UNIT NO. 1

HEALTH CONDITIONS THAT RESULT IN DISABILITY IN ADULTS

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ABSTRACT

Under ElderShield, policyholders who are not able to perform at least 3 of the following ADLs, will be eligible for the insurance pay-outs. The conditions that result in disability in adults can be grouped into six: Disorders from childhood – sequelae of infections, injuries, and intellectual disorders reach adulthood and contribute to the pool of adults with disability; Injuries – spinal cord injuries in younger adults, traumatic brain injury in young and old, musculoskeletal injury in particular hip fractures in the older adult; Cardiovascular system disorders -- strokes, ischaemic heart disease, peripheral vascular disease, retinopathy, nephropathy, and neuropathy; Degenerative musculoskeletal disorders – osteoarthritis of the knee, hip; cervical and lumbar spondylosis. Health conditions with a high potential to result in ADL disability are strokes, pelvic/femoral fractures, and osteoporosis. Prevention of strokes through attention to the high risk diseases (obesity, hypertension, diabetes, and hyperlipidemia). In the elderly, falls is an important cause of traumatic brain injury and musculoskeletal injury. Patients on hypnotic drugs, cough preparations and anti-platelets were more likely to fall. Appropriate usage of analgesics, especially paracetamol, to relieve pain may reduce falls.

Keywords: disorders from childhood, sequelae of infections, injuries, cardiovascular disorders, degenerative musculoskeletal disorders, falls, ADL limitations.

SFP2014; 40(4): 10-15

INTRODUCTION

Health conditions (disorders and diseases) causing disability in adults (and children) besides the medical perspective has three other important perspectives, namely classification framework, disability financing, and social perspectives. These latter 3 will be dealt with first under introduction.

Classification of disability

The classification of disability which started off as the physical framework of *impairment – disability – handicap* proposed by the World Health Organisation (WHO) in 1980 served us well but is now not enough conceptually. We need to think beyond the physical dimension in caring for people with disability.

Consequently, WHO and the World Bank have jointly released the World Report on Disability in 2011 where the new framework of disability called the International Classification of Functioning, Disability and Health (ICF in short), first released in 2001 was proposed again for worldwide adoption. (WHO & World Bank, 2011)[1]. The details of this new classification and a full text of this Report are available at the WHO website.

ICF looks at a disabling health condition (disorder or disease) as being related to body function & structure, activity to deal with it, and participation by the person with disability as well as by his/her fellow beings. Activity required to deal with this health condition is dependent on the contextual factors of environment factors and personal factors. A figure depicting these components as well the application of ICF can be found in Dr Ng Zhi Min's paper (Unit 5). (Ng, 2014)[2]

Disability financing perspective

The need for financing the care for a person with disability is a reality. One of the mechanisms of such financing is insurance. In Singapore, the Eldershield and IDAPE are insurance instruments to help in disability financing. Insurance pay-out is claimed when the threshold for the claim is reached. Operationally, disability is measured by the number of limitations in activities of daily living. In this context, the Ministry of Health has defined disability on its webpage:

"The extent of disabilities is measured by the number of Activities of Daily Living (ADLs), a standard widely used by private insurers which offer such severe disability insurance schemes. There are altogether 6 ADLs. Under ElderShield, members who are not able to perform at least 3 of the following ADLs, will be eligible for the insurance pay-outs."

The definitions of the 6 ADLs are shown in Table 1.

Social perspective

The societal perspective in coping with disability is complex. Structurally, besides the person with disability there is the family unit and beyond that the community. There are also environmental factors and personal factors that reduce or add to the barriers of care and function. Disability poses a challenge to caregivers. The limits of the ability to care for the person with disability at home is often breached when bladder and/or bowel incontinence, behavioural & psychological symptoms (BPS) set in.

