

ECONOMIC BURDEN OF PRIMARY IMMUNODEFICIENCY IN NATIONAL INSTITUTE OF PEDIATRICS IN MEXICO

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Background: Observational and retrospective study examining the economic burden of disease in children with Primary Immunodeficiency (PID) in the National Institute of Pediatrics in Mexico (INP).

Objectives: The aim of this study was to describe health care resource use (HCRU) and disease cost burden in both, children with PID in treatment and children with PID belatedly diagnosed.

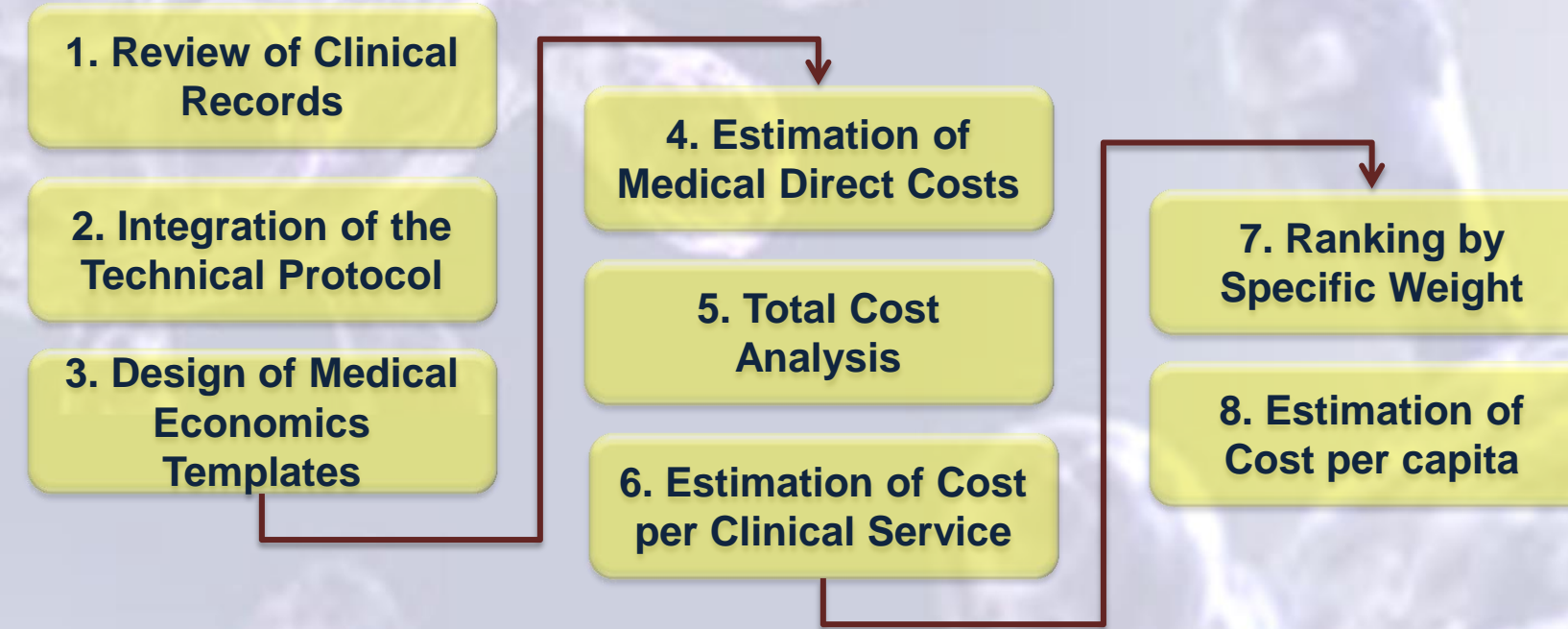
Methods: 34 cases of IDP were enrolled, registered from 2010 to 2015 in INP (47% agammaglobulinemic type and 29% with common variable immunodeficiency). Clinical histories were reviewed and It was developed a medical-economic model for register HCRU. Local sourced unit costs were used in the calculation for total costs and cost per capita was estimated by using INP attended reference population.

Results: Overall, the mean annual cost for patients with PID in treatment was in \$11,564 USD and the mean annual cost for children with PID belatedly diagnosed was \$16,019 USD. Main cost for patients with belatedly diagnosis were produced for infections: Pneumonia \$6,785 USD, Acute Otitis Media \$733 USD, Acute Respiratory Infection (upper tract) \$843 USD, Sinusitis \$609 USD, Septic Arthritis \$1,242 USD and Infectious Gastroenteritis \$5,805 USD. Cost per capita for patients with PID in treatment were estimated in \$0.023 USD and cost per capita for patient with PID belatedly diagnosed was estimated in \$0.031 USD.

Conclusions: Belatedly diagnosis for PID in INP has a significant impact on HCRU and associated costs. Timely and effective diagnosis and management of this group of diseases has the potential to reduce disease burden and health care costs.

Keywords: primary immunodeficiency, economic burden, cost of illness, health care costs, cost per capita.

