



ESTUDOS DE CUSTOS DO DIABETES NO SISTEMA PÚBLICO DE SAÚDE BRASILEIRO

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CUSTOS DIABETES

Perspectivas do SUS e da sociedade

- REVISÃO DAS EVIDÊNCIAS DE CUSTOS DO DIABETES MELLITUS NO BRASIL E AL;
- CUSTOS BASEADOS EM PREVALÊNCIA;
- CUSTOS BASEADO EM INCIDÊNCIA;
- CUSTOS DAS HOSPITALIZAÇÕES;
- CUSTOS DO PÉ DIABÉTICO;
- CUSTOS INDIRETOS;







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*Environmental Research
and Public Health*



Article

Disease and Economic Burden of Hospitalizations Attributable to Diabetes Mellitus and Its Complications: A Nationwide Study in Brazil

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METODOLOGIA

- PREVALÊNCIA DO DIABETES NO BRASIL, POR SEXO, FAIXAS ETÁRIAS e UF
 - PNS 2013 : diagnóstico de diabetes auto-referido X 2
- POPULAÇÃO BRASIL: IBGE
- HOSPITALIZAÇÕES
 - CID10 : diabetes e complicações (66 códigos 3 dígitos)
 - SIH/SUS: AIH-1 e AIH-5
 - > 20anos, ano 2014

METODOLOGIA

- RISCO ATRIBUÍVEL POPULACIONAL (RAP)

$$RAP = [P (RR - 1)] / [P (RR - 1) + 1]$$

P=prevalência

RR=risco relativo para o desfecho de interesse

METODOLOGIA

- Valores obtidos em reais(R\$) e convertidos em dolar internacional considerando o “paridade do poder de compra”(Int\$ / purchasing power parity (PPP) (fator de conversão 1.748)

World Bank. PPP Conversion Factor, GDP (LCU per International \$)

Table 1. Number and rates of hospitalization due to diabetes and related conditions, by age-group and sex, Unified Health System (SUS), Brazil, 2014.

Diabetes and Related Conditions	Age Groups (Years)										All
	20-44		45-64		65-74		75+		Total		
	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	All
Diabetes Mellitus	8898	10,243	25,991	27,141	14,014	17,689	10,465	16,931	59,368	72,004	131,372
Attributed to diabetes											
Cardiovascular Disease *	1588	1683	14,527	12,046	14,482	13,536	10,683	14,412	41,281	41,678	82,958
Kidney Disease	1017	1170	4066	3385	3750	2844	3475	2852	12,308	10,251	22,559
Eye Disease	315	216	2417	2885	3400	5326	2333	3922	8465	12,349	20,814
Neurological Disease **	1668	976	6200	4561	4165	3268	2820	3050	14,853	11,855	26,708
Infectious Disease ***	564	685	1847	1866	2547	2614	4405	5846	9362	11,011	20,373
Neoplasms ****	104	439	1105	2332	1016	1865	542	1085	2767	5721	8488
Total *****	14,154	15,412	56,154	54,217	43,374	47,142	34,723	48,098	148,404	164,869	313,273
Crude Rate/10,000 population	3.5	3.8	28.4	25.4	101.6	90.1	146.0	133.3	22.2	23.3	22.8
Age adjusted Rate/10,000 population									23.9	21.9	

* Coronary heart disease and cerebrovascular disease; ** Diagnoses related to diabetic neuropathy; *** Urinary and respiratory infections; **** Breast, endometrial, pancreas, colorectal, hepatocarcinoma, cholangiocarcinoma ***** Numbers do not necessarily sum to totals because of rounding

Table 3. Total hospitalization cost (in 000 Int\$) due to diabetes and related conditions by age group and sex, SUS, Brazil, 2014.

