

Economic Cost of Acute Coronary Syndrome in Australia:

The Cost to Individuals and Their Families



TABLE OF CONTENTS

04	Acronyms
05	Executive summary
07	Call to action
08	Introduction Refining the scope Approach Structure of the report
10	Productivity losses Probability of being employed at time of ACS event Income from employment Returning to work after an ACS event Lost economic output
13	Out of pocket expenses
14	Informal care
15	Results
16	Recommendations Heart and stroke action plan Detect and manage those at risk Support a Risk and Warning Signs Campaign Increased Participation in Cardiac Rehabilitation Program Secondary Prevention Clinics
18	Appendix: Data tables



ACRONYMS

ABS	Australian Bureau of Statistics
ACS	Acute coronary syndrome
AMI / MI	Acute/myocardial infarction
AIHW	Australian Institute of Health and Welfare
CHD	Coronary heart disease
HF	Heart failure
ICD	International Statistical Classification for Diseases
NSTEMI	Non-ST elevation myocardial infarction
STEMI	ST elevation myocardial infarction
UA	Unstable angina

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EXECUTIVE SUMMARY

Heart disease is the leading cause of death in Australia. Whilst an improvement in treatment and care now means more people are surviving an acute heart event, this also means an increasing number of people are living with the burden of heart disease.

It follows then that heart disease places a large economic burden on individuals experiencing heart disease, their families and carers, and governments that funds the health system.

This paper is the second in a series to place a figure on the full economic cost of heart disease to all stakeholders within the economy, with the focus of this report on the burden placed on individuals, carers and their families.

This paper builds upon the Heart Foundation's, *'Economic Cost of Acute Coronary Syndrome in Australia: The Cost to Governments'*, by taking the estimated number of acute coronary syndrome (ACS) events in 2017-18, and estimating the cost to individuals and their families from these events.

Literature is leveraged to develop estimates of lost productivity from death or absence from paid work, out of pocket expenses and the value of informal care provided to ACS patients.

Costs are typically measured just once, in the year of the event. However, emerging evidence shows that more people are surviving their ACS event. While this has many benefits, it means that the number of people living with disability or illness associated with the ACS event is growing. Consequently, more households are bearing costs attributable to ACS years after the initial event.

In this paper the ongoing costs are captured, and discounted to a present value to provide a comprehensive measure of the total costs to households of the current and future costs associated with ACS events in 2017-18.

Current and future costs attributed to ACS events in 2017-18 are \$4,830.9 million. The largest share of this is due to productivity losses, estimated to cost \$3,565.9 million. Out of pocket and informal costs are similar in magnitude, costing households \$620.3 million and \$644.6 million.

The majority of these costs occur in future years highlighting that a single event in a given year has ongoing health implications and costs for individuals, carers and their families. This is particularly the case for people who survive their initial ACS event, and experience ongoing out of pocket and informal care costs.



CALL TO ACTION



Heart and stroke action plan

A national comprehensive and integrated approach to preventing and treating heart attacks and strokes.



Heart Health Checks

Heart health checks to be routinely conducted for persons aged **45 to 74** (or aged **35 and over** for Aboriginal and Torres Strait Islander Peoples).



Public Campaigns

Awareness and education campaigns to improve knowledge of leading risk factors and signs of a heart attack.



Participation in Cardiac Rehabilitation

Increase uptake and completion of cardiac rehabilitation programs to improve recovery.



Secondary Prevention Clinics

Dedicated clinics to provide ongoing medical treatment and lifestyle advice.

INTRODUCTION

Heart disease affects three percent of the adult Australian population, based on 2014-15 self-reported data.¹ While death rates have fallen substantially since the peak of the late 1960s and early 1970s², heart disease continues to be the single leading cause of death in Australia.³

It follows then that heart disease places a large economic burden on individuals experiencing heart disease, their families and carers, and governments that fund the health system.

This paper is the second in a series to place a figure on the full economic cost of heart disease to all stakeholders within the economy. The focus of this second paper is on the burden placed on individuals experiencing heart disease, their families and carers.