It was determined to develop a Cost Analysis Model from the information contained in the clinical records of 34 patients from National Institute of Pediatrics (INP - Mexico). The economic evaluation methodology was designed for comparing: (1) Costs of No-treatment (infections) and (2) Costs of Standardized Treatment.



Medical Economics templates included Infrastructure (medical consultation, emergency room, hospitalization), laboratory and treatment costs.

INTERVENCIÓN:		DIAGNÓSTICO Y TRATAMIENTO DE NEUMONÍA	
DESCRIPCIÓN:	DIAGNÓSTICO, TRATAMIENTO, HOSPITALIZACIÓN	COSTO TOTAL	
CLAVE	NOMBRE	UNIDAD DE MEDIDA	CANTIDAD POR ACTIVIDAD
100001	Consulta de pediatría general (CEPA)	Consulta	10.00
100002	Consulta de laboratorio clínica	Consulta	7.00
100003	Consulta de subespecialista	Consulta	7.00
100005	Valoración y Orientación Nutricional	Consulta	1.00
Subtotal Consultas 18,228.00			
URGENCIAS		UNIDAD DE MEDIDA	CANTIDAD POR ACTIVIDAD
100003	Atención de urgencias	Hora	2.00
Subtotal Urgencias 1,220.00			
HOSPITALIZACIÓN		UNIDAD DE MEDIDA	CANTIDAD POR ACTIVIDAD
000003	Oxígeno	Por día	5.00
000009	Nebulizaciones por día (Pneumía)	Por día	7.00
000011	Vitroglicerol	Evento	5.00
000005	Examen de laboratorio (analítica)	Evento	3.00
000005	Catéter por nebulización	Flebo	1.00
000006	Hospitalización cualquier servicio (por día)	Día Cama	10.00
Subtotal Hospitalización 21,189.00			
ESTUDIOS DE DIAGNÓSTICO		UNIDAD DE MEDIDA	CANTIDAD POR ACTIVIDAD
100002	Biométrie Metálica (BPA)	Estudio	5.00
402005	Télex PA	Estudio	5.00
100014	Proteína C reactiva	Estudio	5.00
100018	Tiempo de Protrombina (TP)	Estudio	2.00
100026	Tiempo de Tromboplastina Parcial activada (TTPa)	Estudio	2.00
100033	Fibrinógeno	Estudio	2.00
100033	Albumina Amonioacetato (ALB)	Estudio	3.00
100044	Aspartato Aminotransferasa (ASAT)	Estudio	3.00
100039	Bilirrubina Total	Estudio	3.00
100039	Bilirrubina Directa	Estudio	3.00
100042	Gamma Glutamil Transferasa (GGT)	Estudio	3.00
100036	Proteínas Totales	Estudio	3.00
100034	Nitrogenio Ureico Sérico	Estudio	3.00
100033	Colesterol	Estudio	3.00
100034	Sodio	Estudio	3.00
100036	Closo	Estudio	3.00
100006	Urea	Estudio	3.00
100037	Fósforo	Estudio	3.00
100040	Glicemia	Estudio	3.00
100037	Magnésio	Estudio	3.00
100018	Tiempo de Protrombina (TP)	Estudio	2.00
100033	Albumina (PR, PICO, PICO, PICO)	Estudio	4.00
100005	Lactato	Estudio	3.00
100005	Procalcitonina	Estudio	3.00
100035	Echocardiograma	Estudio	1.00
100009	Palet de 36 virus respiratorios por PCR	Estudio	1.00
Subtotal Estudios de Diagnóstico 26,927.00			
TRATAMIENTO		UNIDAD DE MEDIDA	CANTIDAD POR ACTIVIDAD
MEDICAMENTOS: OPCION 1			
1001	Bencipropolona Sódica Cristalina 100/1000 UI	Bencipropolona Sódica Cristalina	20.00
106	Paracetamol 500 mg/ml Frasco Sol Oral	Paracetamol	3.00
4332	Budesonida 0.250 mg. Enzaca con 5 envases con 2 ml.	Budesonida	1.00
Subtotal Medicamentos Opcion 1 585.45			
MEDICAMENTOS: OPCION 2			
1097	Si Carbazona 1g Sol Iny Faa Dil 10ml	Carbazona	15.00
106	Paracetamol 500 mg/ml Frasco Sol Oral	Paracetamol	3.00
4332	Budesonida 0.250 mg. Enzaca con 5 envases con 2 ml.	Budesonida	1.00
Subtotal Medicamentos Opcion 2 188.78			
Subtotal Tratamiento (Promedio de Opciones) 484.81			

Specific Technical Protocols were defined from the clinical records.

PNEUMONIA REQUIRING HOSPITALIZATION WITHOUT COMPLICATIONS. CONSIDERING PROCESS OF 21 DAYS.