In the Singapore context, domestic helps are a big supportive factor in helping to keep the disabled at home. The ability

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TABLE 1. DEFINITIONS OF THE 6 ACTIVITIES OF DAILY LIVING

1. Washing -- The ability to wash in the bath or shower (including getting into and out of the bath or shower) or wash by other means.
2. Dressing -- The ability to put on, take off, secure and unfasten all garments and, as appropriate, any braces, artificial limbs or other surgical or medical appliances.
3. Feeding -- The ability to feed oneself food after it has been prepared and made available.
4. Toileting -- The ability to use the lavatory or manage bowel and bladder function through the use of protective undergarments or surgical appliances if appropriate.
5. Mobility -- The ability to move indoors from room to room on level surfaces.
6. Transferring -- The ability to move from a bed to an upright chair or wheelchair, and vice versa.

Definition of Pre-existing Disability

Pre-existing Disability means suffering from the Severe Disability as defined above before ElderShield Policy Commencement Date. For persons who are auto-covered, severe disability caused solely by accidents that occur during the 90-day opt-out period shall not be regarded as Pre-existing Disability.

Source: MOH, 2014 (updated on 19 Dec 2011)
URL: http://www.moh.gov.sg/content/moh_web/home/costs_and_financing/schemes_subsidies/ElderShield/Definition_of_Disability.html

to engage domestic helps hinges on financial resources and financial assistance from Government as subsidies is therefore greatly welcomed. Currently, the Ministry of Health (MOH), Ministry of Social and Family Development (MSF), HDB, MAS, MOF have financial assistance schemes in place to assist family members to ease the financial strain. The threshold to qualify are shown in the list of disability assistance schemes in the section on useful information.

MEDICAL PERSPECTIVE

There are several elements that need to be discussed: Causes, prevalence, disease burden, dementia, age related disability, innovation, intervention, and prevention.

Causes of adult disability

In this unit, we focus on disability in adults. Disability in infants and children is covered by Prof Ong in Unit 4. (Ong, 2014)[3]. From the clinical standpoint, disorders and diseases causing adult disabilities affecting ADLs can be grouped under six headings:

- Disorders from childhood – Many of the people disease burden of childhood – sequelae of infections, injuries, and intellectual disorders reach adulthood and contribute to the pool of adults with disability. See Table 2.
- Injuries – spinal cord injuries in younger adults, traumatic brain injury in young and old, musculoskeletal injury in particular hip fractures in the older adult.
- Cardiovascular system disorders – strokes, ischaemic heart disease, peripheral vascular disease, retinopathy, nephropathy, and neuropathy.
- Degenerative musculoskeletal disorders – osteoarthritis of the knee, hip; cervical and lumbar spondylosis.
- Psychiatric and neuropsychiatric disorders – anxiety, depression, psychosis, dementia, and end-stage Parkinson's disease
- Others e.g. end stage pulmonary disease, end stage cancers.

Prevalence of medical conditions in the Singapore elderly and disability in adults based on ADL limitations

The most recent and biggest Singapore study on self-reported medical conditions and limitations in ADLs is that by Malhotra et al on 5000 Singaporeans and published in 2012 (Malhotra et al, 2012)[4].

Table 3 taken from this study shows that amongst the 5000 Singaporeans within the age groups of 60 to more than 75, the most prevalent three medical conditions are hypertension, joint/nerve pain, and diabetes. Note that the top three most disabling conditions ranked by adjusted odds ratio for ADL limitations in the same table are stroke, pelvic/femoral fractures, and osteoporosis.

Table 4 taken from Malhotra et al's paper on the 5000 Singaporeans shows the prevalence of ADL limitations amongst them in the different age groups. There is a steep increase in ADL limitations in the older Singaporeans aged 75 and above compared to the younger group 60-74 years. Having at least 1 ADL limitation rises from 3.7% to 14.7% in the males and correspondingly from 5.1% to 32.2%. The frequency of 1 ADL limitation parallels that of limitation to going outdoors. The top three ADLs to be limited are walking, walking, and standing up/sitting down, in that order in the younger elderly; and in the older elderly, the limitations in ADL are going outdoors, bathing and dressing in that order. The order is the same for both the genders. These limitations give us an idea on the help required from caregivers.

