

**Appendix 1. ICD-9 codes used to identify chronic wounds from national claims dataset**

Venous ulcers – *ICD-9-AM: 4540, 4532, 4591; ICD-10-AM: I83.0, I83.2, I87.0.*

Arterial insufficiency ulcers – *ICD-9-AM: 44023, 44024; ICD-10-AM: I70.23, I70.24*

Diabetic ulcers – *ICD-9-AM: 7071, 7078, 7079, 7854 & one of 25070, 25071, 25072 or 25073; ICD-10-AM: E10.73, E11.73, E13.73, E14.73, E10.52, E11.52, E13.52, E14.52, E09.02, E09.52, E10.69, E11.69, E13.69, E14.69*

Pressure ulcers – *ICD-9-AM: 7070; ICD-10-AM: L89.0, L89.1, L89.2, L89.3, L89.4, L89.5, L89.6, L89.7, L89.8, L89.9*

**Appendix 2. Cohort of all hospital admissions for a relevant chronic wound 2012 to 2019**

	All	No wound	Arterial	Venous	Diabetic	Pressure
Number	5,196,899	5,047,162	14,536	19,210	16,999	49,879
Age, mean (st dev)	50.4 (26.9)	49.6 (26.8)	75 (13.3)	72.1 (17.1)	72.4 (15.7)	81.7 (13)
Male	49%	48%	56%	57%	58%	50%
CCI score (mean)	4.1	4.1	6.1	4.7	5.9	4.4
Chinese	64%	64%	63%	60%	54%	71%
Malay	14%	14%	17%	16%	21%	13%
Indian	10%	10%	11%	13%	13%	6%
Others	12%	12%	9%	11%	12%	10%
COPD	7%	7%	6%	5%	5%	8%
Diabetes Mellitus	42%	42%	82%	57%	100%	40%
Hypertension	69%	68%	92%	77%	88%	76%
Dyslipidemia	61%	61%	84%	67%	86%	59%
Heart Failure	14%	14%	33%	21%	27%	14%
Renal Failure	24%	23%	49%	30%	44%	21%
Stroke	17%	17%	27%	19%	20%	40%
Dementia	6%	6%	7%	5%	4%	33%
Major Depression	6%	6%	5%	5%	6%	8%
Parkinson	3%	3%	2%	2%	1%	17%
Schizophrenia	4%	4%	1%	3%	2%	4%
Length of Stay, mean (st dev)	6.5(17)	6.3 (16.7)	16.2 (20.2)	9.8 (16)	14 (18.6)	16.8 (25.2)

**Appendix 3. Summary results of generalised linear model (GLM) with a gamma link function to estimate excess length of stay**

	All	No wound	Arterial	Venous	Diabetic	Pressure
Number	5,196,899	5,054,937	14,536	19,210	16,999	49,879
Length of Stay, mean (st dev)	6.5 (17)	6.3 (16.7)	16.2 (20.2)	9.8 (16)	14 (18.6)	16.8 (25.2)
Coefficient (95% CI)	-	-	0.722 (0.690,0.754)	0.303 (0.272,0.333)	0.701 (0.669,0.733)	0.543 (0.516,0.570)
Rate ratio of length of stay (95% CI)	-	-	2.059 (1.993,2.126)	1.353 (1.993,2.126)	2.015 (1.952,2.081)	1.722 (1.676,1.769)
Estimated mean length of stay (95% CI)	-	-	2.233 (2.215,2.252)	2.232 (2.215,2.252)	2.226 (2.208,2.245)	2.234 (2.216,2.253)
Expected length of stay (95% CI)	-	-	4.598 (4.414,4.788)	3.02 (4.414,4.788)	4.485 (4.31,4.672)	3.847 (3.714,3.986)
Excess length of stay (95% CI)	-	-	2.365 (2.199,2.536)	0.788 (2.199,2.536)	2.259 (2.102,2.427)	1.613 (1.498,1.733)

**Appendix 4. Full results of generalised linear model (GLM) with a gamma link function to estimate excess length of stay**