The purpose of this paper is to detail the methodological approach taken in estimating the economic cost of heart disease to individuals, families and carers, and the results.

REFINING THE SCOPE

Heart disease, as defined by the International Statistical Classification for Diseases (ICD), includes angina, acute myocardial infarctions (AMI), and acute and chronic ischaemic heart disease.⁴ While there is a preference to scope heart disease at its broadest, and include all conditions, costing of chronic disease is difficult because of the nonlinear progression of the disease. Consequently, the focus of this paper is on acute events, specifically, acute coronary syndrome (ACS).

ACS at its simplest, consists of episodes of unstable angina (UA),⁵ and AMI – more commonly referred to as a heart attack. For the purposes of this study, further granularity is required, disaggregating AMI events into ST elevation myocardial infarction (STEMI) and non-STEMI (NSTEMI) events.⁶ STEMI is full blockage of the artery, leading to necrosis of the heart tissue, making it a more serious diagnosis than NSTEMI.

Literature relating to ACS is rich, and enables a detailed full analysis of the different outcomes that people experience post an ACS event.

Furthermore, ACS accounts for over half of all heart disease admissions (53 percent),⁷ and close to nine in every ten dollars of health expenditure (87 percent).⁸ Therefore, the focus on ACS provides a good proxy for the economic cost of heart disease.

¹ Australian Institute of Health and Welfare 2017, *How many Australians have cardiovascular disease?*, available: www.aihw.gov.au/cardiovascular-disease/prevalence/

² Australian Institute of Health and Welfare 2010, *Cardiovascular disease mortality: trends at different ages*, Cardiovascular series no. 31, cat. no. 47.

³ Australian Bureau of Statistics 2017, *Causes of death*, 2016, ABS cat. No. 3303.0, September.

⁴ Heart disease is defined as Ischaemic heart disease, ICD-10-AM codes I20-I25.

⁵ Unstable angina is defined as ICD-10-AM code I20.0

⁶ STEMI is defined as the sum of ICD-10-AM codes I21.0, I21.1, I21.2, I21.3 and I22. NSTEMI is defined as the sum of ICD-10-AM codes I21.4 and I21.9.

⁷ Heart Foundation calculation based on Australian Institute of Health and Welfare National Hospital Morbidity Database.

⁸ Heart Foundation calculation based on health care expenditure for ACS from Access Economics (2009), divided by health care expenditure for CHD from AIHW 2014.

APPROACH

This paper builds upon the first, taking the number of ACS events estimated for 2017-18, and estimating the cost to individuals, families and carers from these events.

Literature is leveraged to develop estimates of lost productivity from death or absence from paid work, out of pocket expenses and the value of informal care provided to ACS patients.

Costs are typically measured just once, in the year of the event. However, emerging evidence shows that more people are surviving their ACS event. For example, between 1998-99 and 2007-08 the number of AMIs ending in death has almost halved.⁹

While this has many benefits, it means that the number of people living with disability or illness associated with the ACS event is growing. Consequently, more households are bearing costs attributable to ACS years after the initial event.

In this paper, the ongoing costs are captured, and discounted to a present value to provide a comprehensive measure of the total costs to households of the current and future costs associated with ACS events in 2017-18.

STRUCTURE OF THE REPORT

As the purpose of this report is to detail the calculation of the economic cost of ACS to households, the following sections outline the data used, the steps taken, and the assumptions made in the calculation of the different types of costs, borne by individuals and carers.

- **Productivity losses** – this chapter builds upon the first paper, using the estimated number of ACS events, deaths and survivors from these events, to estimate the productivity losses associated with death and disability from ACS events.
- **Out of pocket expenses** – this chapter leverages recent literature on the out of pocket expenses for ACS survivors, and estimates the out of pocket expenditure on medication over patients' lifetime.
- **Informal care** – this chapter presents the methodology and results to estimate the value of informal care provided to ACS patients.
- **Results** – this chapter brings together the different cost components to provide a total cost to individuals, carers and their families from ACS events in 2017-18.
- **Appendix** – this chapter includes detailed data tables.