Looking into the future, as the number of elderly persons increase, it is expected that the number of persons with ADL limitations will increase too. Thompsen et al estimate that by 2030, the number of resident Singaporeans aged 60 years or older with 1 or more ADL limitations requiring human assistance is projected to be 82,968 persons (7% of the total population aged 60 years or older). Of this number, 38,809 (47%) are estimated to have 1 or 2 ADL limitations, and 44,159 (53%) are estimated to have 3 or more ADL limitations. (Thompsen et al, 2014)[5].

Disease burden in Singaporeans

Some disorders are more disabling than others as we can gather from Table 3 on the odds ratio on ADL limitations. Another way to look at disability is through the perspective of disease burden. A paper by Phua et al from the Ministry of Health, Division of Epidemiology & Disease Control (Phua et al, 2004)[6] on Singapore's burden of disease and injury based on the Singapore Burden of Disease (SBoD) Study 2004 is very useful in this context. It is the first local study to use disability-adjusted life years (DALYs) to quantify the total disease burden.

TABLE 2. TOP TEN CAUSES OF DISEASE BURDEN (IN DALYs) IN SINGAPORE IN 2004 BY AGE GROUP

Rank	0-14 years of age (% of DALY) (n = 24,668)	15-34 years of age (% of DALY) (n = 42,223)	35-64 years of age (% of DALY) (n = 165,873)	65 years of age or older (% of DALY) (n = 130,466)
1	Autism spectrum disorders (20.7)	Anxiety & depression (25.9)	Diabetes mellitus (15.6)	Ischaemic heart disease (16.1)
2	Asthma (10.9)	Schizophrenia (9.9)	Ischaemic heart disease (9.5)	Stroke (11.6)
3	Attention-deficit hyperactivity disorder (6.0)	Diabetes mellitus (6.5)	Stroke (6.1)	Diabetes mellitus (8.2)
4	Low birth weight (5.8)	Road traffic accidents (6.1)	Anxiety & depression (5.8)	Alzheimer's disease & other dementias (6.5)
5	Anxiety & depression (5.6)	Self-inflicted injuries (5.5)	Breast cancer (4.6)	Lung cancer (5.3)
6	Congenital heart disease (3.3)	Migraine (4.4)	Lung cancer (3.9)	Lower respiratory tract infections (4.8)
7	Falls (2.8)	Asthma (2.3)	Adult-onset hearing loss (3.7)	Vision disorders (4.2)†
8	Migraine (2.5)	Anorexia & bulimia (2.1)	Osteoarthritis (3.2)	Chronic obstructive pulmonary disease (3.7)
9	Other chromosomal disorders* (2.1)	Bipolar disorder (1.7)	Schizophrenia (3.0)	Colon & rectum cancer (3.7)
10	Lower respiratory tract	Falls (1.5)	Self-inflicted injuries (2.9)	Osteoarthritis (2.8)

Source: Phua et al, 2009
Footnotes
DALY: disability-adjusted life years
** excludes Down syndrome*
† includes low vision or blindness due to glaucoma, cataract, macular degeneration and all other causes; but excludes diabetic retinopathy and sight loss due to congenital causes, other diseases or injuries.

TABLE 3. SELF-REPORTED HEALTH CONDITIONS AMONG ADULTS (n = 5000)

Characteristic	n (Weighted %)			Adjusted odds ratio for ADL limitations
	Total (n = 5000)	Men (n = 2257)	Women (n = 2743)	
Age (in years)				
60- 64	971 (32.7)	469 (35.1)	502 (30.7)	
65-74	1928 (41.9)	901 (42.9)	1027 (41.1)	
≥75	2101 (25.4)	887 (22.1)	1214 (28.3)	
Gender				
Men	2257 (45.8)			
Women	2743 (54.2)			
Health conditions				
Hypertension	2730 (52.1)	1150 (49.7)	1580 (54.1)	0.9(0.7-1.2)
Joint/ nerve pain	1617 (30.7)	398 (17.7)	1219 (41.7)	1.5(1.2-1.9)
Diabetes	1214 (21.8)	538 (21.6)	676 (22.0)	1.6(1.2-2.1)
Heart diseases	600 (10.3)	346 (13.2)	254 (7.9)	1.6(1.2-2.2)
Chronic back pain	577 (11.0)	93 (4.3)	484 (16.7)	0.7(0.5-1.0)
Chronic respiratory illness	237 (4.2)	110 (4.3)	127 (4.2)	1.8(1.2-2.8)
Stroke	232 (3.9)	133 (4.9)	99 (3.1)	12.7(8.7-18.6)
Renal or urinary tract illness	217 (4.1)	130 (5.5)	87 (2.9)	2.5(1.6-3.9)
Osteoporosis	191 (3.5)	13 (0.5)	178 (6.0)	3.1(2.0-4.8)
Pelvic/femoral fractures	168 (3.1)	59 (2.8)	109 (3.4)	5.9 (3.9-9.1)
Cancer	162 (3.2)	71 (3.1)	91 (3.3)	1.3(0.7-2.4)