Co-variate	Exponentiated coefficients; 95% confidence intervals in brackets							
los_cens	Arterial		Venous		Diabetic		Pressure	
d_ulcer	2.059***		1.353***		2.015***		1.722***	
95CI	1.993	2.126	1.993	2.126	1.952	2.081	1.676	1.769
age	1.013***		1.013***		1.013***		1.013***	
95CI	1.013	1.013	1.013	1.013	1.013	1.013	1.013	1.013
male	1.019***		1.020***		1.019***		1.020***	
95CI	1.016	1.023	1.016	1.023	1.015	1.023	1.016	1.024
1.Race	1		1		1		1	
2.Race	0.989***		0.989***		0.987***		0.988***	
95CI	0.983	0.994	0.983	0.994	0.982	0.992	0.983	0.993
3.Race	0.903***		0.902***		0.902***		0.904***	
95CI	0.898	0.909	0.898	0.909	0.897	0.908	0.898	0.910
4.Race	0.935***		0.935***		0.934***		0.935***	
95CI	0.927	0.942	0.927	0.942	0.926	0.941	0.928	0.943
dCCI_AMI	0.941***		0.943***		0.942***		0.943***	
95CI	0.936	0.946	0.936	0.946	0.937	0.948	0.938	0.948
dCCI_Cancer	1.099***		1.099***		1.099***		1.099***	
95CI	1.094	1.105	1.094	1.105	1.093	1.105	1.094	1.105
dCD_DM	1.094***		1.096***		1.091***		1.098***	
95CI	1.090	1.099	1.090	1.099	1.087	1.096	1.093	1.102
dCD_Hyp	1.076***		1.077***		1.077***		1.078***	
95CI	1.071	1.082	1.071	1.082	1.071	1.083	1.072	1.084
dCD_LPD	0.919***		0.919***		0.918***		0.920***	
95CI	0.914	0.923	0.914	0.923	0.914	0.923	0.916	0.925
dCD_HeartFail	1.040***		1.040***		1.041***		1.041***	
95CI	1.034	1.046	1.034	1.046	1.035	1.046	1.036	1.047
dCCI_Renal	1.113***		1.115***		1.113***		1.115***	
95CI	1.108	1.118	1.108	1.118	1.108	1.118	1.110	1.121
dCD_Stroke	1.153***		1.153***		1.154***		1.150***	
95CI	1.148	1.159	1.148	1.159	1.149	1.159	1.144	1.155
dCD_Dementia	1.144***		1.143***		1.143***		1.132***	

95CI	1.135	1.152	1.135	1.152	1.134	1.151	1.124	1.141
dCD_MajDepression	1.086***		1.086***		1.086***		1.085***	
95CI	1.078	1.095	1.078	1.095	1.077	1.094	1.077	1.094
dCD_Parkinson	1.155***		1.154***		1.154***		1.143***	
95CI	1.142	1.168	1.142	1.168	1.141	1.168	1.130	1.156
dCD_Schizophrenia	1.475***		1.474***		1.476***		1.474***	
95CI	1.459	1.492	1.459	1.492	1.460	1.493	1.458	1.491
dCD_COPD	0.971***		0.970***		0.970***		0.971***	
95CI	0.965	0.977	0.965	0.977	0.964	0.977	0.965	0.978
dCCI_ModLiver	1.003		1.002		1.003		1.003	
95CI	0.990	1.016	0.990	1.016	0.990	1.016	0.991	1.017
dCCI_PUD	0.969***		0.969***		0.969***		0.969***	
95CI	0.964	0.975	0.964	0.975	0.964	0.975	0.963	0.975
dCCI_PVD	1.226***		1.244***		1.234***		1.248***	
95CI	1.217	1.235	1.217	1.235	1.225	1.243	1.238	1.257
dCCI_SevereLiver	1.015		1.014		1.016		1.014	
95CI	0.999	1.032	0.999	1.032	0.999	1.033	0.998	1.031
_cons	2.233***		2.232***		2.226***		2.234***	
	2.215	2.252	2.215	2.252	2.208	2.245	2.216	2.253
N	1908832		1908832		1908832		1908832	
	10790634.3		10794131.0		10790860.0	1.8	10791675.1	9.0
BIC	10790933.4		10794430.1		10791159.1		10791974.2	

**Appendix 5. The incidence rates by age band, at risk population and incident cases**

	age band	at risk population	incidence rate per 100,000	annual incident cases
Venous	<40	1,957,020	1.2	23
	40-49	614,941	7	43
	50-59	614,492	19.9	122
	60-69	466,620	37.5	175
	70-79	211,447	66.7	141
	≥80	101,276	91.8	93
	total	3,965,796		598
Arterial	<40	1,957,020	1.1	22
	40-49	614,941	15.6	96
	50-59	614,492	67.5	415
	60-69	466,620	143.4	669
	70-79	211,447	246.4	521
	≥80	101,276	477.9	484
	total	3,965,796		2,206
Diabetic	<40	1,957,020	5.8	114
	40-49	614,941	56.6	348
	50-59	614,492	175.8	1,080
	60-69	466,620	368.6	1,720
	70-79	211,447	758.6	1,604
	≥80	101,276	1791.1	1,814
	total	3,965,796		6,680
Pressure	<40	1,957,020	4.8	94
	40-49	614,941	22	135
	50-59	614,492	74.4	457
	60-69	466,620	236.4	1,103
	70-79	211,447	844.2	1,785
	≥80	101,276	3646.5	3,693
	total	3,965,796		7,268

