capacities usually decrease with age.¹⁶

There are two ways of supporting work capacity as workers aged:

- 1) The concept of “maintaining functional capacity” and
- 2) The concept of “age-adjusted workload”.

The Concept of Maintaining Functional Capacity

It is true that age-related decline in functional capacity, in particular the physical aspects, is to be expected, but an accelerated decline should be prevented. Herein lies the important role of health promotion and workplace adjustments.

Health Promotion

Health promotion is mainly concerned with modifiable lifestyle factors. These factors include smoking, physical activity, nutrition and alcohol. The role of health promotion programmes is to lower the starting point at which decline of functional capacity begins as well as preventing accelerated decline. It may also help to reduce the incidence and severity of certain chronic general diseases.

Singapore has taken the initiative with the introduction of the ‘Healthy Lifestyle Unit’ in the Ministry of Health, which co-ordinates health promotion programmes nationwide while promoting healthy lifestyle activities at work.

There are a few problems associated with health promotion for the ageing worker.³ Firstly, the health status of the ageing worker is lower than that of young workers. The presence of chronic symptoms and diseases can limit the possibilities for health promotion activities.

Secondly, old habits do “die hard”—ingrained habits make it more difficult to alter lifestyle factors such as diet and smoking. Special motivation is needed and more time should be allowed for adapting to new lifestyles. Thirdly, frequent monitoring of progress is needed for reasons of safety and to provide opportunities to dispense encouragement. Fourthly, an individual approach in health promotion is required; results must be regularly evaluated and activities adjusted to the appropriate type and level.

Prevention of Occupational Related Diseases

Work, comprising of work content, work organisation and work environment, has a central role for successful ageing in working life. Poor ergonomics have been described to be the main work-related cause of premature decline of work ability.^{12,22} In a four-year follow-up of 6257 employees aged 45 to 58 years at the onset of the study and representing 40 different occupations, ergonomic factors played a significant role, as can be seen in Table V.²² Prevention of occupational disease in the workplace requires a system of appropriate selection of workers and ensuring that workplace hazards do not harm the worker. This may involve an industrial hygiene programme, medical surveillance, engineering controls and health education.

Upgrading Skills and Workplace Training

Education of the employer and employee is required to promote the importance of multiple skills, competency-based training and retraining to facilitate better occupational flexibility, thus improving the employability of workers as they grow older. Skills such as computer literacy and accounting will undoubtedly benefit younger workers when they aged.

The Concept of “Age-adjusted Workload”

This includes measures for decreasing or adjusting

TABLE V: ERGONOMIC FACTORS IN A 4-YEAR STUDY OF 6257 EMPLOYEES OF 40 DIFFERENT OCCUPATIONS²²

- | |
|---|
| 1. Excessive physical demands |
| • static muscular work |
| • use of muscular strength |
| • lifting and carrying |
| • sudden extreme effort |
| • repetitive movements |
| • simultaneously bent and twisted work postures |
| 2. Stressful and dangerous work environment |
| • dirty and wet workplace |
| • risk of work accidents |
| • hot workplace |
| • cold workplace |
| • changes in temperature during the working day |
| • poor lighting |

work demands in accordance with the functional capacities of the ageing.⁵

Adjustment of Work Demands and Job Redesign

Adjustment of work demands to suit the ageing worker usually requires job redesign. In physically demanding jobs, less lifting and carrying per shift among older workers can be compensated, for example by using their skills and experience more for training younger workers or for developing work processes. Also new work schedules can be effective for adjusting the work demands for older workers.

This can be illustrated by a company in which the speed of the assembly line has been lowered by 20% for older workers. The productivity of the older workers' line did not decrease, because sickness absence rates and other health care costs fell. Such a situation was reported by two Japanese car-manufacturing companies, Toyota Motor Corporation²³ and Nissan Diesel Motor.²⁴

The concept of productive ageing, as discussed above, is based on the principle that work demands should change, just as workers themselves change as they grow older. It should be emphasised that a number of mental and social abilities can undergo a positive change with increasing age; and such new strengths should be respected and exploited in everyday work.

Conclusion

The general population is gradually ageing, and there is also a corresponding increase in the number of older workers in the workforce. With the increased demands of work and gradually diminishing workforce in developed and rapidly developing countries, the older worker is a potentially very important human resource.

These ageing workers represent a special group of individuals in the workforce with characteristics that require special health, occupational and environmental needs. They have specific strengths that make them suitable for certain demanding jobs. Ageing is an inevitable process, and there is definitely a need to increase awareness and improve attitudes of all sectors in the working society towards the ageing worker; to match functional capacity with his work demands; thereby laying the foundations for the path towards productive ageing.