Diabetes and Related Conditions	Age Groups (Years)										
	20-44		45-64		65-74		75+		Total		All
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
Diabetes Mellitus Attributed to diabetes	4906.8	5287.7	9231.7	8650.5	5050.5	5684.6	3559.1	5489.5	22,747.9	25,112.4	47,860.3
Cardiovascular Disease *	1977.4	1540.9	28,480.1	17,698.6	27,636.5	20,006.1	14,573.2	14,934.9	72,667.3	54,180.5	126,847.8
Kidney Disease	3449.4	2975.7	9320.8	6461.9	5250.6	3380.8	2859.6	2432.4	20,880.3	15,250.9	36,131.2
Eye Disease	416.9	260.7	2217.3	2162.8	2133.3	2798.2	1159.3	1782.6	5926.8	7004.3	12,931.1
Neurological Disease **	909.6	475.0	4049.4	2713.4	3101.1	2258.1	2276.1	2346.6	10,336.2	7793.1	18,129.3
Infectious Disease ***	325.6	298.0	1236.4	1132.6	1734.8	1660.2	2709.9	3624.1	6006.7	6714.9	12,721.6
Neoplasms ****	109.7	502.4	1254.6	2831.1	1270.1	2292.8	668.2	1317.9	3302.4	6944.2	10,246.6
Total *****	12,095.4	11,340.6	55,790.3	41,650.9	46,176.9	38,080.8	27,805.4	31,928	141,867.8	123,000.3	264,867.9

* Coronary heart disease and cerebrovascular disease; ** Diagnoses related to diabetic neuropathy; *** Urinary and respiratory infections; **** Breast, endometrial, pancreas, colorectal, hepatocarcinoma, cholangiocarcinoma. ***** Numbers do not necessarily sum to totals because of rounding.

Table 5. Number, average and total hospitalization cost due to cardiovascular disease, overall and related to diabetes, adults (20+ years), SUS, Brazil, 2014.







Diabetes and Related Conditions	Overall Hospitalization			Hospitalization Due to Diabetes		
	Number	Average Hospitalization Cost	Total Hospitalization Cost	Number	Average Hospitalization Cost	Total Hospitalization Cost
	(n)	(Int\$)	(in 000 Int\$)	(n)	(Int\$)	(in 000 Int\$)
I20 Angina pectoris	123,897	2265.29	280,662.5	21,202	2318.49	49,156.1
I21 Acute myocardial infarction	91,951	2025.70	186,265.3	13,784	2036.35	28,070.1
I23 Certain current complications following acute myocardial infarction	937	2069.76	1939.4	137	2293.55	315.1
I24 Other acute ischemic heart diseases	19,283	2878.38	55,503.8	3005	3009.33	9041.7
I22 Subsequent myocardial infarction	2248	1669.43	3752.9	340	1720.45	584.4
I25 Chronic ischemic heart disease	14,856	4065.16	60,392.1	2712	4065.62	11,027.9
I10 Essential (primary) hypertension	74,141	202.77	15,033.7	10,075	228.94	2306.6
I11 Hypertensive heart disease	9704	244.19	2369.6	736	271.00	199.5
I12 Hypertensive renal disease	1159	1736.11	2012.2	254	1277.07	324.6
I50 Heart failure	220,476	790.71	174,333.6	19,892	776.83	15,453
I60 Subarachnoid haemorrhage	9406	3339.63	31,412.6	259	3129.97	810.4
I61 Intracerebral haemorrhage	13,031	1555.16	20,265.3	404	1507.63	608.6
I62 Other non-traumatic intracranial haemorrhage	3736	2118.63	7915.2	113	2033.32	229.3
I63 Cerebral infarction	15,523	909.46	14,117.5	3787	920.99	3487.8
I65 Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction	2775	2782.18	7720.5	115	2755.04	315.5
I66 Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction	1255	840.22	1054.5	45	784.87	35.2
I67.2 Cerebral atherosclerosis	49	1303.74	63.9	10	1313.46	12.9
I69 Sequelae of cerebrovascular disease	7642	1577.12	12,052.4	1096	1837.99	2014.7
G45 Transient cerebral ischemic attacks and related syndromes	20,969	573.59	12,027.6	4993	571.77	2854.6
Total cardiovascular disease *	633,038	1404.17	888,894.5	82,958	1529.05	126,847.9

