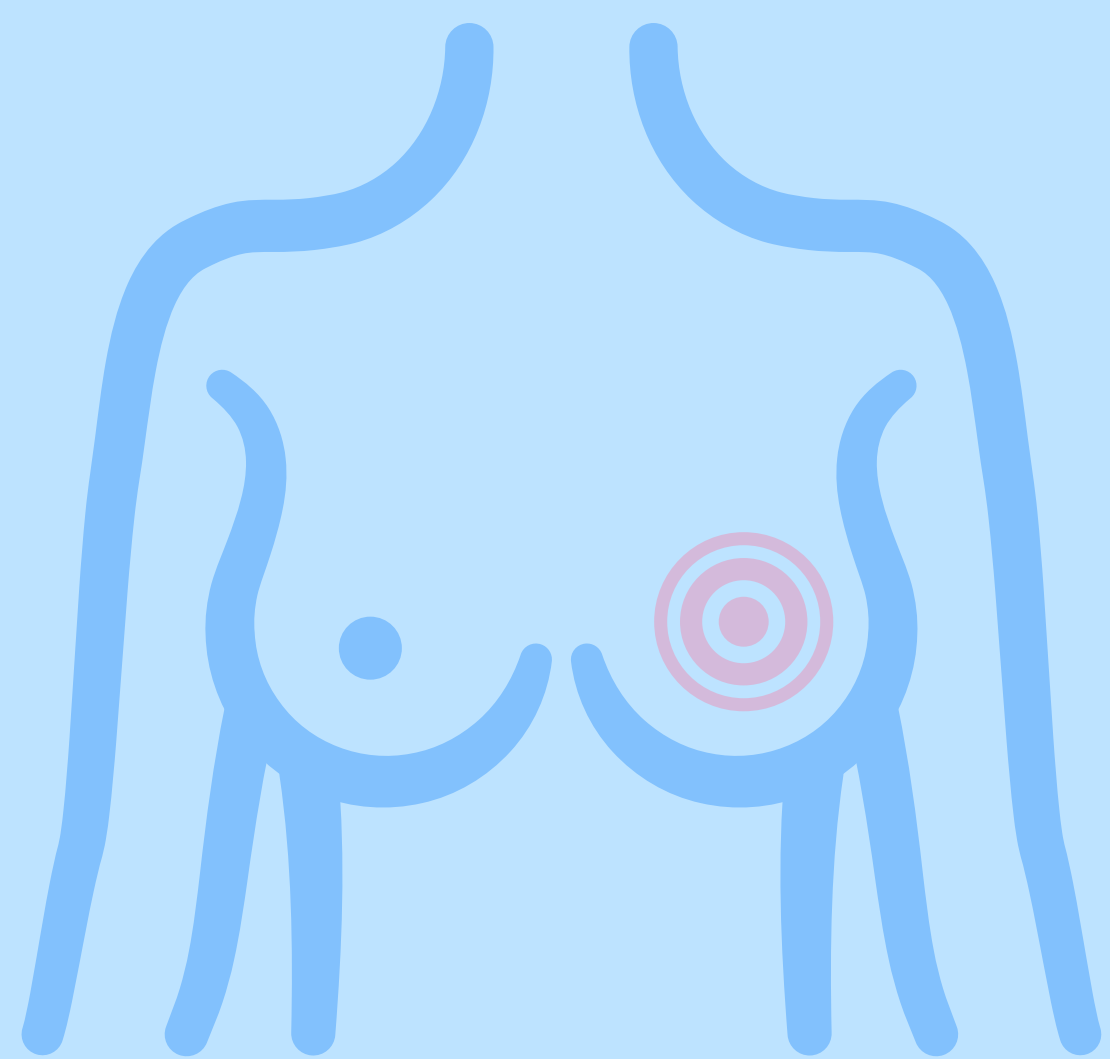


The Burden of Intravenous vs Subcutaneous Oncological Products Application in Honduras

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Introduction

In Honduras, the healthcare system faces significant challenges, including limited resources and varying accessibility to essential treatments. (1) One of the biggest challenges is the access of new routes of administration that could facilitate the application and the quality of life of the patients. One example of it is the use of Trastuzumab (breast cancer medication) that today is only administered by intravenous (IV) application, while the healthcare system has, the possibility of applying it subcutaneously, which could led to an economic and patient care implications. (2) Comparing intravenous (IV) and subcutaneous (SC) applications, this study aims to determine the impact of applying Trastuzumab IV vs Trastuzumab SC in terms of cost and potential adverse events related to each application. By analyzing direct treatment costs, preparation times, and the frequency of adverse events, this investigation provides crucial data to guide healthcare decisions in a context where efficient resource utilization is vital. Such insights are essential for optimizing oncological care in environments constrained by economic and logistical limitations.