Source: Malhotra et al, 2012 (adapted)
Numbers with missing values in total sample: 12 for hypertension, 9 for joint/nerve pain, 9 for diabetes, 6 for heart diseases, 8 for chronic back pain, 5 for chronic respiratory illness, 5 for stroke, 8 for renal/ urinary tract illness, 58 for osteoporosis, 4 for pelvic/femoral fracture, 10 for cancer.

TABLE 4. PREVALENCE OF ADL LIMITATIONS BY AGE AND GENDER

Variable	Men			Women			Total
	60-74 years n = 1370	75+ years n = 887	Total n = 2257	60-74 years n = 1370	75+ years n = 887	Total n = 2257	Total n = 5000
At least 1 ADL limitation	3.7 (2.8-4.6)	14.7 (11.6-17.7)	6.1 (5.1-7.1)	5.1 (4.1-6.1)	32.2 (28.9-35.5)	12.7(11.5-14.0)	9.7 (8.9-10.5)
Bathing	1.2 (0.7-1.7)	7.5 (5.2-9.8)	2.6 (2.0-3.3)	2.1 (1.5-2.7)	16.2 (13.6-18.8)	6.1 (5.1-7.0)	4.5 (3.9-5.1)
Dressing	0.9 (0.5-1.4)	6.4 (4.3-8.6)	2.1 (1.5-2.7)	1.8 (1.2-2.4)	14.1 (11.7-16.6)	5.3 (4.4-6.1)	3.8 (3.3-4.4)
Eating	0.5 (0.2-0.9)	2.9 (1.4-4.3)	1.0 (0.6-1.5)	0.8 (0.4-1.1)	4.8 (3.3-6.3)	1.9 (1.4-2.4)	1.5 (1.2-1.8)
Toileting	0.6 (0.2-1.0)	3.1 (1.6-4.7)	1.2 (0.7-1.6)	1.3 (0.8-1.8)	9.8 (7.7-11.9)	3.7 (3.0-4.4)	2.5 (2.1-3.0)
Standing up/sitting down	1.8 (1.2-2.5)	5.7 (3.7-7.7)	2.7 (2.0-3.4)	2.1 (1.5-2.7)	12.1 (9.8-14.4)	4.9 (4.1-5.7)	3.9 (3.4-4.4)
Walking	2.0 (1.4-2.7)	7.0 (4.8-9.2)	3.1 (2.4-3.8)	2.2 (1.5-2.9)	13.7 (11.3-16.2)	5.5 (4.6-6.3)	4.4 (3.8-5.0)
Going outdoors	3.0 (2.2-3.8)	13.4 (10.4-16.3)	5.3 (4.4-6.2)	4.5 (3.6-5.4)	31.4 (28.1-34.7)	12.1 (10.9-13.3)	9.0 (8.2-9.8)

Source: Malhotra et al, 2012

Figures 1, and 2 taken from Phua et al's paper show the distribution of disabilities afflicting adults in Singapore. Figure 1 clearly shows that cardiovascular diseases and cancers kill but mental disorders, diabetes mellitus, and neurological & sense disorders maim. Figure 2 clearly shows diabetes mellitus as the top disabling disease among Singaporeans resulting in years of life lost due to disability (YLD). Anxiety and depression ranks next, and the rest are Alzheimer's disease & other dementias, stroke, osteoarthritis, hearing loss, and vision loss.