REFERENCES

1. World Health Organisation (WHO). Health of the elderly. Geneva: Report of a WHO Study Group, 1987. WHO Technical Series 779.
2. Chen A J, Jones G. Ageing in Asean: its socio-economic consequences. Singapore: Institute of Southeast Asia Studies, 1989.
3. World Health Organisation (WHO). Ageing and working capacity. Geneva: Report of a WHO Study Group, 1993. WHO Technical Report Series 835.

4. Low L, Phua K H, Toh M H, Yap M T. Population ageing on national health expenditure in Singapore. Singapore: Institute of Policy Studies, 1996.
5. Ilmarinen J. Ageing, work and health. In: Snel J, Cremer R, editors. *Work and Ageing: A European Perspective*. The Hague: Pasmans, 1994:47-65.
6. Recommendation No. 162. Recommendation concerning older workers. In: International Labour Organisation. *International Labour Conventions and Recommendations*, 1981. Geneva: International Labour Office, 1982:773-9.
7. Van Bezooijen CF A. Biological ageing, theories of ageing, age-associated diseases and their intervention. In: Goedhard W, editor. *Ageing and Work*. 3. The Hague: Pasmans, 1996:19-34.
8. Kemper HC G. Physical work and the consequences for the ageing worker. In: Snel J, Cremer R, editors. *Work and Ageing: A European Perspective*. The Hague: Pasmans, 1994:31-47.
9. National Health Survey 1992. Singapore: Research and Evaluation Dept, Ministry of Health, 1993.
10. Chia KS, Lee H I', Seow A, Shanmugaratnam. Cancer incidence in Singapore 1968-92. Singapore: Singapore Cancer Registry, 1996. Report No.4.
11. Tuomi K, Ilmarinen J, Skelinen L, Jarvinen E, Toikkaren J, Klockas M. Prevalence and incidence rates of diseases and work ability in different work categories of municipal employees. *Scand J Work Environ Health* 1991; 17:67-74.
12. Koh D, Ong C N. Effects of ageing on taxi driving. *Ann Acad Med* 1987; 1:107-9.
13. Cryer P C, Fleming C. A review of work-related fatal injuries in New Zealand 1974-84—numbers, rates and trends. *NZ Med J* 1987; 100:1-6.
14. Strauntins I', Hall W. Does early referral to an on-site rehabilitation program predict an early return to work? *J Occup Health Safety ANZ* 1989; 5:137-43.
15. Sickness absence. In: Seaton A, editor. *Textbook of Occupational Health*. Great Britain: Oxford Univ Press, 1994:112-20.
16. Ilmarinen J. International Recommendations for Ageing Workers. In: Kumashiro, editor. *Proceedings of the XIVth UOEH International Symposium "The Paths to Productive Ageing"*; 1994 Oct 19-21; Kitakyushu, Japan. Kitakyushu: Taylor and Francis, 1995:8-11.
17. Molinie A F, Volkoff S. Working conditions: problems ahead for workers over the age of 40. In: Snel J, Cremer R, editors. *Work and Ageing: A European Perspective*. The Hague: Pasmans, 1994:213-25.
18. Age and work behaviour. In: Chareness N, editor. *Ageing and Human Performance*. Chichester: John, 1985:293-336.
19. Warr I'. Ageing and job performance. In: Snel J, Cremer R, editors. *Work and Ageing: A European Perspective*. The Hague: Pasmans, 1994:309-23.
20. De La More G C, Shepard R D. Ageing: changes in consistency of work among leather cutters. *Occup Physiol* 1958, 32:204-9.
21. Ilmarinen J, Tuomi K. Work ability index for ageing workers. In: Ilmarinen J, editor. *Ageing and Work. Proceedings 4. International Scientific Symposium on Ageing and Work*; 1992 May 28-30; Haikko, Finland. Helsinki: Finnish Institute of Occupational Health, 1992:42-151.
22. Ilmarinen J, Tuomi K, Eskelinen L, Nygard C H, Hauhtaran I', Klockas M. Background and objectives of the Finnish Research Project on ageing workers in municipal occupations. *Scand J Work Environ Health* 1991; 7:1-141.
23. Kato K, Kuzuhara T, Tobita H. Challenge to develop an innovative person-centred automobile assembly line. In: Kumashiro M, editor. *Proceedings of the XIVth UOEH International Symposium "The Paths to Productive Ageing"*. Kitakyushu: Taylor and Francis, 1995:274-80.
24. Yamaguchi T. Assigning statistical values to psychophysiological burdens on automobile assembly lines. In: Kumashiro M, editor. *Proceedings of the XIVth UOEH International Symposium "The Paths to Productive Ageing"*. Kitakyushu: Taylor and Francis, 1995:281-9.