HUMAN RESOURCES COSTS IN BREAST CANCER BIOPSY PROCESSING IN CHILE: WHAT´S THE IMPACT OF HUMAN RESOURCES?

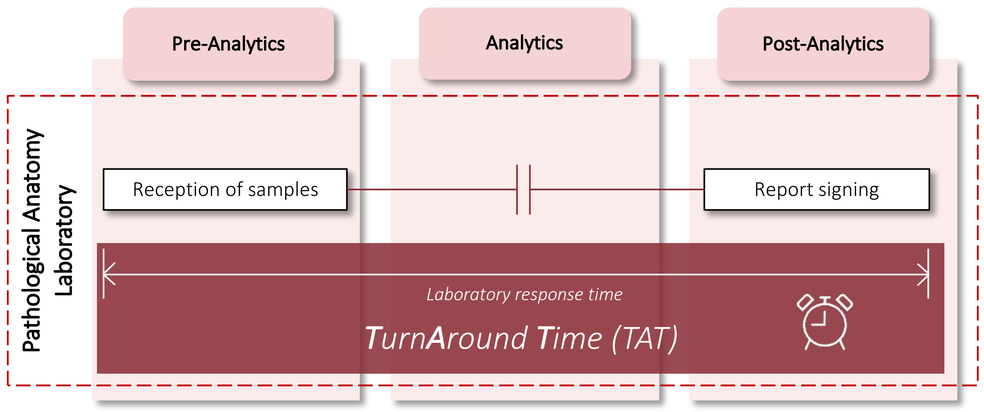
Authors: Lenz-Alcayaga R[1,2], Paredes-Fernández D[1,2], Páez-Pizarro L[1,2], Hernández-Sánchez K[1].
[1]Lenz Consultores – Chile, [2]Public Health Institute - University Andrés Bello - Chile
Corresponding author: rony.lenz@unab.cl

Background & Objectives:

- No evidence of human resources (HR) costs in processing breast cancer biopsies is available in the Chilean public sector.
- This analysis aims to estimate the impact of HR on direct costs, considering the effects of time in costs in a local pathology laboratory responsible for processing 8.8% of national breast cancer intraoperative biopsies (IB).

Methods:

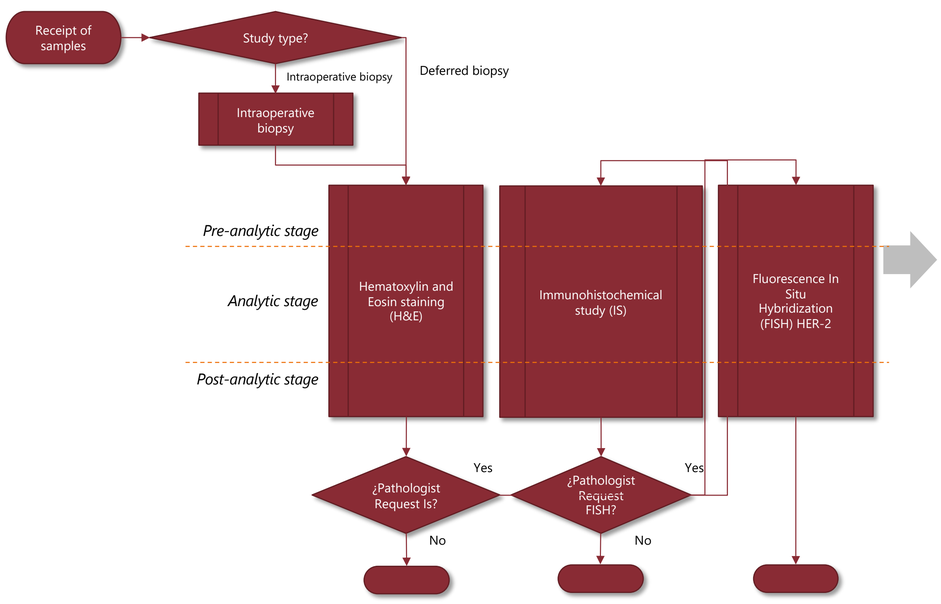
Time-Driven Activity-Based Costing (TDABC). A comprehensive Business Process Management Notation diagram was constructed to represent human resources activities dedicated to processing biopsies based on fieldwork.
Turn-Around Time (TAT) was calculated. Time was studied as direct working time (DWT) and latencies (measured in hours) for each biopsy technique: Intraoperative biopsy (IB), Hematoxylin and Eosin staining (H&E), Immunohistochemical study (IS), and FISH HER-2 determination.