Dementia

We are yet to experience the real onslaught of dementia as the number of people aging to the 90s increase in numbers into the future. There is a need for a paradigm shift in caring for large numbers of people with dementia. Also the challenge lies in the caring for people with early dementia particularly those with BPS – and this will be a GPs' problem as these people will be free living people in the community – physically able as far as ADL's go but intellectually disabled. Those with wandering behaviour and impairment of insight of safety will clearly need social resources to provide the surveillance to keep them safe from harm.

Age related disability

With age there is an accumulation of disabilities. There is the phenomenon of frailty that sets in on the elderly as they age. Frailty is characterised by multisystem decline and vulnerability to adverse health outcomes. Diabetes has its long shadow as a predisposing cause of premature frailty and the geriatric syndromes. Geriatric diabetes care guidelines have refocused from risk factor control to geriatric syndromes. (Chen et al, 2010)[7]

Innovations

With innovations in intervention in physical disabilities in adults through bio-engineering create a leftward shift from handicap to impairment and reduces the impact of disability on towards independence to a great extent and this is welcomed; the premise of course is mental status is reasonably intact in such disabled persons. An example is the wheelchair that is now motorised, and also vehicles are now fitted with ramps that allow these wheelchairs to be driven into the vehicles and docked for transport. The disabled person can stay in the wheelchair throughout this transport and drives himself or herself out at the destination once the ramp is down. People with disabling osteoarthritis of the knees, or cardiovascular impairment now can have a new lease of independence. A visit to the Marina Bay Gardens for such people is now a reality. The continued innovation of smart gadgets in the home will no doubt add to the independence of people with disabilities.