* Numbers do not necessarily sum to totals because of rounding



Article

Annual Direct Medical Costs of Diabetic Foot Disease in Brazil: A Cost of Illness Study

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METODOLOGIA

custos hospitalares

Table 2. Causes of hospitalization and procedures related to diabetic foot disease, as coded by ICD-10 codes, relative risk and source.

Diabetes Mellitus *			
E10	Insulin-dependent diabetes mellitus		
E11	Non-insulin-dependent diabetes mellitus		
E13	Other specified diabetes mellitus		
E14	Unspecified diabetes mellitus		
Complications Related to Diabetic Foot Disease		Relative Risk	Ref.
G57	Mononeuropathies of lower limb	1.97	[29]
G59	Mononeuropathy in diseases classified elsewhere	1.97	[29]
G63	Polyneuropathy in diseases classified elsewhere	1.97	[29]
L97	Non-pressure chronic ulcer of lower limb, not elsewhere classified	1.97	[29]
M86	Osteomyelitis	5.8	[30]
M87.3	Other secondary osteonecrosis	5.8	[30]
M87.8	Other osteonecrosis	5.8	[30]
M87.9	Unspecified osteonecrosis	5.8	[30]
R02	Gangrene, not elsewhere classified	10.9	[31]
S88	Traumatic amputation of lower leg	6.4	[31]
S98	Traumatic amputation of ankle and foot	19.4	[31]

METODOLOGIA

custos ambulatoriais

Table 1. Epidemiology model parameters—Base case and sensitivity analysis.

Model Parameters	Base Case		Sensitivity Analysis			
	Value	Reference	Lower	Reference	Upper	Reference
Total adult population, 2014	148,696,000	[12]				
Prevalence of self-reported diabetes (%)	6.2	[13]				
Prevalence of neuroischemic foot among DM # patients (%)	9	[14]	3.3	[15]	10.6	[14]
Proportion of DM # patients with ulcers (%)	5.27	[13]	1.24	[15]	30	[16]
Ulcers managed as outpatients * (%)	98.31	[17]	65.2	[18]	99.7	[19]
Non-infected foot ulcer (%)	50	[20]	88	[21]	44.5	[22]
Infected foot ulcer (%)	50	[20]	12	[21]	55.5	[22]
Ulcers managed as inpatients	1.69	[17]	34.8	[18]	0.3	[19]
Amputation (%)	1.36	[13]	1.1	[15]	13.7	[6]

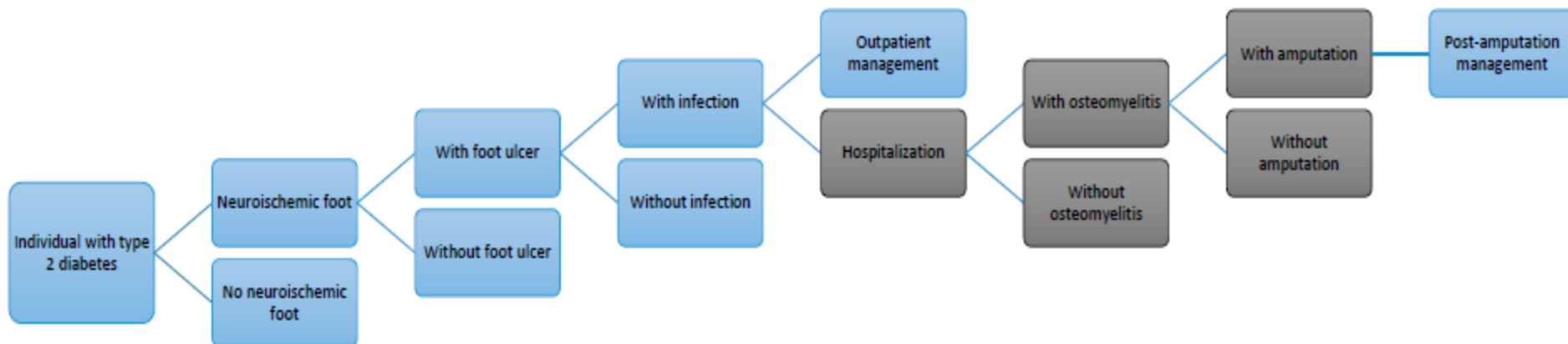
DM = diabetes mellitus; * Estimated from the frequency of hospitalized treated infected ulcers.

