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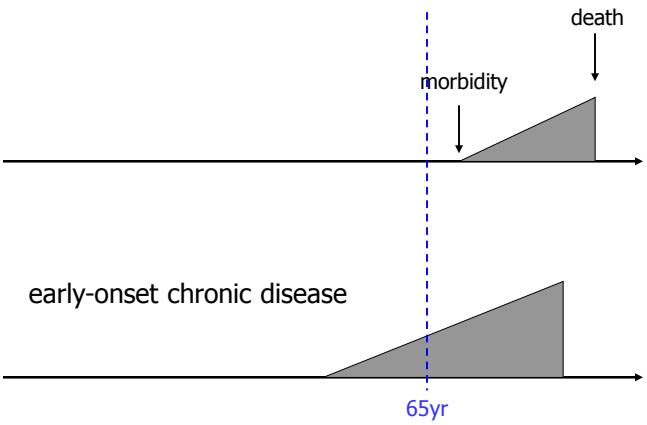
ISPOR Panel, Tokyo Sep 2108:

The Productivity-Adjusted Life Year (PALY)

Danny Liew

Early-Onset Chronic Disease



Productivity-Adjusted Life Year

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Measuring Productivity

examples of tools:

- work, productivity and activity impairment (WPAI)
- health and labour questionnaire (HLQ)
- work limitations questionnaire (WLQ)
- Endicott work productivity scale (EWPS)

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The Productivity Burden of Diabetes at a Population Level

Diabetes Care 2018;41:1–6 | https://doi.org/10.2337/dc17-2138

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Magliano et al. *Diabetes Care*. 2018

Methods

- Australian cohort with diabetes (NDSS), aged 20-65 years
- simulated follow-up via life table modelling until 69 years
- same cohort remodelled, but assumed no diabetes
  - mortality and productivity improved
  - effect of diabetes on productivity[1]: 1.3% absenteeism, 6.6% presenteesim → 'productivity index' = 0.921

1. American Diabetes Association. *Diabetes Care* 2013;36:1033-1046

Diabetes in Australia

Table 1—Model population at baseline from the NDSS diabetes population in 2011

	Men			Women		
Age-group (years)	Population	People with diabetes	Diabetes Prevalence	Population	People with diabetes	Diabetes Prevalence
20–24	823,470	3,665	0.0045	788,193	3,484	0.0044
25–29	841,084	4,480	0.0053	817,086	4,554	0.0056
30–34	769,211	6,285	0.0082	766,950	6,487	0.0085
35–39	782,204	9,995	0.0128	791,706	10,580	0.0134
40–44	786,748	17,201	0.0219	800,496	18,915	0.0236
45–49	764,147	26,352	0.0345	777,690	26,538	0.0341
50–54	739,627	40,196	0.0543	754,436	35,721	0.0473
55–59	662,069	53,970	0.0815	673,924	42,872	0.0636
60–64	611,198	68,667	0.1123	614,802	51,146	0.0832
65–69	474,253	78,092	0.1647	480,007	56,098	0.1169
	7,254,011	308,903	4.3%	7,265,290	256,395	3.5%

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Diabetes and PALYs

Table 4—PALYs lived, simulated from life table modeling

Age-group (years) by sex	Population with diabetes	Population assumed not to have diabetes	Percent reduction in PALYS: nondiabetes versus diabetes
Men			
20–24	149,907	168,192	12.2
25–29	163,504	183,658	12.3
30–34	202,012	227,066	12.4
35–39	278,292	312,816	12.4
40–44	405,969	455,949	12.3
45–49	511,591	573,447	12.1
50–54	613,728	685,619	11.7
55–59	734,910	819,514	11.5
60–64	479,172	528,874	10.4
65–69	210,325	230,046	9.4
Total (men)	3,749,408	4,185,182	11.6
Women			
20–24	146,353	162,501	11.0
25–29	170,940	189,908	11.1
30–34	214,729	238,589	11.1
35–39	303,697	337,303	11.1
40–44	460,515	510,906	10.9
45–49	531,374	588,377	10.7
50–54	561,729	620,210	10.4
55–59	490,248	539,230	10.0
60–64	364,097	398,645	9.5
65–69	152,506	166,174	9.0
Total (women)	3,396,188	3,751,843	10.5
Total	7,145,596	7,937,024	11.1

