



FIVE-YEARS FOLLOW-UP OF CONGENITAL  
HEART SURGERY AT THE HEART INSTITUTE.

UNIVERSITY of São Paulo, MEDICAL SCHOOL  
InCor - HC - FMUSP

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# Author's Concerns

- preliminary study: situational analysis of pediatric cardiac surgery in our institution
- retrospective analysis of the cohort database
- represents a small part of a great number of actions started in our institution to improve our efficiency regarding pediatric congenital cardiac care
- this is part of a national program supported by the Brazilian Society of Pediatric Cardiac Surgery



BRAZILIAN SCENARIO

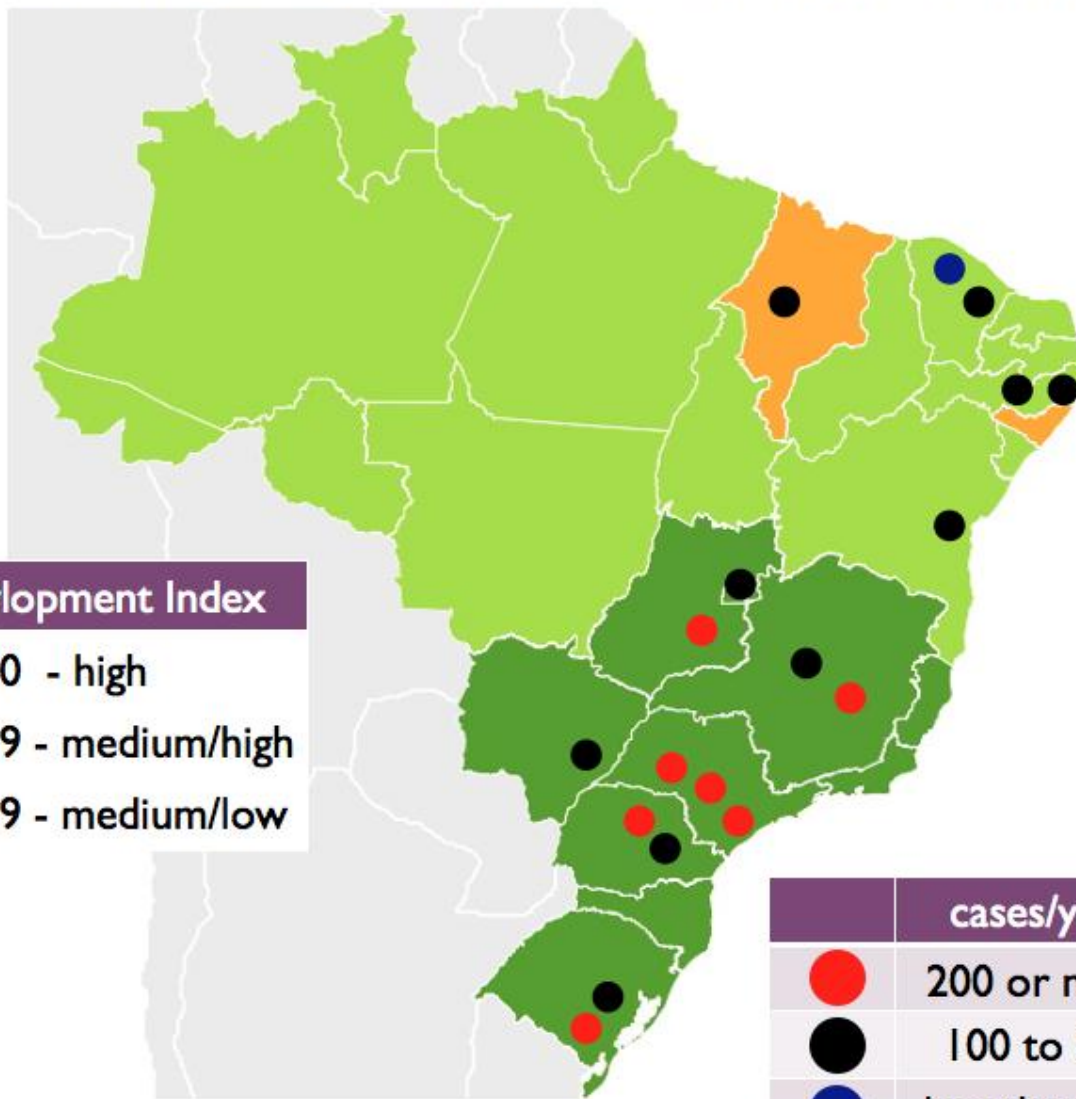
AN INSIDE VIEW

# Pediatric Cardiac Surgery

|      | Performed                       | Populational needs* |
|------|---------------------------------|---------------------|
| 2005 | 6.998                           | 19.869              |
|      | result:<br>deficit of<br>35,22% |                     |