METODOLOGIA

custos ambulatoriais

MICRO-CUSTEIO

- Quantificação de recursos utilizados por ano por caso (Sigtab e banco de preços)
 - Painel 12 especialistas
 - 4 casos clínicos



ANÁLISES DE SENSIBILIDADE

Table 4. Estimated annual direct medical costs of diabetic foot disease (DFD) outpatients. Base-case and sensitivity analysis. Brazil, 2014.

DFD Condition	Value in Int\$		
	Base Case	Sensitivity Analysis	
		Lower	Upper
Neuroischemic foot without ulcer	285,197,635	104,572,466	335,899,436
Non-infected foot ulcer	8,771,482	833,410	53,085,829
Infected foot ulcer	34,752,923	477,287	262,319,121
Patients amputated requiring follow up	6,767,704	2,007,089	80,294,609
Total outpatient DFD costs	335,489,743	107,940,251	731,598,996

CUSTOS BASEADOS EM PREVALÊNCIA

CUSTOS AMBULATORIAIS



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The Costs of Type 2 Diabetes Mellitus Outpatient Care in the Brazilian Public Health System

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- Utilização de recursos de saúde 1.000 indivíduos DM2 atendidos em unidade básicas de saúde e centros de referências em 8 cidades;
- CUSTOS DIRETOS MÉDICOS: consultas profissionais de saúde, medicamentos, exames e procedimentos, tiras reagentes glicemia capilar.
- CUSTOS DIRETOS NÃO-MÉDICOS: transporte, alimentos dietéticos, cuidadores.

MEDICAMENTOS

- Medicamentos para diabetes da farmácia popular: valores da portaria do Ministério da Saúde, no 971, que dispõe sobre a farmácia popular (Ministério da Saúde, 2012);
- Medicamentos da lista da RENAME comprados pelo governo: valores (média ponderada do ano de 2014) de todas as compras públicas (Banco de Preços em Saúde)
- Outros medicamentos referidos pelos pacientes: menores valores de mercado acrescido do ICMS de 18% obtidos do relatório da Câmara de Regulação do Mercado de Medicamentos (ANVISA, 2015).

CUSTOS DIRETOS

COST COMPONENTS	COSTS per case/year (Int\$) *	TOTAL COSTS (Int\$)	% of direct costs
Medicines	480.8	4 448 916 269	45.39
Insulin syringes	51.5	194 414 077	1.98
Health professional visits	76.2	705 386 372	7.19
Lab tests	49.2	455 750 648	4.65
Home glucose monitoring (lancets and test strips)	93.7	297 332 316	3.03
TOTAL MEDICAL COSTS	751.4	6 101 799 682	62.26
Diet	349.7	3 236 104 918	33.03
Transportation	100.7	462 346 326	4.71
TOTAL NON-MEDICAL COSTS	450.4	3 698 451 244	37.74
TOTAL DIRECT COSTS (medical and non-medical)	1 201.9	9 800 250 926	

CUSTOS INDIRETOS

- perdas de horas/dias de trabalho(paciente e acompanhante)
- licenças médicas
- aposentadorias precoces