**Appendix 6. EQ-5D scores by type of wound and time from Singapore Wound Registry**

Mean (Std. Dev.)	Baseline	month 1	month 3	month 6
Venous	0.57 (0.34) (n=255)	0.68 (0.31) (n=235)	0.74 (0.30) (n=242)	0.74 (0.30) (n=243)
Arterial	0.44 (0.40) (n=354)	0.52 (0.42) (n=311)	0.54 (0.45) (n=303)	0.58 (0.44) (n=291)
Diabetic	0.64 (0.42) (n=139)	0.71 (0.44) (n=128)	0.72 (0.38) (n=129)	0.74 (0.43) (n=126)
Pressure	-0.18 (0.50) (n=51)	0.00 (0.56) (n=43)	0.18 (0.54) (n=38)	0.11 (0.59) (n=40)

**Appendix 7 - SAS code for calculating the local EQ-5D index score from EQ-5D-3L**

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*** coding of EQ-5D data: 1 = no problems, 2 = some/moderate problems, 3 = extreme problems;
*** mo = mobility, sc = self-care, ua = usual activity, pd = pain/discomfort, ad = anxiety/depression;

data new; set new;
  if mo=2 then m2=1; else m2=0;
  if mo=3 then m3=1; else m3=0;
  if sc=2 then s2=1; else s2=0;
  if sc=3 then s3=1; else s3=0;
  if ua=2 then u2=1; else u2=0;
  if ua=3 then u3=1; else u3=0;
  if pd=2 then p2=1; else p2=0;
  if pd=3 then p3=1; else p3=0;
  if ad=2 then a2=1; else a2=0;
  if ad=3 then a3=1; else a3=0;
  if mo=3 or sc=3 or ua=3 or pd=3 or ad=3 then n3=1; else n3=0;
  EQ_index = 1 - 0.1678*m2 - 0.3040*m3 - 0.1615*s2 - 0.3465*s3 - 0.2555*u2 - 0.3209*u3 - 0.1462*p2 - 0.2291*p3 - 0.1501*a2 - 0.2784*a3 - 0.2905*n3;
  if mo =. or sc =. or ua =. or pd =. or ad =. then EQ_index =. ;
drop m2 m3 s2 s3 u2 u3 p2 p3 a2 a3 n3; run;
```



**Appendix 8. Mean duration of wounds in days, by age band; Mean (Standard Deviation)**

Age Band	Venous (n=150)	Diabetic (n=245)	Pressure (n=24)
<40	133 (92)	177 (88)	55 (11)
40-49	129 (109)	325 (550)	86 (24)
50-59	331 (394)	224 (216)	115 (1)
60-69	223 (269)	314 (430)	103 (59)
70-79	307 (438)	256 (305)	105 (115)
≥80	205 (153)	160 (138)	62 (52)

# values for Diabetic were used to proxy 'Arterial' wounds

**Appendix 9 – usage and costs of outpatient services for patients with chronic wounds**

	with consult		without consult	
	mean (sd)	95% CI	mean (sd)	95% CI
Total annual costs				
Costs of Outpatient with Consult - Arterial	\$908.13 (\$778.27)	(\$815.39, \$1000.86)	\$992.01 (\$1241.53)	(\$844.08, \$1139.94)
Costs of Outpatient with Consult - Venous	\$685.73 (\$575.30)	(\$603.62, \$767.84)	\$2381.98 (\$2449.41)	(\$2024.72, \$2739.24)
Costs of Outpatient with Consult - Diabetic	\$918.06 (\$823.40)	(\$752.11, \$1084.01)	\$1068.85 (\$905.06)	(\$888.33, \$1249.36)
Costs of Outpatient with Consult - Pressure	\$702.40 (\$525.63)	(\$368.43, \$1036.37)	\$1111.98 (\$1330.34)	(-\$118.38, \$2342.34)
Annual visits				
No. of Visits of Outpatient with Consult - Arterial	8.249 (6.107)	(7.521, 8.977)	8.454 (6.362)	(7.696, 9.212)
No. of Visits of Outpatient with Consult - Venous	5.874 (5.932)	(5.028, 6.721)	23.639 (18.989)	(20.870, 26.409)
No. of Visits of Outpatient with Consult - Diabetic	8.102 (6.209)	(6.857, 9.347)	14.172 (51.225)	(4.008, 24.336)