\*procedure/live birth  
source: SAS MS - DATASUS

# Human Development Index and Pediatric Cardiac Centers Distribution



## Human Development Index

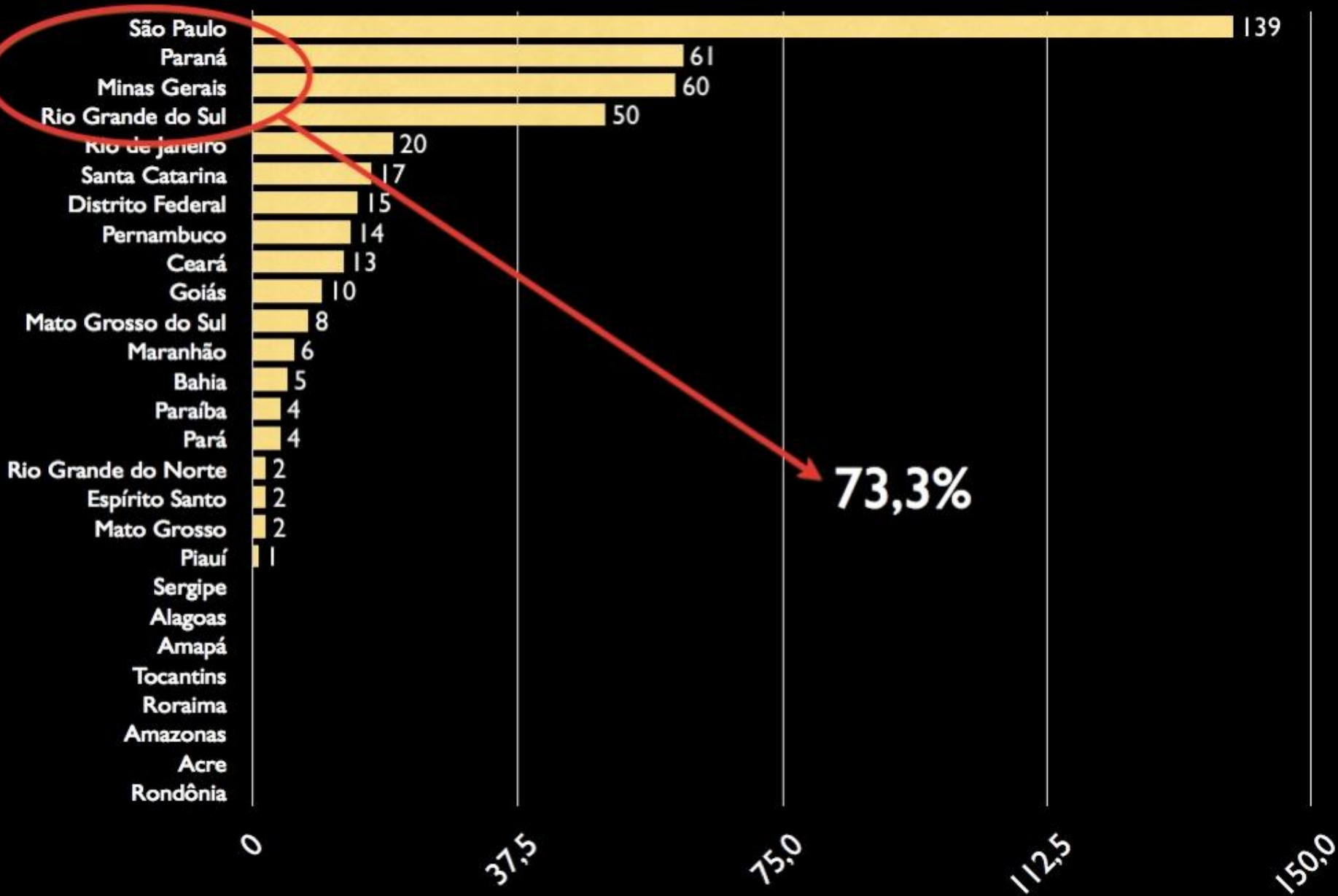
0,800 - 0,900 - high

0,700 - 0,799 - medium/high

0,600 - 0,699 - medium/low

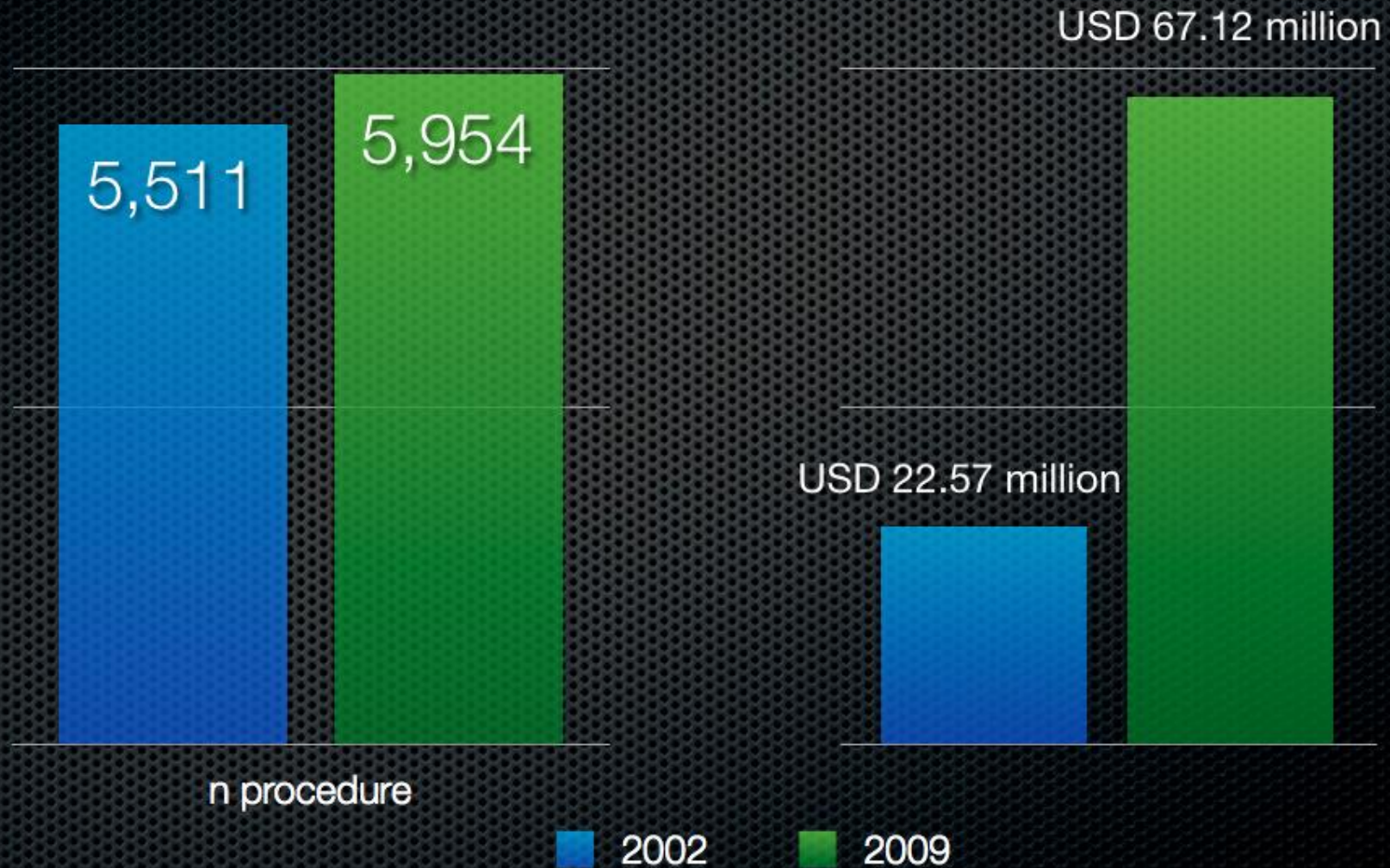
|   | cases/year    | number of centers |
|---|---------------|-------------------|
| ● | 200 or more   | 7                 |
| ● | 100 to 200    | 12                |
| ● | less than 100 | 1                 |

# Neonates operated X State - 2007



# More complex?, more expensive?

More reimbursement but same number of procedures





UNIVERSITY of São Paulo, MEDICAL SCHOOL  
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our profile



# Institution Profile

Heart Institute, University of São Paulo

- Specialized hospital for cardiac diseases, adult and pediatric cardiac surgery, congenital and acquired cardiac cases.
- Public, University Hospital
- Public and Private patients
- Private foundation support (Zerbini Foundation).