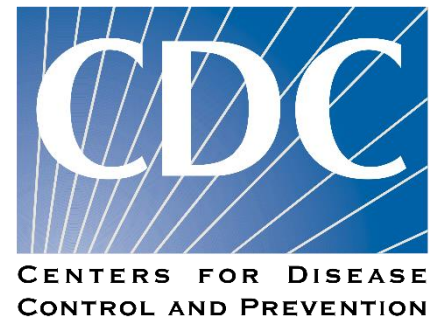
COST COMPONENT	Average costs per patient/year (Int\$)§	Total costs (Int\$)
Absenteeism – patient	188.3	1,555,600,383
Absenteeism – companion	100	276,607,341
Early retirement	6,931.4	4,746,254,695
TOTAL INDIRECT COSTS		6,578,623,243

CUSTOS BASEADOS EM INCIDÊNCIA

METODOLOGIA

Modelo Markov

U.S. Centers for Disease Prevention and Control



Lifetime Direct Medical Costs of Treating Type 2 Diabetes and Diabetic Complications

Xiaohui Zhuo, PhD, Ping Zhang, PhD, Thomas J. Hoerger, PhD

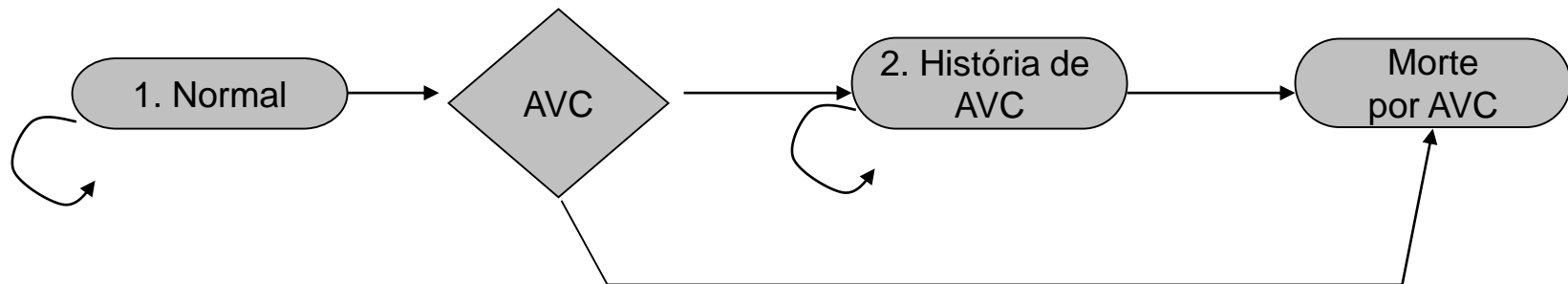
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Background: Lifetime direct medical cost of treating type 2 diabetes and diabetic complications in the U.S. is unknown.