- Pediatrics daily valuation
- Evaluation by subspecialists
- Nutritional counseling
- Antibiotic scheme
- Oxygen
- Micronebulization
- Venipuncture
- Catheters
- Parenteral feeding
- Blood count
- Chest X-ray
- Coagulation times
- Fibrinogen
- Liver function tests
- Kidney function tests
- Blood cultures
- Arterial Blood Gasometry
- Lactate
- C-Reactive Protein
- Pro-calcitonin
- Echocardiogram
- 19 tests for respiratory viruses

To assess the impact of diagnosis delay costs associated with susceptibility to infections are estimated.

INFECTION	ANNUAL FREQUENCY	HORIZON	COSTING CRITERIA
Pneumonia	2	21 days	With hospitalización. Without shock. Without mechanical ventilation.
Pharyngitis / Tonsillitis	6	7 days	Without hospitalización.
AOM	4	10 days	Without hospitalización.
Sinusitis	2	10 days	With hospitalización. Without shock. Without mechanical ventilation.
Septic arthritis	0.5	21 days	With hospitalización. Without shock. Without mechanical ventilation.
Infectious Gastroenteritis	3	10 days	With hospitalización. Without shock. Without mechanical ventilation.

1. For the National Institute of Pediatrics, treatment delay represents annual direct costs for USD \$16,019 (average per case), mainly for susceptibility to infections.

2. For the 34 cases of INP, the difference in treatment vs no-treatment implicates annual savings for USD \$151,476

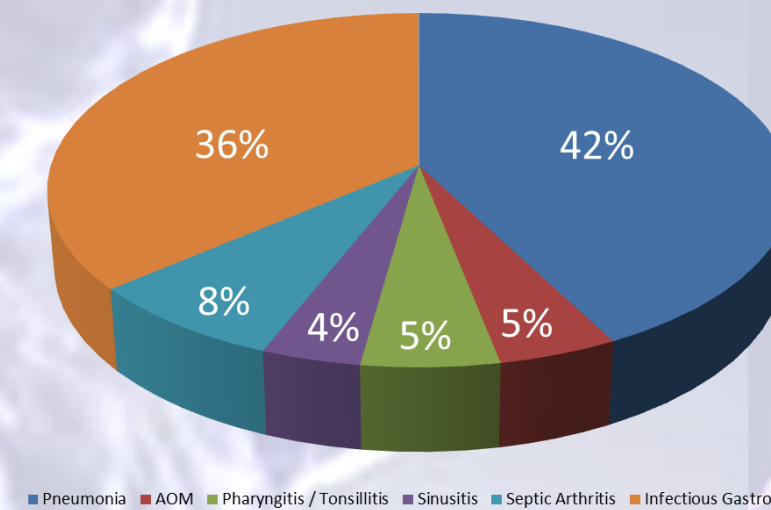
3. Difference of USD \$0.0088 per capita, implicates for Mexico annual savings for USD \$1,050,093 (Reference population: 120 Million People)

4. Financially, expenses for each year of diagnosis delay only could be recovered 7.5 años later after starting treatment.

Cost per Infection: Most expensive infection was Pneumonia (USD \$3,392)

DIRECT COST OF INFECTIONS IN PRIMARY IMMUNODEFICIENCY						
INFECTIONS	CONS	ER	HOSP	LAB	TREAT	TOTAL
Pneumonia	1,012.67	67.78	1,172.72	1,112.61	26.93	3,392.71
AOM	162.11	-	-	10.83	10.34	183.28
Pharyngitis / Tonsillitis	128.22	-	-	10.83	1.57	140.63
Sinusitis	162.11	-	-	126.17	16.27	304.55
Septic Arthritis	1,950.06	101.67	1,483.83	567.94	39.39	4,142.89
Infectious Gastroenteritis	958.17	101.67	598.33	270.39	6.46	1,935.02
TOTAL	4,373.33	271.11	3,254.89	2,098.78	100.97	10,099.08

Annual Total Cost of all Infections in IDP Children form INP was USD \$16,019



According to INP incidence, cost for 5 years Diagnosis delay was USD 2,723,291\$

Average annual cost for all IDP treatment in INP was USD \$393,181

ANNUAL COST PER DIAGNOSIS DELAY		
YEARS	COST PER CASE	PER INCIDENCE
1	16,019.36	544,658.30
2	32,038.72	1,089,316.60
3	48,058.09	1,633,974.90
4	64,077.45	2,178,633.20
5	80,096.81	2,723,291.50

COST OF TREATMENT PER CASE IN INP		
Type	N	TOTAL
Agammaglobulinemy	16	185,026.72
Common Variable ID	10	115,641.70
Other IDP	8	92,513.36
Total Annual	34	393,181.78

Based on reference population, diagnosis & treatment of IDP could represent savings for Health System in the order of USD \$0.0088 per cápita.

Resume		
COST COMPARISON FOR ALL CASES (INP MEXICO)		
N=34	TOTAL	COST PER CAPITA
DIAGNOSIS DELAY (5 years)	\$ 544,658.30	\$ 0.0315
DIGANOSIS & TRETAMENT OF IDP'S	\$ 393,181.78	\$ 0.0227
DIFERENCIA	\$ 151,476.52	\$ 0.0088

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