⁹ Australian Institute for Health and Welfare 2011, *Monitoring acute coronary syndrome using national hospital data: an information paper on trends and issues*, cat. no. CVD 57.



PRODUCTIVITY LOSSES

From an economic perspective, the major cost borne by individuals and their families is the loss of income contributed by their loved one. Collectively, this is a significant loss to the economy.

Lost income, or productivity, as it is typically referred, is measured using the human capital approach. The human capital approach is based on the premise that an individual is irreplaceable (i.e. the economy is at full employment) and the income a person would have earned over their life is a loss in productivity to the economy.

Productivity loss is measured as the present value of gross income that would have been earned, for people that have extended absences from paid employment, or die because of their ACS event.

For these people, estimates are made about the likelihood of being in paid employment, and the income drawn from this employment. Assuming a retirement age of 65, the residual number of years of employment is calculated using the median age for each age group.

For those people that survive their ACS event, additional research on the time taken to return to work is used to estimate the productivity loss associated with ACS events.

PROBABILITY OF BEING EMPLOYED AT TIME OF ACS EVENT

National figures are used to estimate the probability of a person being employed by age group. This is measured as the total number of persons employed (full time and part time), divided by the total number of persons in that age group.

To account for cyclical effects in the rate of employment, the average employment rate over the last ten years (February 2008 to January 2018) was used for each five-year age group.¹⁰

INCOME FROM EMPLOYMENT

Gross earnings that an individual would have earned during their remaining working life were estimated using Australian Bureau of Statistics (ABS) data on the average weekly earnings by age group. This data is drawn from the May 2016 collection and inflated to current prices using the wage price index.¹¹

¹⁰ See Table 5 of the Appendix.

¹¹ See Table 6 of the Appendix.

RETURNING TO WORK AFTER AN ACS EVENT

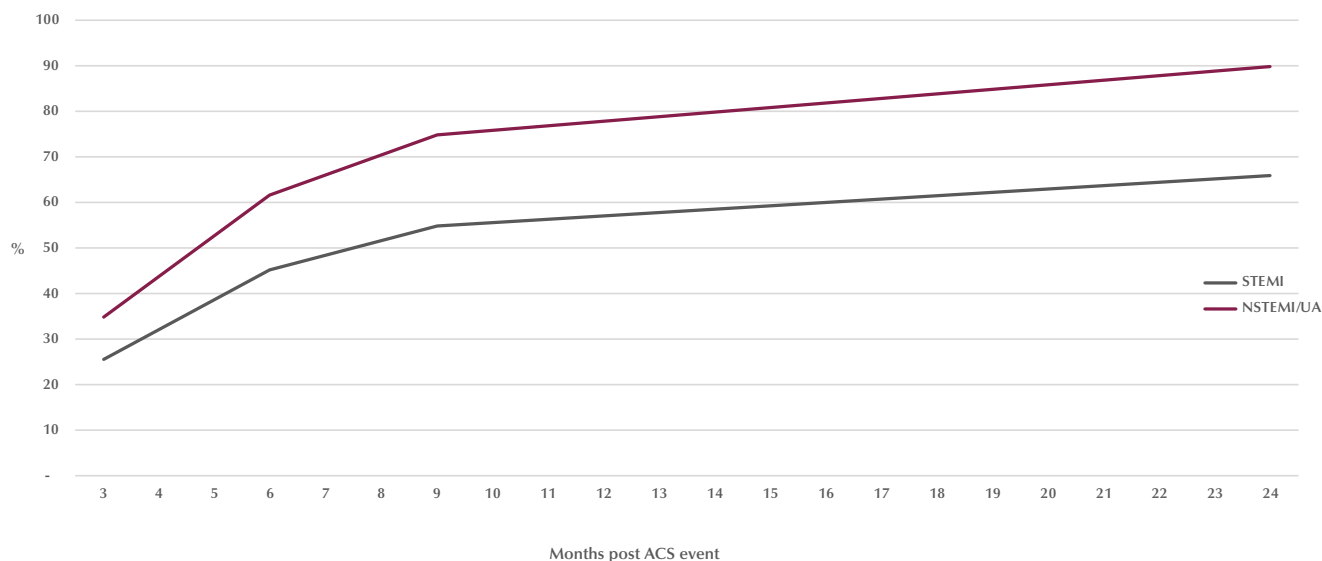
For those people that were in paid employment at the time of their ACS event, a significant proportion are not able to return to work immediately, and therefore, suffer a loss of income.