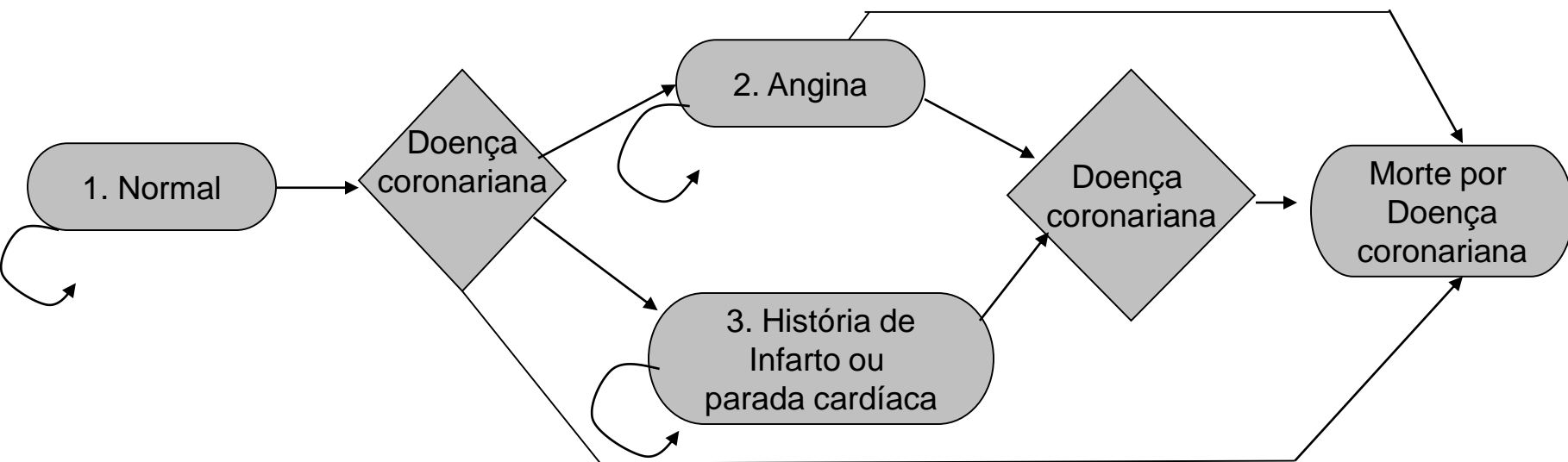
Purpose: This study provides nationally representative estimates of lifetime direct medical costs of treating type 2 diabetes and diabetic complications in people newly diagnosed with type 2 diabetes, by gender and by age at diagnosis.

Modelo de Markov, progressão do diabetes complicações macrovasculares

Acidente Vascular Cerebral (AVC)