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Magliano et al. *Diabetes Care*. 2018

Productivity burden of smoking in Australia: a life table modelling study

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Owen et al. *Tobacco Control.* 2018

Methods

- cohort of smokers, 20-65 years, followed up until 69 years
- prevalence of smoking from National Health Survey
- same cohort remodelled, but assumed not smoking
  - reduced mortality[1]
  - prod. indices[2] = 0.957 non-smokers, 0.932 smokers

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1. Peto R et al. http://www.deathsfromsmoking.net/2006
2. Bunn et al. J Occup Environ Med. 2006;48:1099-108.

Prevalence of Smoking in Australia

	Males			Females		
Age	**N**	**% smoking**	**n**	**N**	**% smoking**	**n**
20-24yr	851,818	16.2%	137,995	807,634	17.3%	139,721
25-29yr	885,390	25.5%	225,774	873,715	14.2%	124,068
30-34yr	876,875	25.5%	223,603	874,000	14.2%	124,108
35-39yr	785,670	22.2%	174,419	790,262	14.1%	111,427
40-44yr	819,943	22.2%	182,027	835,414	14.1%	117,793
45-49yr	774,379	20.7%	160,296	789,310	17.2%	135,761
50-54yr	769,307	20.7%	159,247	788,657	17.2%	135,649
55-59yr	714,584	18.3%	130,769	736,359	12.9%	94,990
60-64yr	632,862	18.3%	115,814	653,546	12.9%	84,307
65-69yr	570,582	11.1%	63,335	582,977	6.9%	40,225
TOTAL	7,681,410	20.5%	1,573,278	7,731,874	14.3%	1,108,050

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Owen et al. *Tobacco Control.* 2018

Smoking and PALYs

Age (years)	PALYs lost to smoking	% PALYs lost	PALYs lost per smoker
	Males		
20-24	247,604	5·7%	1.8
25-29	380,994	6·0%	1.7
30-34	346,165	6·3%	1.5
35-39	239,675	6·6%	1.4
40-44	211,217	6·9%	1.2
45-49	149,449	7·2%	0.9
50-54	109,286	7·4%	0.7
55-59	57,992	7·5%	0.4
60-64	26,076	7·4%	0.2
65-69	3,756	6·2%	0.1
All males	1,772,214	6·4%	1.1
	Females		
20-24	144,023	4·5%	1.0
25-29	118,851	4·7%	1.0
30-34	108,518	5·0%	0.9
35-39	86,319	5·2%	0.8
40-44	77,198	5·3%	0.7
45-49	72,214	5·5%	0.5
50-54	54,838	5·7%	0.4
55-59	25,928	6·0%	0.3
60-64	13,065	6·1%	0.2
65-69	1,975	5·1%	0.0
All females	702,931	5·0%	0.7
TOTAL	2,475,144	6·0%	1.0

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Cost of PALYs

"... cost for each PALY ... derived from Australian gross domestic product (GDP) in 2016 (AU$1,474,705 million) divided by the estimated number of equivalent full-time (EFT) workers (9,411,998) ... *AU$157,000*."

"... the total cost of productivity loss attributable to smoking was estimated to be *AU$388 billion* over the working life of the current Australian population."

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Owen et al. *Tobacco Control.* 2018

Limitations

- 'non-dynamic' models
- non-existence of condition vs reversal
- crude estimations of productivity indices
- undiscounted
- how can PALYs inform decision-making?

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PALY vs QALY

- less subjective measurement
- biased towards working-age people
- intrinsic monetary value (societal perspective)
- less comparable across countries

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Thank You

ありがとうございました

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