In a study of ACS patients, it was observed that for people who experienced a STEMI, 34 percent will not return to the same level of work, or at all, within two years of their event.¹² For those that experience a NSTEMI or UA, prospects of returning to work are much better, with only 10 percent not having returned to work, or at the same level, within two years of their initial event.

The Heart Foundation's own survey of heart attack survivors finds similar results. In 2016, 52.8 percent of respondents that had experienced a heart attack within the last five years, had returned to the same level of work after their heart attack.¹³

Looking at the path back to work it is apparent that the majority of patients return to work within 9 months of their ACS event (see Chart 1).

Chart 1: Proportion of ACS patients returning to same level of work, post ACS event



Source: Slebus F et al 2012, 'Return to work after an ACS: Patients' perspective', Safety and Health at Work, vol. 3, pp. 117-122; Heart Foundation calculations

For those patients that do not return to work within two years of their event, it is assumed they retire or become long-term unemployed until their retirement.

¹² Slebus F et al 2012, 'Return to work after an ACS: Patients' perspective', Safety and Health at Work, vol. 3, pp. 117-122; Heart Foundation calculations

¹³ Heart Foundation 2017, Heart Attack Survivors Survey 2016.

LOST ECONOMIC OUTPUT

In 2017-18, an estimated 3,130 working age people will die within one year of their ACS event, with a further 26,543 working age people surviving their ACS event.

Of those who die within the first 12 months of their ACS event, 2,156 persons are estimated to have been in full or part time employment. It is assumed that if they had not died from their ACS event, they would have continued to contribute to the economy, and earn an income until their retirement at 65 years of age.

For those of working age that survived their ACS event, an estimated 18,679 were in paid full or part time employment. While the majority of these people return to work within 9 months of their ACS event, some people never return to the same level of activity as prior to their ACS event.

The present value of productivity losses for those patients that experience an ACS event in 2017-18 is an estimated \$3,565.9 million. As illustrated in Table 1, NSTEMI events are responsible for the largest proportion of productivity loss. This is expected, as there are more NSTEMI events than STEMI or UA.

Table 1: Present value of productivity losses from ACS events in 2017-18

	UA	STEMI	NSTEMI	ACS
\$ million	660.5	1,410.0	1,495.5	3,565.9
Share	18.5	39.5	41.9	100.0

Source: Heart Foundation calculations

Notes: See Table 8 for a breakdown of results by age group; discount rate of 5 percent.

OUT OF POCKET EXPENSES

To manage the impact of an ACS event, and prevent secondary events, patients may require rehabilitation or exercise programs, additional medical services and medication.

While Australia is fortunate to have free public hospital care, and a pharmaceutical and medical benefits scheme to subsidise medicines and medical appointments, there is growing recognition that the burden of out of pocket costs is significant.¹⁴

A 2012 Australian study surveyed patients that had experienced an ACS event, to ascertain what, if any, out of pocket expenses patients incurred as a consequence of their ACS event. Of those patients surveyed, 92 percent experienced out of pocket expenses, with an average cost of \$258.06 per month. See Table 2 for a breakdown by type of expense.