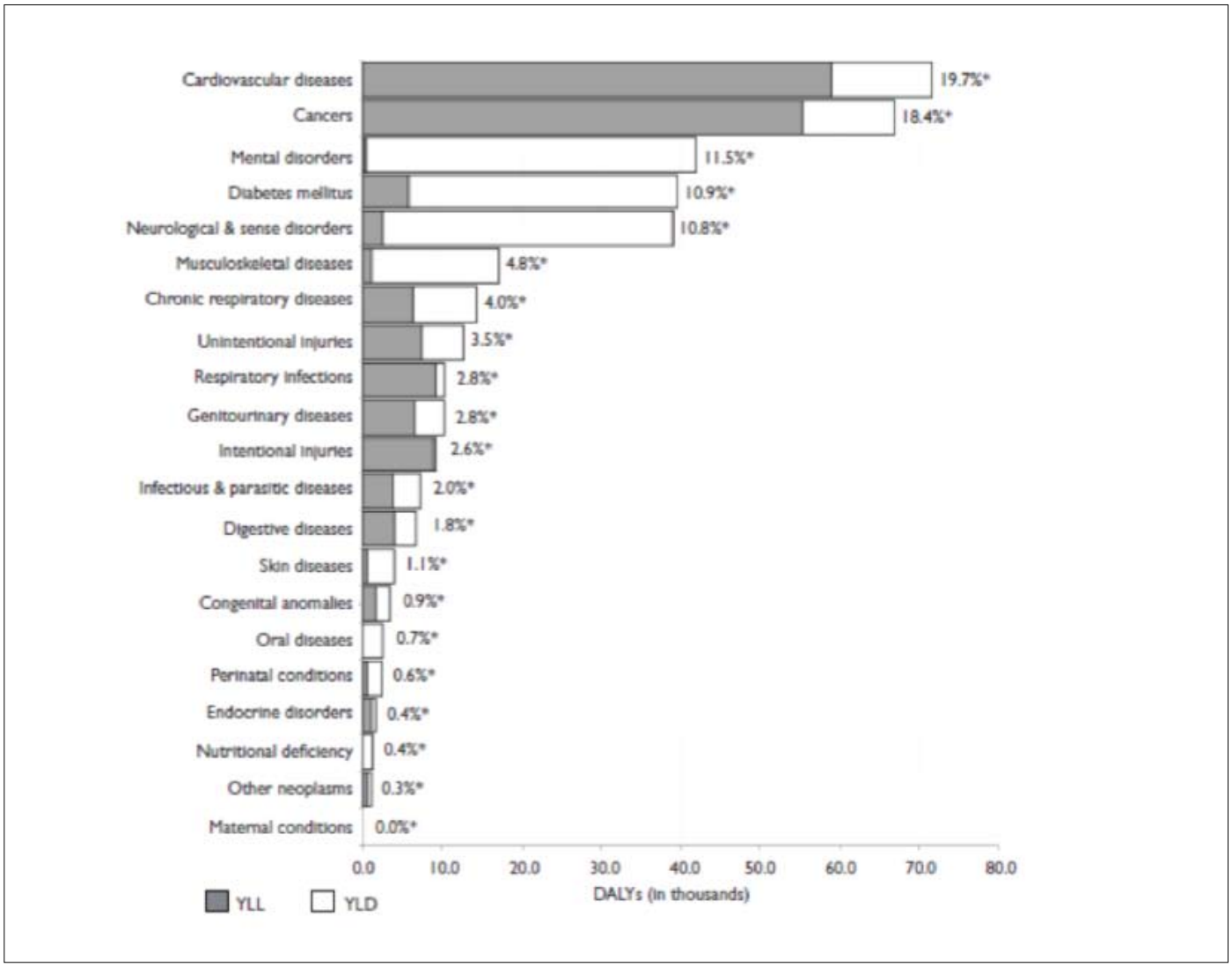
Intervention

Where prevention has not achieved, intervention provides another chance to reduce disability. Timely treatment of musculoskeletal injury in the elderly and rehabilitation can help to reduce downstream disability and dependency.

Prevention

Prevention remains the best strategy against disability in adult life. A life course approach needs to be adopted because disabilities accumulate through life. The big contribution to disability as a consequence of diabetes mellitus has been shown in the Singapore Burden of Disease (SBoD) Study 2004 by Phua et al. (Phua et al, 2009)[6] Attention to lifestyle change and the four high risk diseases of obesity, hypertension, diabetes mellitus, and hyperlipidemia need to be impressed on every person that we encounter in the consultation room. Smoking contributes to ischaemic heart disease and chronic obstructive pulmonary disease. In the elderly, falls is an important cause of traumatic brain injury and musculoskeletal injury. Patients on hypnotic drugs, cough preparations and anti-platelets were more likely to fall. Appropriate usage of analgesics, especially paracetamol, to relieve pain may reduce falls. (Mamun and Lim, 2009)[8]

FIGURE 1. BURDEN OF DISEASE FROM MAJOR DISEASE CATEGORIES IN SINGAPORE 2004.



Source: Phua et al, 2009
Footnote: Bar chart shows the burden of disease (years of life lost to premature mortality [YLL], years of life lost due to disability [YLD] and total disability-adjusted life years [DALYs]) for major disease categories in Singapore 2004.
** refers to the percentage of total DALYs for each disease category*

CONCLUSION

Health conditions that result in ADL limitation as disability can be grouped into 6. Those with a high potential to result in ADL disability are strokes, pelvic/femoral fractures, and osteoporosis. Prevention of strokes through attention to the high risk diseases (obesity, hypertension, diabetes, and hyperlipidemia), and prevention of falls are important.