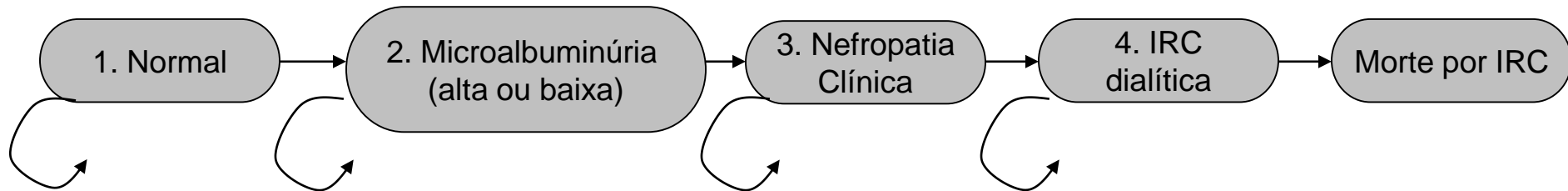


Doença coronariana – Angina/infarto

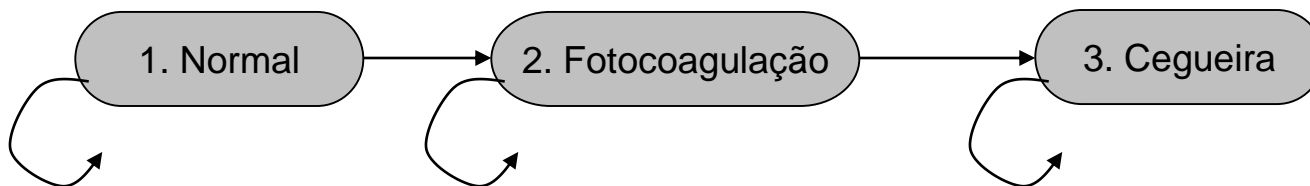


Modelo de Markov, progressão do diabetes complicações microvasculares

Nefropatia

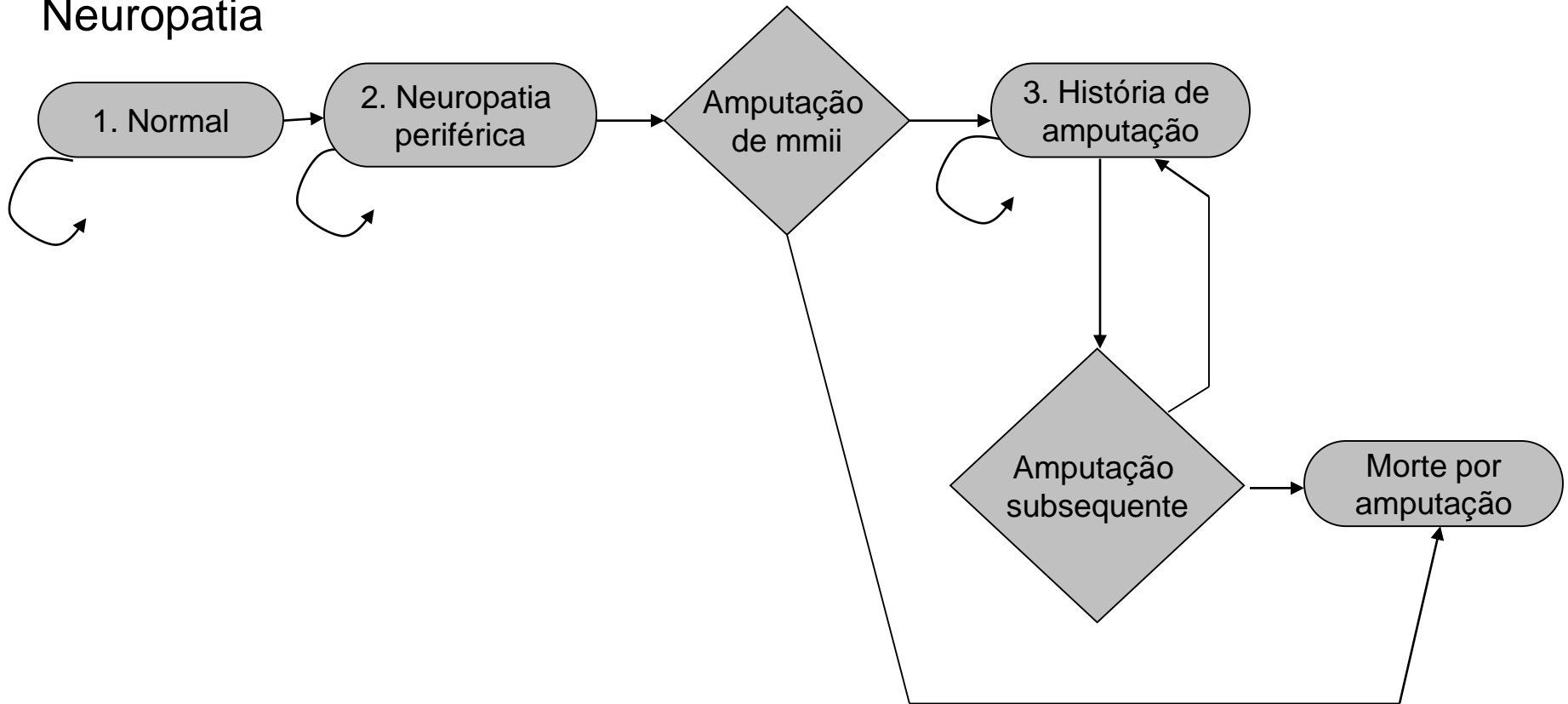


Retinopatia



Modelo de Markov, progressão do diabetes complicações microvasculares

Neuropatia



CUSTOS INDIRETOS

DADOS DATAPREV

- Afastamentos definitivos (aposentadoria precoce)
- Afastamentos temporários (auxílios-doença)

Secretaria da Previdência. Ministério da Fazenda. Dados abertos – Previdência Social e INSS - Previdência Social. <http://www.previdencia.gov.br/dados-abertos/dados-abertos-previdencia-social/>.

OBRIGADA PELA ATENÇÃO!

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