Table 2: ACS-related out of pocket expenses (per month), 2012

	Average expenditure (\$)	Share of patients with expenditure (%)
Medical service	120.18	51.3
Medications	66.25	90.2
Ambulance/transport costs	30.95	26.3
Exercise/allied health	16.68	14.4
Home and self-care assistance	14.14	9.3
Special foods	5.66	3.5
Other	4.2	1.9
Total expenditure	258.06	100.0

Source: Jan S., Essue B.M, Leeder, S. 2012 'Falling through the cracks: the hidden economic burden of chronic illness and disability on Australian households', Medical Journal of Australia, vol. 196, issue 1, pp. 29-31

These costs have been collected for a 3-month period, 18 months after the patients' ACS event. However, it is not possible to determine over what period patients continue to incur these costs. The exception to this is medications, which patients are typically required to continue with, for most, if not all of their lives.

Consequently, the lifelong out of pocket expenses associated with medications has been estimated for ACS patients that survive the first 12 months. The present value of out of pocket expenses on medications for patients that experience an ACS event in 2017-18 is an estimated \$620.3 million (see Table 9 for a break down by gender and age group).

¹⁴ Jan S., Essue B.M, Leeder, S. 2012 'Falling through the cracks: the hidden economic burden of chronic illness and disability on Australian households', Medical Journal of Australia, vol. 196, issue 1, pp. 29-31



INFORMAL CARE

Informal care, such as collecting medicine, driving to appointments, and basic nursing care is typically provided by family and friends, once a patient is discharged from hospital. While often invisible or intangible, informal care plays an important role in ensuring patients are stable, and don't require unnecessary readmission to hospital.

In a British study of carers of patients experiencing coronary heart disease (for which ACS is a subset), it was observed that carers spent an average of 280 hours per year (or 23 hours per month), caring for their loved one.

While the amount of care required by each person is likely to vary, it is assumed that every person that experiences an ACS event will require informal care in the first month following their ACS event. After the first month, it is assumed that for those people that return to work, they no longer have a requirement for informal care. Conversely, for those people that don't return to work, it is assumed that they continue to receive informal care until their death.

The value of informal care is estimated using the opportunity cost method. This method values the alternate use of time (e.g. work or leisure), which is proxied using an average wage rate.

For those patients that experience and survive an ACS event, it is estimated that \$644.6 million worth of informal care is provided to these patients.

Table 3: Present value of productivity losses from ACS events in 2017-18, by age group

	UA	STEMI	NSTEMI	ACS
Total	182.0	281.7	180.9	644.6

Source: Liu J et al 2002, 'The economic burden of coronary heart disease in the UK', *Heart*, vol. 88, pp. 597-603; ABS 2017, Employee earnings and hours, Australia, May 2016, cat. no.6306.0; ABS 2018, Wage Price Index, Australia, December 2017, cat. no. 6345.0; Slebus F et al 2012, 'Return to work after an ACS: Patients' perspective', *Safety and Health at Work*, vol. 3, pp. 117-122; Heart Foundation calculations.



RESULTS

The total cost to households of ACS is calculated by summing the present value of the different types of costs. As presented in Table 4, the total cost borne by individuals, families and carers is \$4,830.9 million, with the largest share due to productivity losses.

Table 4: Total cost of ACS in 2017-18 borne by households

	\$ million	Share (%)
Productivity loss	3,565.9	73.8
Out of pocket	620.3	12.8
Informal care	644.6	13.3
Total	4,830.9	100.0

Source: Heart Foundation calculations.

The majority of these costs accrue in the years following the ACS event, which are then discounted to a present value. This highlights that a single event in a given year has ongoing long term ramifications and costs for individuals, carers and their families.

This is particularly the case for people that survive their initial ACS event, and experience ongoing out of pocket and informal care costs.

RECOMMENDATIONS

To reduce the economic and social impact of the burden from ACS, the following interventions are critical in reducing the number of heart attacks and strokes, as well as improving recovery and ongoing management.

HEART AND STROKE ACTION PLAN

While prevention, treatment and ongoing management of people with cardiovascular disease in Australia is generally good, and sometimes very good, there are still some alarming gaps. There are gaps in our approach to prevention, early detection, treatment, ongoing management and research.

There are, for example, 1.4m Australians at high risk of having a heart attack or stroke within the next five years, yet nearly one million of these are not getting the required medication. These gaps cost lives and money.