Methods

A Delphi panel was performed, integrating insights from a multidisciplinary team of healthcare professionals, including oncologists, cardiologists, nurses, and pharmacists, from the two principal regions of Honduras (San Pedro Sula and Tegucigalpa). The experts collaboratively assessed the resource usage, including time and materials required for the preparation and administration of Trastuzumab, as well as the management of adverse events associated with both IV & SC applications. Experts estimated the frequency and probability of various healthcare processes and resource uses through a structured interview. This method helped to identify and quantify the direct costs associated with each administration route, taking into account factors such as drug preparation time, application duration, and the handling of adverse events like heart failure, phlebitis, severe arterial hypertension, and cardiomyopathy. The cost data were gathered from the latest tariff manuals and supplemented by firsthand reports from the participating experts.



References:

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- Stoner, K. L., Harder, H., Fallowfield, L. J., & Jenkins, V. A. (2015). Intravenous versus subcutaneous drug administration. Which do patients prefer? A systematic review. The Patient-Patient-Centered Outcomes Research, 8, 145-153.

Results

The Delphi panel's comprehensive analysis revealed notable disparities in the costs associated with the intravenous (IV) and subcutaneous (SC) administration routes of Trastuzumab over a one-year period. For patients receiving IV Trastuzumab every three weeks, the annual cost amounted to USD 2,058.71 per patient, encompassing 18 applications. The majority of this expense (USD 1,877.59) was attributed to the preparation and administration of the drug. Additionally, adverse events related to IV administration, including heart failure, phlebitis, severe arterial hypertension, and cardiomyopathy, contributed another USD 203.74 per patient annually. In contrast, the cost for the SC administration of Trastuzumab was significantly lower, totaling just USD 81.77 per patient annually for the same number of treatments. This dramatic cost difference highlights the efficiency of the SC method, primarily due to reduced requirements for preparation and administration resources. Data shown in table 1-3.

These findings illustrate a clear economic advantage for the SC administration route in Honduras, where healthcare resources are scarce. Not only does the SC method reduce direct treatment costs, but it also minimizes the incidence and financial impact of adverse drug reactions, presenting a compelling case for its wider adoption in clinical practice.

Table 1. The resources used per-application of Trastuzumab IV vs SC in Honduras.

Resource	Materials			
	IV		SC	
	Quantity	Cost	Quantity	Cost
20cc Syringe	1.00	USD 0.28	0.00	USD 0.00
10cc Syringe	0.00	USD 0.00	1.00	USD 0.52
No.18 Needle	2.00	USD 0.04	1.00	USD 0.02
Tuberculin needle	0.00	USD 0.00	1.00	USD 0.08
Cotton	0.00	USD 0.00	3.00	USD 8.91
Sticking plaster	1.00	USD 14.20	1.00	USD 14.20
Gauze	3.00	USD 2.06	3.00	USD 2.06
Intravenous cannula No.22	1.00	USD 0.61	1.00	USD 0.61
IV Connection	1.00	USD 0.16	0.00	USD 0.00
Glove	2.00	USD 0.61	2.00	USD0.61
Saline solution (100 ml)	0.00	USD 0.00	0.00	USD 0.00
Saline solution (250 ml)	1.75	USD 0.93	0.00	USD 0.00
Alcohol (1 liter)	0.06	USD 1.78	0.01	USD 0.30
Sterile water (10 mL)	0.00	USD 0.00	0.00	USD 0.00
SUBTOTAL		USD 20.68		USD 27.32
Pre-treatment Drugs				
	IV		SC	
Resource	Quantity	Cost	Quantity	Cost
Ondansetron 8mg	1.00	USD 1.52	0.00	USD 0.00
Difedramine 10mg	2.00	USD 0.59	0.00	USD 0.00
Acetaminophen 500mg	2.00	USD 0.19	0.00	USD 0.00
Dexametasone 8mg	1.00	USD 2.60	0.00	USD0.00
SUBTOTAL		USD 2.31		USD 0.00
Human resources				
First-Dose	IV		SC	
Resource	Quantity	Cost	Quantity	Cost
Pharmaceutic: Drug preparation	USD 15.00	USD 6.09	0.00	USD 0.00
Nursing: preparation and application	USD 180.00	USD 93.34	5.00	USD25.93
Nursing: monitoring	USD 5.00	USD 2.59	15.00	USD 77.79
Maintenance dose				
	IV		SC	
Resource	Quantity	Cost	Quantity	Cost
Pharmacist: preparation of medicine	USD 15.00	USD 6.09	0.00	USD 0.00
Nursing: preparation and application	USD 185.00	USD95.94	5.00	USD 2.59
SUBTOTAL		USD 204.05		USD 106.31
TOTAL COST	IV	USD 227.04	SC	USD 133.63