# Pediatric Cardiac Surgery Program profile

Heart Institute, University of São Paulo (InCor)

- Specialized team (surgeon, anesthesia, perfusion, scrub nurse) for pediatric surgery, sharing a single agenda for both adult and pediatric cases
- 30 beds Surgical ICU, 10 PICU (clinical), 70 beds ward for pediatrics and adults with congenital heart defects (GUCH)
- One of major reference centre for congenital heart surgeries in Brazil.
- Most complex cases are referred to the InCor and congenital heart surgeries account for more than 10% of all surgical interventions done at the InCor.

# The Study

# Key Issues

- Costs and outcomes varies according to procedure and patient complexity
- SUS reimbursement rates are a fixed package by procedure regardless of patient diagnosis or risk stratum.
- Evaluation of the quality and the quantities of required resources may allow better planning for the InCor and for the government.

# Objective

- Understand our scenario in pediatric cardiac surgery, including patient and procedure profile, costs and outcomes
- Evaluate cost-effectiveness of our pediatric cardiac program
- Identify factors associated with our poor results and to improve the pediatric cardiac care

- Electronic medical record (institutional developed software: SI3)
- diagnosis and procedure code based on STS/EACTS nomenclature
- the primary procedure documented by the surgeon, allied bar codes data collection and electronic prescription of drugs

# Strengthening the analysis stratifying the risk

- Aristotle Basic Score (ABC): complexity related to procedure
- Comprehensive Aristotle Complexity Score (CS): complexity related to procedure + complexity related to the patient
- patients stratified in 4 levels: level 1 (scores 3 to 5.9), level 2 (6 to 7.9), level 3 (8 to 9.9) and level 4 (scores of 10 or more)