The recent development of the National Strategic Framework for Chronic Conditions provides an opportunity for the Government to ensure it has a comprehensive and integrated approach to the major chronic disease groups.

While there are strategies and action plans to address a number of chronic diseases, such as diabetes and asthma, and key risk factors, such as tobacco and alcohol control, there remains no national action plan for heart attack and stroke. This is a conspicuous gap in Australia's overall approach to chronic disease. From a government perspective, a well-targeted heart and stroke action plan has the potential to curb future costs as evidenced in this report.

A heart and stroke action plan should focus on:

- preventing premature death
- improving quality of life
- cutting avoidable hospital admissions, and
- reducing the immense economic and social burden cardiovascular disease imposes on the health system and the community.

DETECT AND MANAGE THOSE AT RISK

More than 100,000 Australians have a heart attack or stroke each year, taking an immense social and economic toll on the community. And yet, much of this toll is avoidable if Australians at high risk are detected early and are then well-managed.

Disturbingly, over 1.4 million Australians aged 45 to 74 have a high risk of a heart attack or stroke within the next five years, with most not receiving the recommended treatment.

Thousands of heart attacks and strokes could be averted if people aged 45–74 had an absolute cardiovascular risk assessment (heart health check) and those at high risk were well managed according to existing guidelines.

Undertaking heart health checks and ensuring ongoing management of patients at high risk should be incorporated into the proposed Quality Improvement Incentive payment. A full heart health check allows therapy to be targeted to those who would most benefit. Not only is this good clinical practice, it makes sound economic sense.

SUPPORT A RISK AND WARNING SIGNS CAMPAIGN

With heart disease being the leading cause of death in Australia, it is disturbing that very few Australians are aware of the risk factors for heart attacks, notably high blood pressure and high cholesterol. Whilst awareness of lifestyle risk factors such as poor diet, being physically inactive or smoking is high, fewer than 10% of Australians are aware that having high and unmanaged blood pressure and/or high cholesterol increases the risk of having a heart event.

The lack of awareness means emphasis placed on effectively managing high blood pressure and/or high cholesterol takes a back seat behind focusing on dietary changes and exercise. A public campaign focused not only on increasing awareness but also knowledge levels of how to reduce the impact of risk factors would ensure Australians devoted their time and attention to the leading risk factors.

Comparable to the lack of knowledge of risk factors, few Australians are aware of the variety of signs and symptoms of a heart attack. Whilst most Australians can connect chest pain and shortness of breath with a heart attack, few are aware that other signs such as neck pain, nausea, vomiting and jaw pain are also warnings of a heart attack.

The lack of awareness leads to delayed action in responding to a heart attack, placing most at risk of poor recovery, unnecessary damage to heart muscle and even premature death. The Heart Foundation's Warning Signs campaign between 2009 and 2012 demonstrated that a public awareness campaign aimed at increasing knowledge of signs of a heart attack can and does lead to an increase in the number of people taking action earlier, resulting in the reduction of significant heart muscle damage and enhancing recovery and quality of life.

INCREASED PARTICIPATION IN CARDIAC REHABILITATION PROGRAM

Cardiac rehabilitation can reduce mortality, improve cardiac risk factor profile and reduce readmissions; yet uptake remains low. For heart attack survivors, cardiac rehabilitation is an important step in their journey of care. While there is strong evidence that attending a program of cardiac rehabilitation can dramatically reduce the chance of a further cardiac event, attendance rates for cardiac rehabilitation programs are as low as 30%.

A Victorian study reported a 25% increase in five-year survival rates among patients who attended cardiac rehabilitation. Other recent research also indicated that \$227m worth of economic and social benefits could be made from increased cardiac rehabilitation participation over a 10-year period in Victoria alone.¹⁵

Getting more eligible patients to participate in cardiac rehabilitation should, therefore, be a high priority for all Australian governments. Given that more than one-third of hospital admissions for heart attack are repeat events, this is particularly true.