Table 2. The cost of 1-year treatment of AEs of Trastuzumab IV vs SC in Honduras.

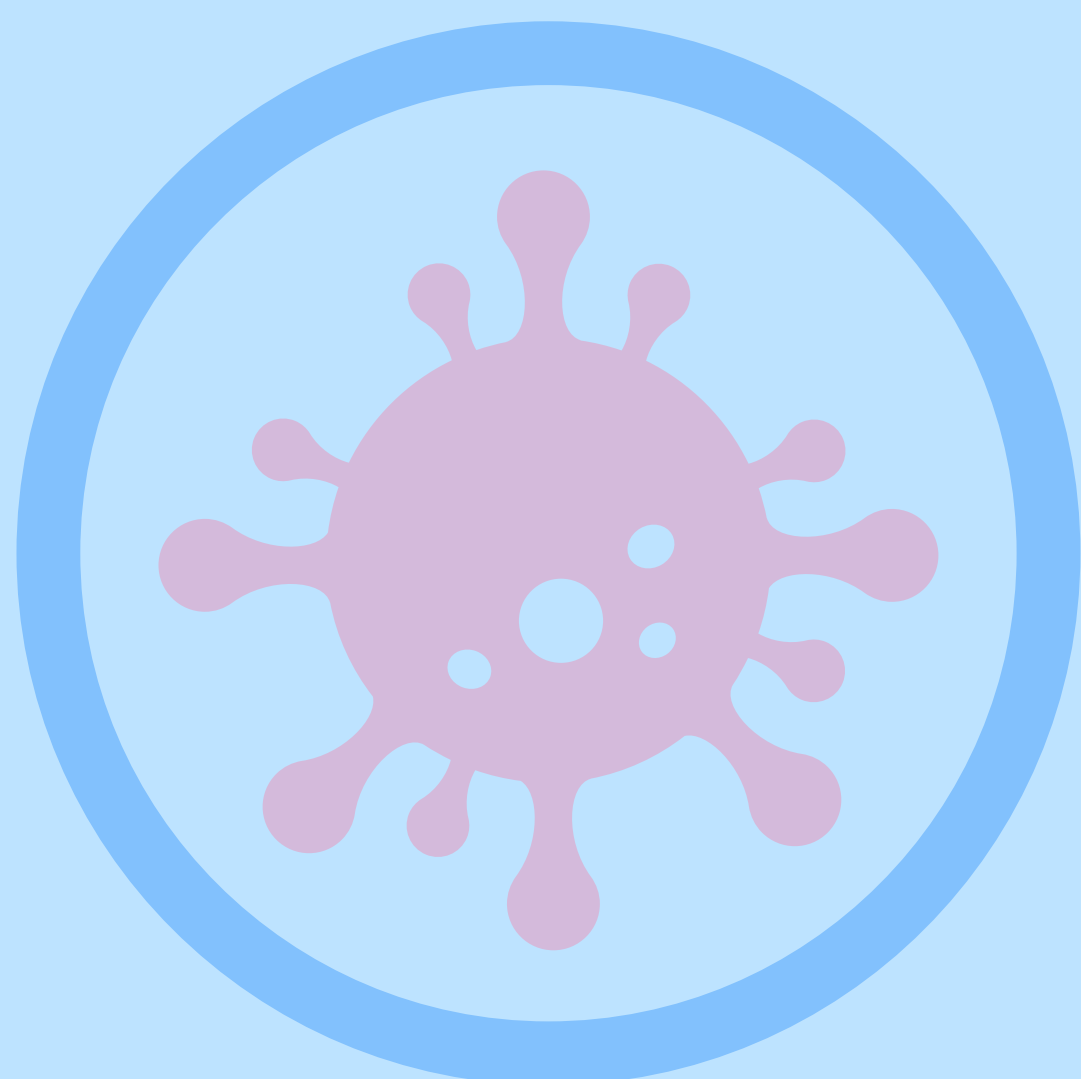
Adverse Events			
Administration Route	IV		SC
Heart failure (5% prevalence)			
Enalapril 10mg	37.80	USD 3.53	USD 0.00
Bisoprolol 5mg	37.80	USD 27.34	USD 0.00
Spinarolactone 25mg	37.80	USD 20.15	USD 0.00
Furosemide 40mg	16.20	USD 2.21	USD 0.00
Consultations	0.15	USD 1.37	USD 0.00
Echocardiogram	0.08	USD 1.64	USD 0.00
Electrocardiogram	0.08	USD 1.52	USD 0.00
Hemogram	0.08	USD 0.55	USD 0.00
Chest X-ray	0.08	USD 1.69	USD 0.00
Phlebitis (20-30% prevalence)			
Clindamycin 500mg	31.50	USD 36.89	USD 0.00
Dexketoprofen	31.50	USD 32.97	USD 0.00
Acetaminophen	31.50	USD 1.52	USD 0.00
Hemogram	1.50	USD 10.96	USD 0.00
Arterial hypertension (3% prevalence)			
Enalapril 10mg	16.20	USD 1.51	USD 0.00
Ibersartan 30mg	8.10	USD 5.84	USD 0.00
Hydrochlorothiazide 25mg	16.20	USD 1.23	USD 0.00
Amlodipine 10mg	16.20	USD 7.21	USD 0.00
Spinarolactone 25mg	8.10	USD 4.32	USD 0.00
Bisoprolol 10mg	8.10	USD 5.86	USD 0.00
Consultations	0.14	USD 1.23	USD 0.00
Echocardiogram	0.14	USD 2.96	USD 0.00
Electrocardiogram	0.14	USD 2.74	USD 0.00
Chest X-Ray	0.14	USD 3.04	USD 0.00
Kidney ultrasound	0.14	USD 4.66	USD 0.00
kidney doppler	0.14	USD 8.88	USD 0.00
Cardiomyopathy (1% prevalence)			
Enalapril 10mg	7.56	USD 0.71	USD 0.00
Bisoprolol 10mg	3.78	USD 2.73	USD 0.00
Spinarolactone 25mg	3.78	USD 2.02	USD 0.00
Furosemide 40mg	4.86	USD 0.66	USD 0.00
Consultations	0.03	USD 0.27	USD 0.00
Echocardiogram	0.02	USD 0.33	USD 0.00
Electrocardiogram	0.02	USD 0.30	USD 0.00
Chest X-ray	0.02	USD 0.34	USD 0.00
Hemogram	0.02	USD 0.11	USD 0.00
TOTAL COST		USD 199.28	USD 0.00