No. of Visits of Outpatient with Consult - Pressure	6.5 (4.681)	(3.526, 9.474)	9.714 (10.797)	(-0.271, 19.700)
Cost per Visit				
Costs per Visit of Outpatient with Consult - Arterial	\$110.44 (\$46.69)	(\$104.88, \$116.01)	\$117.28 (\$87.66)	(\$106.84, \$127.73)
Costs per Visit of Outpatient with Consult - Venous	\$133.24 (\$81.05)	(\$121.67, \$144.80)	\$106.81 (\$105.11)	(\$91.48, \$122.14)
Costs per Visit of Outpatient with Consult - Diabetic	\$112.00 (\$66.26)	(\$98.64, \$125.35)	\$114.93 (\$39.31)	(\$107.08, \$122.77)
Costs per Visit of Outpatient with Consult - Pressure	\$111.04 (\$55.19)	(\$75.97, \$146.10)	\$124.14 (\$38.92)	(\$88.14, \$160.13)

**Appendix 10. Cohort of all patients who accessed CHAS, Polyclinic or Emergency departments (ED) 2012 to 2019**

	CHAS		Polyclinic		ED	
	No Wound	Any Wound	No Wound	Any Wound	No Wound	Any Wound
Number	1,013,104	3,463	2,600,153	1,441	2,964,540	7,403
Age	49.4	67.9	37	65	36	68
Male	46%	45%	51%	57%	56%	52%
CCI score	2.6	4.0	2.1	4.3	2.0	5.0
Chinese	72%	78%	64%	61%	52%	61%
Malay	14%	10%	12%	13%	10%	17%
Indian	6%	8%	10%	20%	9%	13%
Others	9%	5%	14%	6%	30%	9%
COPD	3%	4%	2%	5%	3%	5%
Diabetes Mellitus	32%	55%	28%	68%	30%	70%
Hypertension	64%	82%	55%	81%	56%	83%
Dyslipidemia	61%	72%	50%	78%	51%	77%
Heart Failure	4%	13%	3%	15%	4%	22%
Renal Failure	10%	24%	7%	26%	8%	39%
Stroke	8%	16%	7%	17%	8%	26%
Dementia	2%	6%	1%	6%	2%	16%
Major Depression	3%	3%	2%	4%	2%	7%
Parkinson	1%	3%	1%	2%	1%	6%
Schizophrenia	2%	2%	2%	3%	2%	3%
Average no. of episodes in 12 months from wound/first visit	3.1	6.2	1.8	2.8	1.4	2.6

**Appendix 11. Results of generalised linear model (GLM) with a Poisson link function to estimate excess use of poly-clinic services, CHAS and ED.**

<i>Polyclinic</i>	All	No wound	Any wound
Number	2601594	2600153	1441
Mean no. of episodes in 12 months, SD	1.85(1.78)	1.85(1.77)	1.85(1.78)
Median 12 month utilisation, IQR	1 (1-2)	1 (1-2)	2 (1-3)
Coefficient			0.352 (0.288,0.416)
Rate ratio of Episodes, CI			1.423 (1.333,1.513 )
Estimated mean Episodes, CI			2.157 (2.13,2.184 )
Expected Episodes, CI			3.069 (3.031 ,3.108 )
Excess Episodes, CI			0.912 (0.901 ,0.924 )
<i>CHAS</i>	All	No wound	Any wound
Number	1016567	1013104	3463
Mean no. of episodes in 12 months, SD	3.13 (3.75)	3.12 (3.73)	6.18 (7.30)
Median 12 month utilisation, IQR	2 (1 - 4)	2 (1 - 4)	4(2 -8)
Coefficient			0.685 (0.669 , 0.701)
Rate ratio of Episodes, CI			1.984 (1.952 , 2.016)
Estimated mean Episodes, CI			3.596 (3.578 , 3.614)
Expected Episodes, CI			7.134 (7.099 , 7.169)
Excess Episodes, CI			3.538 (3.521 , 3.556)
<i>ED</i>	All	No wound	Any wound
Number	2971943	2964540	7403
Mean no. of episodes in 12 months, SD	1.38(1.17)	1.38(1.16)	1.38(1.17)
Median 12 month utilisation, IQR	1 (1-1)	1 (1-1)	2 (1-3)
Coefficient			0.343 (0.319 ,0.367 )
Rate ratio of Episodes, CI			1.410 (1.376 ,1.444 )
Estimated mean Episodes, CI			1.531 (1.515 ,1.547 )
Expected Episodes, CI			2.159 (2.136 ,2.181 )
Excess Episodes, CI			0.628 (0.621 ,0.634 )