Greater uptake of cardiac rehabilitation can reduce the burden of disease, directly translating to benefits for society and the economy.

SECONDARY PREVENTION CLINICS

Cardiac rehabilitation is crucial in the initial recovery post heart attack or stroke, however, ongoing management to prevent secondary events is just as critical.

With one in three heart attacks and strokes being repeat events, the establishment of multidisciplinary clinics and/or programs provide the capacity for patients to receive ongoing medical and lifestyle advice, treatment and care.

Studies have shown having secondary prevention clinics/programs lead to a significant reduction in hospital readmissions within the first twelve months, a period of critical importance as survivors from heart attacks and strokes are at considerable risk of having a repeat event within this period.

¹⁵ De Gruyter E, Ford G, Stavreski B 2015, 'Economic and Social Impact of Increasing Uptake of Cardiac Rehabilitation Services – A Cost Benefit Analysis'; Heart, Lung and Circulation; vol.26, issue 2, p. 175-183

APPENDIX: DATA TABLES

Table 5: Employment rate by age group, 2008-2018

Age group	Average employment rate (%)
15-19	45.7
20-24	72.4
25-29	78.6
30-34	78.8
35-39	79.1
40-44	80.8
45-49	81.3
50-54	78.7
55-59	69.9
60-64	51.3

Source: ABS 2018, Labour Force, Australia – detailed, cat. no. 6291.0.55.001; Heart Foundation calculations

Table 6: Estimate gross income by age group, current prices

Age group	Average employment rate (%)
< 20	18,331
21-34	57,655
35-44	79,065
45-54	79,253
≥ 55	69,399

Source: ABS 2017, Employee earnings and hours, Australia, May 2016, cat. no.6306.0; ABS 2018, Wage Price Index, Australia, December 2017, cat. no. 6345.0; Heart Foundation calculations

Table 7: People experiencing an ACS event in 2017-18

	Died		Survived	
	Working age	Employed	Working age	Employed
15-19	0	0	2	1
20-24	4	3	26	19
25-29	14	11	120	96
30-34	36	28	291	233
35-39	101	80	811	653
40-44	229	185	1,911	1,567
45-49	422	343	3,503	2,891
50-54	629	495	5,264	4,220
55-59	762	533	6,539	4,686
60-64	934	479	8,075	4,313
Total	3,130	2,156	26,543	18,679

Source: Heart Foundation calculations

Table 8: Present value of productivity losses from ACS events in 2017-18, by age group

	UA	STEMI	NSTEMI	ACS
15-19	0.1	-	0.1	0.2
20-24	0.5	5.0	2.5	8.0
25-29	6.1	16.2	11.7	34.0
30-34	11.9	40.7	32.4	85.0
35-39	32.6	110.2	94.7	237.5
40-44	85.4	208.0	201.0	494.4
45-49	134.2	331.9	327.7	793.8
50-54	165.7	349.6	394.1	909.4
55-59	144.4	252.1	285.8	682.3
60-64	79.5	96.3	145.6	321.4
Total	660.5	1,410.0	1,495.5	3,565.9

Source: Heart Foundation calculations

Table 9: Present value of medication expenses from ACS events in 2017-18

	Male	Female	Persons
15-19	0.0	-	0.0
20-24	0.3	0.1	0.4
25-29	1.2	0.6	1.8
30-34	3.4	0.9	4.3
35-39	8.8	2.8	11.6
40-44	19.1	7.4	26.5
45-49	33.8	12.6	46.4
50-54	49.5	16.9	66.3
55-59	56.3	19.9	76.3
60-64	62.4	24.2	86.7
65-69	60.8	26.7	87.6
70-74	49.2	26.9	76.1
75-79	37.1	24.1	61.2
80-84	21.9	17.5	39.3
>85	15.6	20.3	35.9
Total	419.4	200.9	620.3

Source: Jan S., Essue B.M, Leeder, S. 2012 'Falling through the cracks: the hidden economic burden of chronic illness and disability on Australian households', Medical Journal of Australia, vol. 196, issue 1, pp. 29-31



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