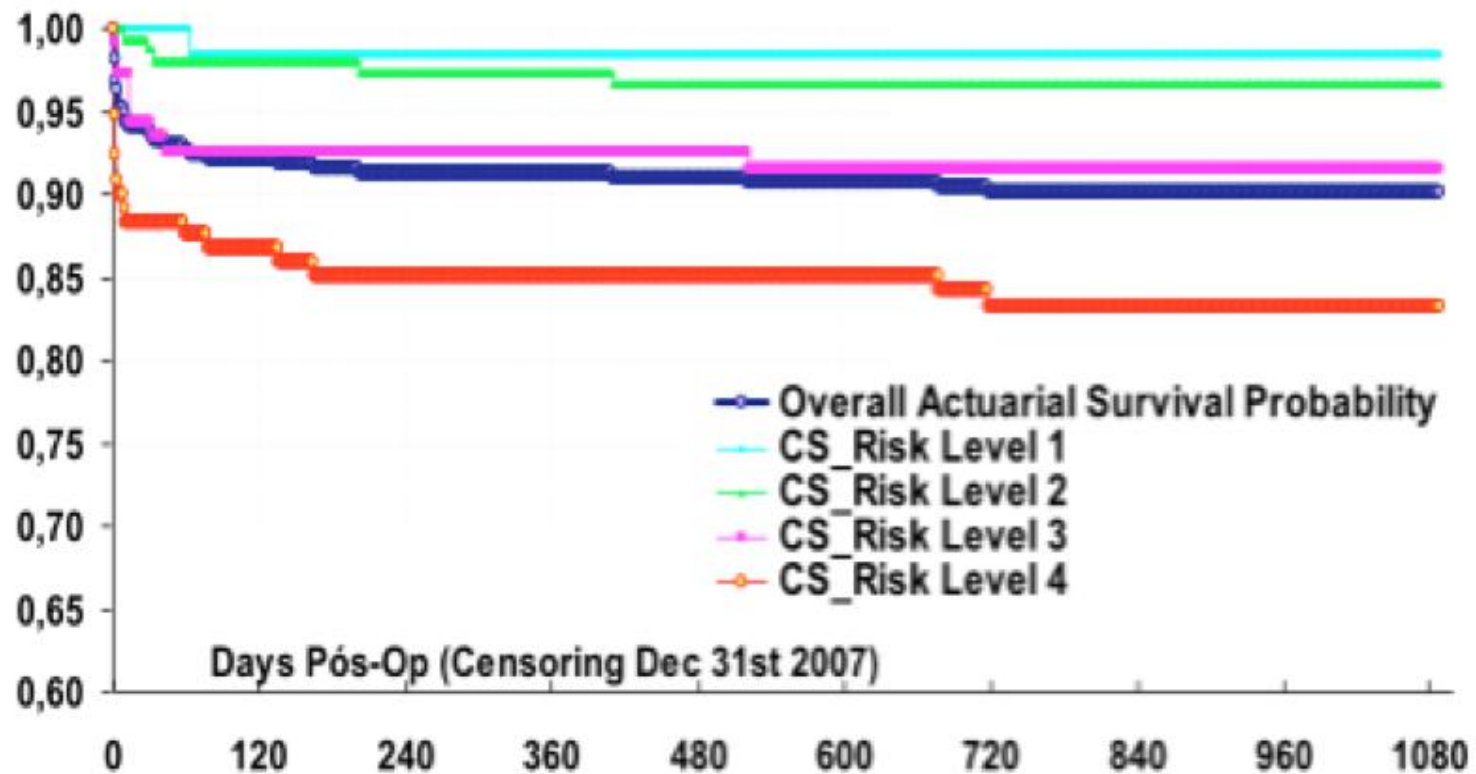
# Parameters Studied

- morbidity and mortality were documented
- LOS: hospital, ICU, ward
- Estimated costs of hospital care (materials, medications, procedures, tests, operating theatre hours and the ICU or ward rate per day) used Micro-costs methods (physicians fee were excluded)