Table 3. Total difference in 1-year application of a patient with Trastuzumab IV vs SC.

	Trastuzumab IV	Trastuzumab SC
Cost of adverse events	USD 199.28	USD 0.00
Cost of medical materials	USD 20.68	USD 27.32
Cost of associated medications	USD 2.31	USD 0.00
HR costs for first application	USD 102.02	USD 103.72
HR maintenance costs	USD 1,734.42	USD44.08
TOTAL COSTS	USD 2,058.71	USD 175.11

Discussion

The results of this study significantly highlight the reduce in cost and patient care benefits of subcutaneous (SC) administration of Trastuzumab compared to the intravenous (IV) method. The difference in costs associated with each administration route is particularly relevant in Honduras, where healthcare resources are not only scarce but also need to be utilized in the most efficient manner possible to maximize patient outcomes. Firstly, the reduction in direct costs with SC administration offers a substantial benefit. This method requires fewer resources in terms of both time and materials for drug preparation and administration. Moreover, the SC route's association with fewer and less severe adverse events presents an additional layer of benefit. By minimizing the risk and severity of complications such as phlebitis and cardiomyopathy, SC administration not only enhances the patient's quality of life but also reduces the long-term costs associated with managing these adverse effects. Such complications can lead to prolonged treatment courses, increased use of healthcare resources, and, importantly, greater patient distress. These findings underscore the need for healthcare policy adjustments that encourage the use of SC administration of Trastuzumab in Honduras. The evidence suggests that such a shift would not only be economically prudent but also align with the goals of patient-centered care. Facilitating wider access to SC Trastuzumab would likely lead to improved patient adherence and outcomes, given the method's convenience and lower risk profile.



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