Own authorship scheme (2021)

Results:

Process maps were constructed for each type of biopsy, which distinguished stage, resources used, direct work times and latencies between activities. From them, costing matrices were constructed according to direct cost drivers (HR, equipment and supplies).



Direct costs by type of biopsy and stage

Direct Cost for Intraoperative biopsy	Pre-Analytics stage		Analytics stage		Post-Analytics stage		Total	
	Direct cost	%	Direct cost	%	Direct cost	%	Direct cost	%
Human resources	$ 4,001	18.84%	$ 4,918	23.16%	$ 562	2.65%	$ 9,481	44.65%
Supplies	$ 1,767	8.32%	$ -	0.00%	$ -	0.00%	$ 1,767	8.32%
Equipment	$ 9,966	46.94%	$ 20	0.09%	$ -	0.00%	$ 9,986	47.03%
Total	$ 15,733	74.10%	$ 4,938	23.26%	$ 562	2.65%	$ 21,233	100.00%
Direct Cost for Hematoxylin and Eosin staining	Pre-Analytics stage		Analytics stage		Post-Analytics stage		Total	
	Direct cost	%	Direct cost	%	Direct cost	%	Direct cost	%
Human resources	$ 11,012	46.36%	$ 8,734	36.77%	$ 1,064	4.48%	$ 20,810	87.61%
Supplies	$ 1,533	6.45%	$ 292	1.23%	$ -	0.00%	$ 1,825	7.68%
Equipment	$ 1,093	4.60%	$ 20	0.08%	$ 3	0.01%	$ 1,117	4.70%
Total	$ 13,639	57.42%	$ 9,046	38.09%	$ 1,067	4.49%	$ 23,752	100.00%
Direct Cost for Immunohistochemical study	Pre-Analytics stage		Analytics stage		Post-Analytics stage		Total	
	Direct cost	%	Direct cost	%	Direct cost	%	Direct cost	%
Human resources	$ 8,263	9.81%	$ 30,863	36.65%	$ 1,064	1.26%	$ 40,191	47.73%
Supplies	$ 43,423	51.57%	$ 292	0.35%	$ -	0.00%	$ 43,714	51.91%
Equipment	$ 276	0.33%	$ 20	0.02%	$ 3	0.00%	$ 300	0.36%
Total	$ 51,962	61.71%	$ 31,175	37.02%	$ 1,067	1.27%	$ 84,205	100.00%
Direct Cost for FISH HER-2 determination	Pre-Analytics stage		Analytics stage		Post-Analytics stage		Total	
	Direct cost	%	Direct cost	%	Direct cost	%	Direct cost	%
Human resources	$ 12,221	8.89%	$ 7,377	5.37%	$ 1,245	0.91%	$ 20,843	15.16%
Supplies	$ 116,230	84.54%	$ -	0.00%	$ -	0.00%	$ 116,230	84.54%
Equipment	$ 415	0.30%	$ -	0.00%	$ -	0.00%	$ 415	0.30%
Total	$ 128,866	93.73%	$ 7,377	5.37%	$ 1,245	0.91%	$ 137,487	100.00%