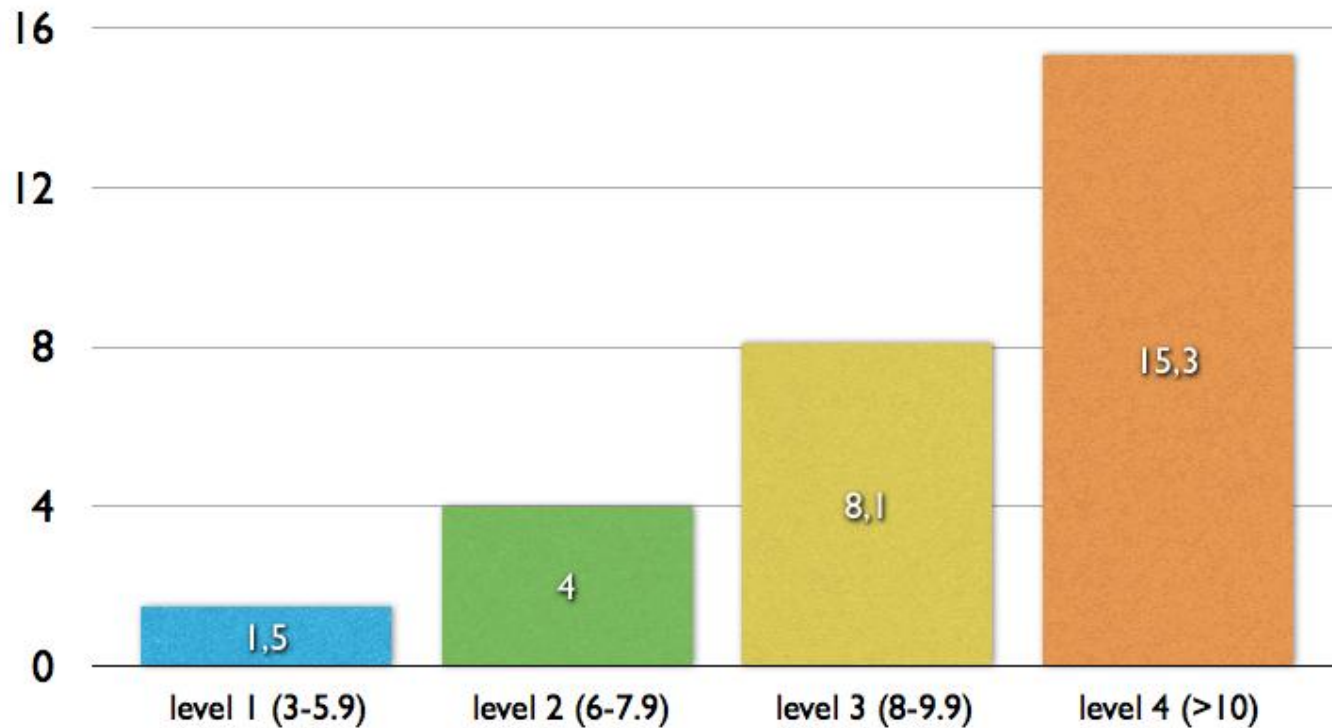
# Actuarial survival probability

according to Aristotle Complexity Scale Risk Levels

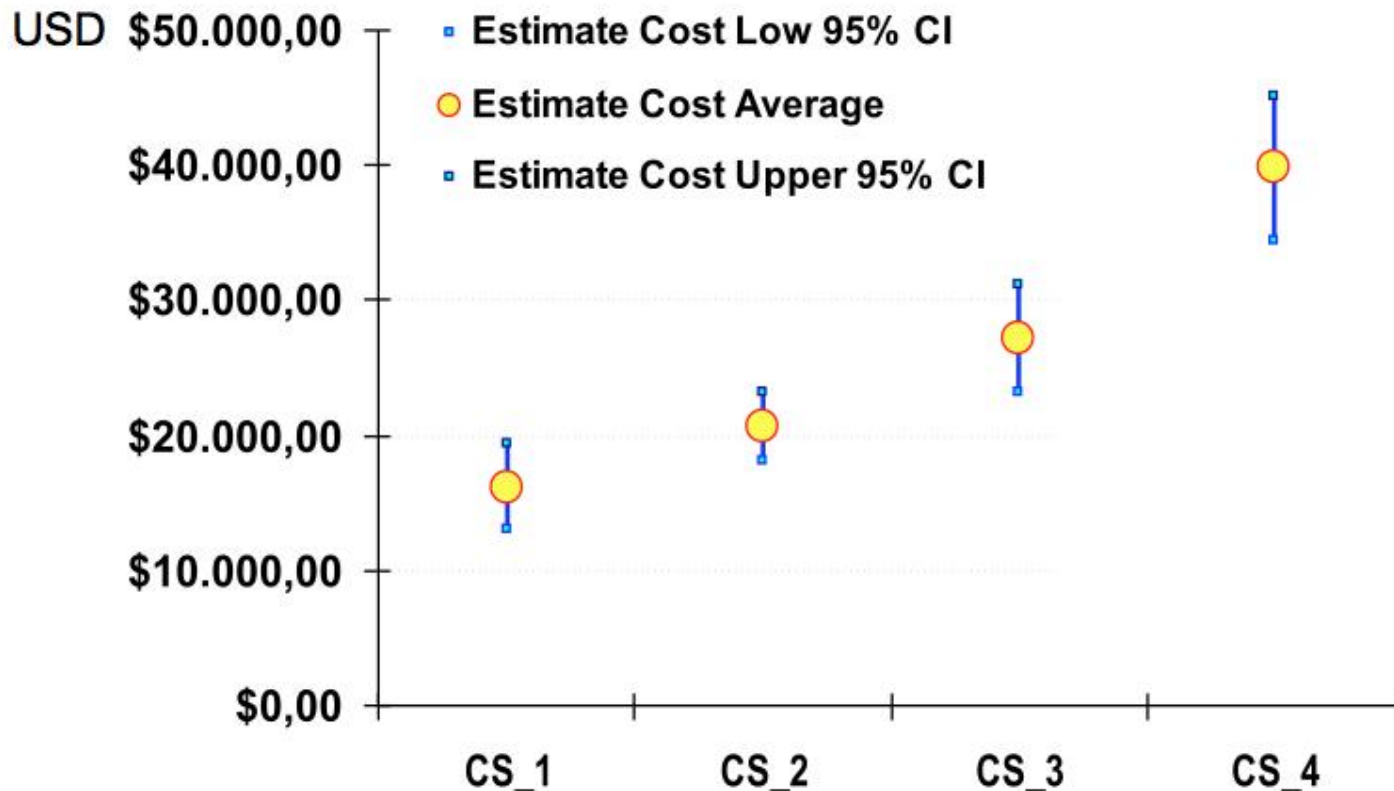


# Hospitalar Mortality

according to Aristotle Complexity Level

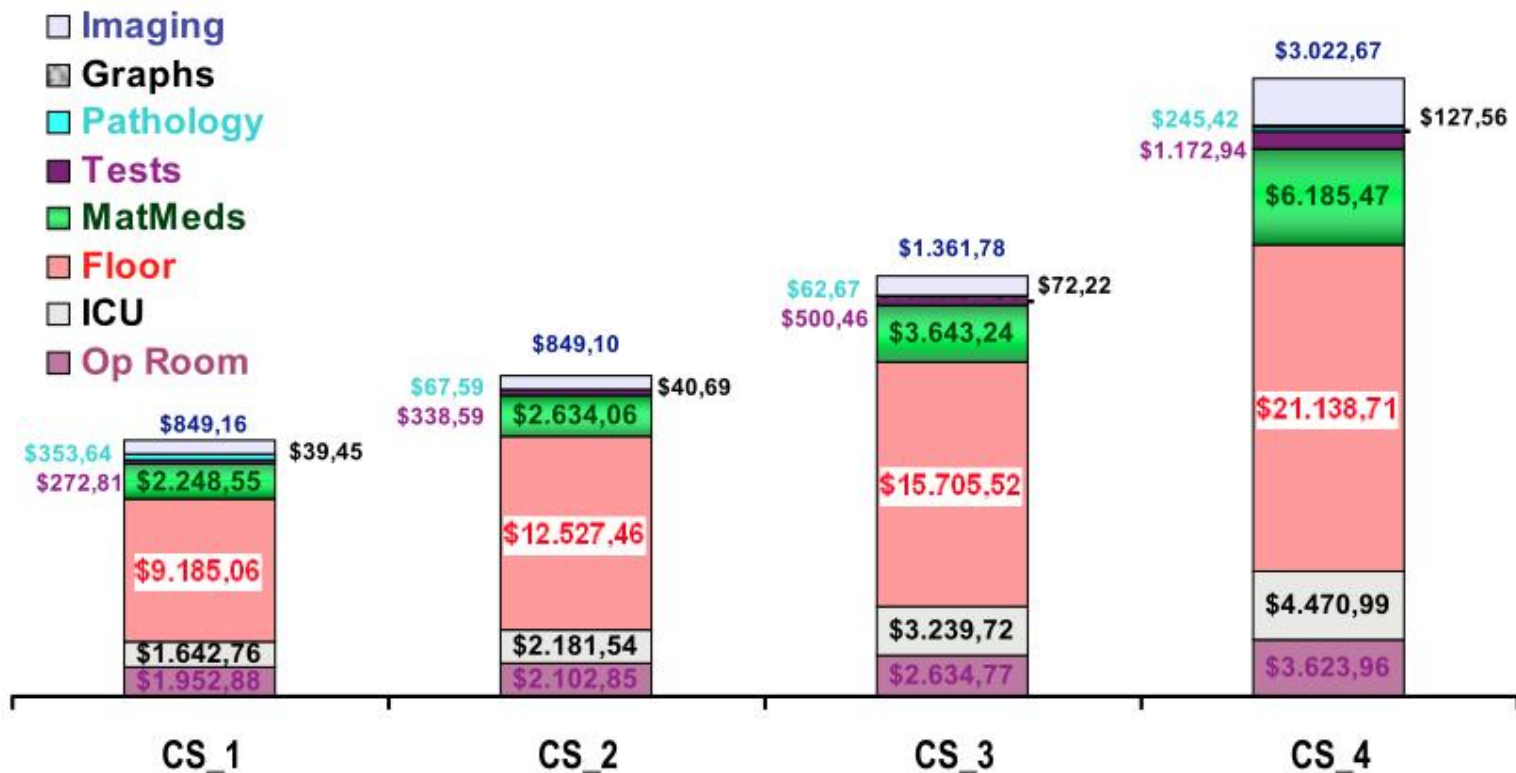


# Total costs variation and average cost per Complexity Scale Risk Levels

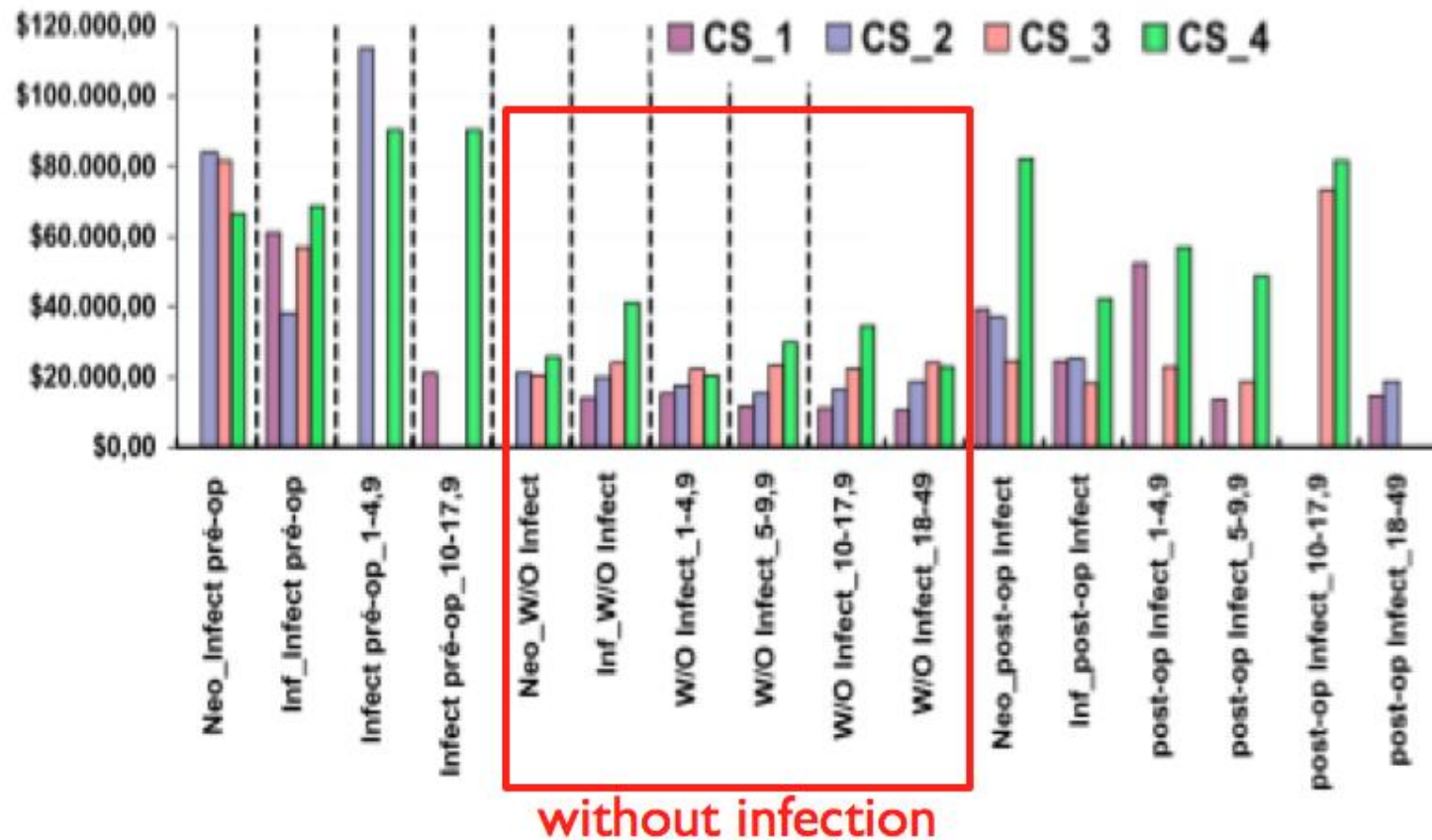


# Total cost by center/categories

## per Complexity Scale Risk Levels



# Total Cost Estimates modification due to absence or presence of infection before or after the surgery per group of age and Aristotle Complexity Scale Risk Levels



# Conclusion

- Patients with the highest scores, 4th stratum required the double of the length of stay and ICU use than the 2nd stratum, as well as more than double the number of diagnostic tests and therapeutic procedures required.

# Conclusion

- Costs for the hospital admissions have increased three fold from the 2nd stratum until the 4th level of scores

# Conclusion

- Presence of infection before surgery tripled costs regardless of age group or risk levels.
- Post-operative infection tripled costs for neonatal and adolescents and doubled it particularly for patients with the highest scores.



# Inferences

- A national database is mandatory to better understand and to improve the care for pediatric cardiac cases around the country
- Reimbursement by complexity must be considered
- The improvement of quality may decrease our costs

**Thank you!**