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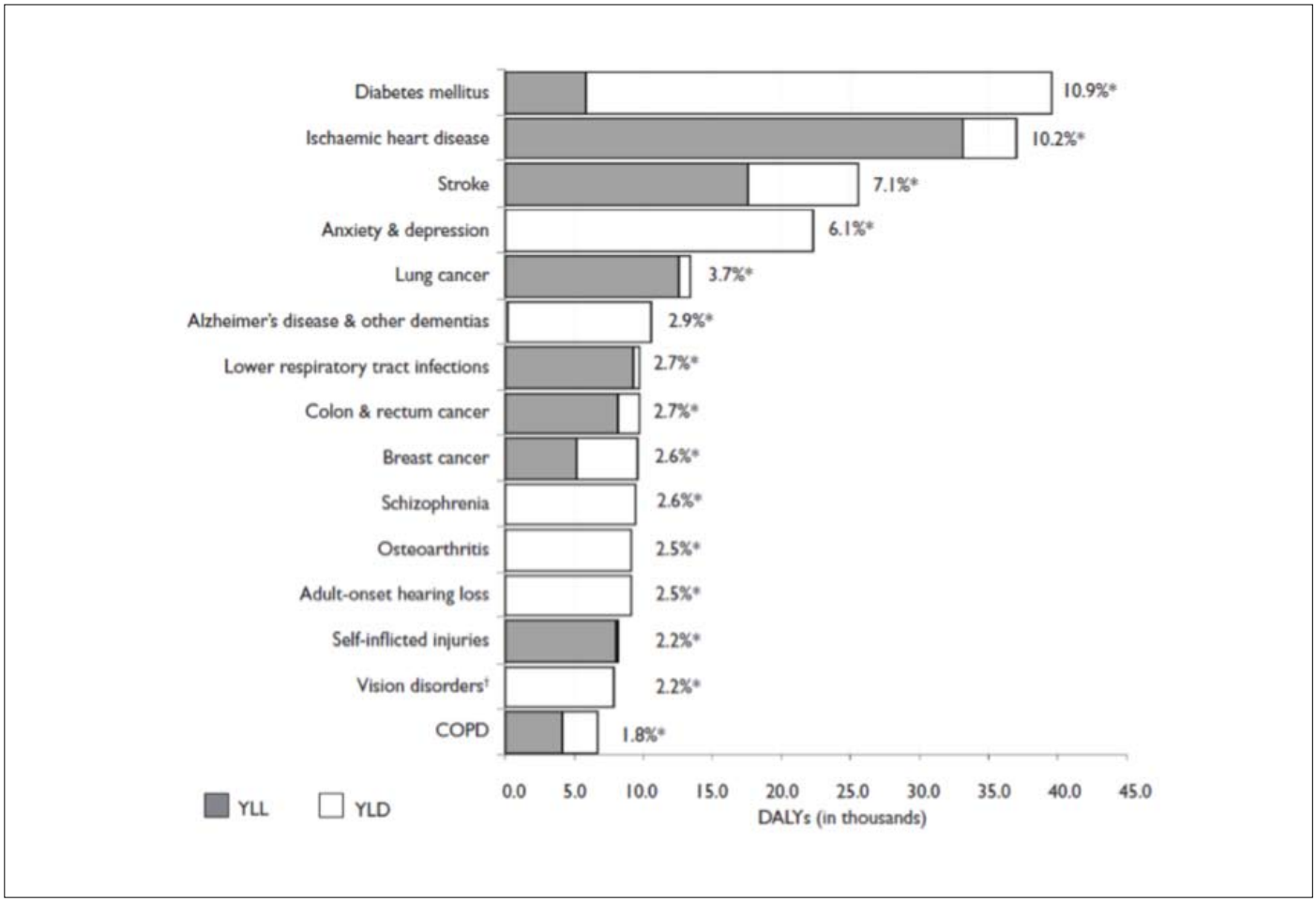
FIGURE 2. THE 15 SPECIFIC LEADING CAUSES OF DISEASE BURDEN IN SINGAPORE 2004.



Source: Phua et al, 2009
Footnote: COPD: chronic obstructive pulmonary disease.
† Includes low vision or blindness due to glaucoma, cataract, macular degeneration and all other causes; but excludes diabetic retinopathy and sight loss due to congenital causes, other diseases or injuries

LEARNING POINTS

- **Under ElderShield, policyholders who are not able to perform at least 3 of the following ADLs, will be eligible for the insurance pay-outs.**
- **Health conditions that with a high potential to result in ADL disability are strokes, pelvic/femoral fractures, and osteoporosis.**
- **Prevention of strokes through attention to the high risk diseases (obesity, hypertension, diabetes, and hyperlipidemia), and prevention of falls are important.**