**Figures in Chilean pesos. Exchange rate 1 USD = 937 Chilean pesos approximately.*

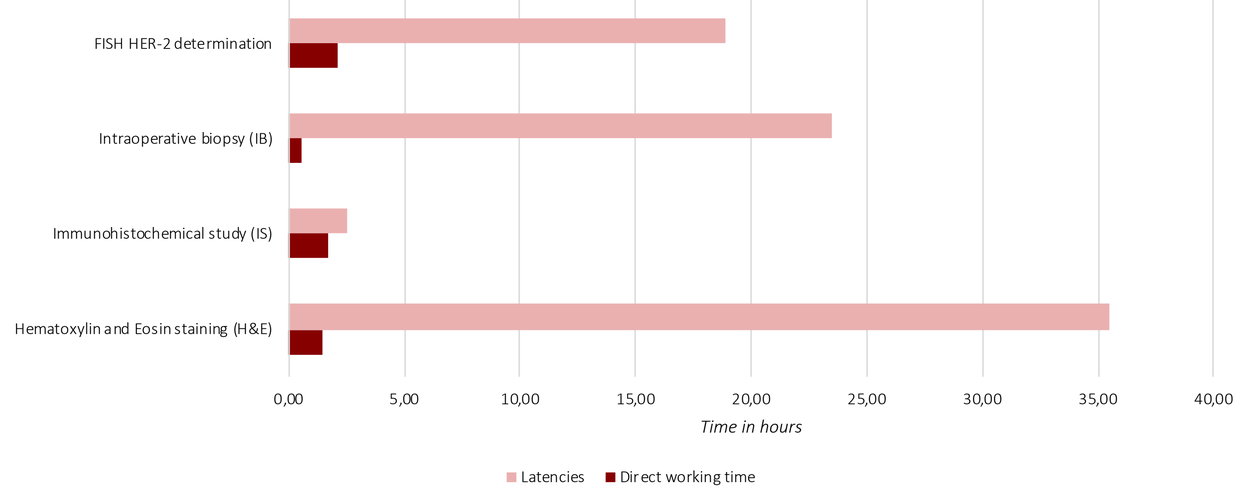
A key performance indicator was estimated (turnaround time - TAT). The laboratory TAT corresponds to the time from when the sample is received until the report is released. TAT is made up of direct work time and latencies between activities.

- Direct costs of IB, H&E, IS, and FISH determination were USD$23.0, USD$25.3, USD$90, and USD$146.7, respectively.
- HR costs in intraoperative biopsy represent 44.6% of direct costs. Direct working time in IB was 0.55 hours versus 0.05 in latencies.
- In the case of H&E, HR explained 87.61% of direct costs, with a DWT of 1.44 hours and 35.47 hours in latencies.
- In IS, HR explained 47.7% of direct costs, at a TAT of 4.29 hours, composed of 1.73 hours of DWT.
- HR in FISH determination weighted 15.16% of direct cost, at a TAT of 33.58 hours and 2.51 DWT. For biopsies requiring H&E, IS, and FISH, a TAT of 62.1 hours was estimated.

Total time according to stage of the processing of breast biopsies at the Santiago Oriente Hospital

Type of biopsy	Direct work time	%	Latencies	%	TAT (TurnAround Time)
Intraoperative biopsies	0.55 hours	2.29%	0.05 hours	97.71%	0.60 hours
Hematoxylin and Eosin staining	1.44 hours	3.91%	35.47 hours	96.09%	36.91 hours
Immunohistochemical study	1.73 hours	40.33%	2.56 hours	59.67%	4.29 hours
FISH HER-2 determination	2.11 hours	18.87%	18.87 hours	89.95%	20.98 hours
Turn-Around Time (TAT) since the sample is received for the performance of a current deferred Biopsy with and ending after confirmation of HER-2 overexpression by FISH determination					62.17 hours 7.77 working days

Direct working time and latencies by type of biopsy



Conclusions:

- Human resources represents a greater proportion of the direct costs in H&E biopsies (87.6%). The proportion of HR driver is similar in IB and IS biopsies (44.6 – 47.3%, respectively), while in the FISH determination, the smallest proportion of this component of the cost is presented. The biopsy type with longest DWT was FISH determination (2.11 hours), representing 18.85% of biopsy TAT. Otherwise, IS had the highest proportion of DWT, regarding to its TAT (1.73 hours, equivalent to 44,33% of TAT).
- In a local context of increasing demand for breast cancer diagnosis, the TAT observed results, human resources impact on direct costs, and scarcity of pathologists in the public sector, should be all factors to consider incorporating new diagnostic devices to improve laboratory workflow and decrease TAT.
- These measurements are relevant in decision-making processes and health technology assessment of diagnostic devices.