Cost-Effectiveness of Transcatheter Aortic Valve Implantation in Argentina

El costo-efectividad del implante transcatéter de la válvula aórtica en Argentina

In November, 2019, the National Commission for the Evaluation of Health Technologies (*Comisión Nacional de Evaluación de Tecnologías de Salud, CONETEC*) published the recommendations for the use of transcatheter aortic valve implantation (TAVI) in Argentina. In its conclusions, CONETEC supports TAVI only for inoperable patients, and discourages it for the rest of the risk groups based on the lack of benefits in critical points (mortality), the scarce evidence regarding durability, the potentially high financial impact, and the negative impact on equity and probably on public health. (1) The document includes a detailed bibliographic review of the international clinical outcomes and cost-effectiveness of implementing TAVI in Argentina.

This analysis made by a government agency is likely to induce health funders to restrict the indication and coverage of TAVI, taking advantage of these official arguments. Nevertheless, in a stable, free capitalist system like that of Argentina, physicians, patients or institutions can make independent decisions that contest these state recommendations.

The evaluation of new technologies through cost-effectiveness analysis identifies the relative value of interventions based on measurements of their net cost and their effects on health. It compares the cost and results of two or more procedures and determines their cost-effectiveness with the Black quadrant (2) (Figure 1). In the case of Argentina, TAVI would be in the upper left quadrant.

Also, recommendations point out that, for the time being, in Latin America, only Chile accepts TAVI coverage in patients who are unsuitable candidates for conventional surgery, while the rest of the countries, such as Brazil, do not report it on their coverage or do not recommend it.

Similarly to the National Institute for Health and Care Excellence (NICE) in the UK, Medicare and Medicaid in the USA accept TAVI coverage for inoperable or high-risk patients, while only Anthem Health Insurance recommends it for intermediate and low-risk patients. For the moment, Australia and France do not recommend the use of TAVI. In any case, it should be also mentioned that many of these recommendations have not been updated recently. Table 1 summarizes in detail CONETEC recommendations for the use of TAVI in Argentina

Strictly speaking, the CONETEC document includes studies published up to July 2019; since then, other meta-analyses have been published, especially for low-risk patients. (3-7) Nevertheless, this new evidence does not seem to change previous results. After these recommendations were published, a meta-analysis of moderate or severe mismatch one year post-TAVI, with an incidence of 36.3%, concluded that severe mismatch was associated with high risk of mortality at one-year (OR 1.11, 95% CI 1.04-1.18, p=0.001). (8) Another recent registry of 4,336 procedures reported a risk for endocarditis after TAVI of 1.4% during the first year and of 0.8% (0.6–1.1%) for the following years, similar to that of surgery. (9)

Three other cost-effectiveness analyses were published recently but were not included in the recommendations. In Japan, TAVI was shown to be cost-effective in inoperable high-risk patients, (10) in Australia in moderate-risk patients, (11) and in Denmark in low-risk patients. (12) Regarding TAVI durability, Orvin et al. (13) recently reported structural valve deterioration of 12.3% at 5 years, and Rheude et al. (14) of 10.3% at one year.

Finally, other recent studies may provide new evidence to these recommendations, such as results of balloon-expandable or self-expanding valves (15-17), or the Canadian Cardiovascular Society position statement for TAVI. (18)

Argentina's health regulatory system has had poor ruling in the incorporation of new technologies. The National Administration of Drugs, Food and Medical Technology (*Administración Nacional de Medicamentos, Alimentos y Tecnología Médica, ANMAT*) evaluates and approves the efficacy and safety of new

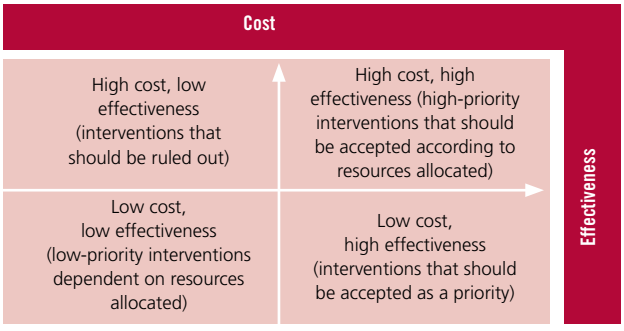

Table 1. Summary of CONETEC recommendations for the use of TAVI in Argentina

Severe aortic stenosis	Recommendation for the use of TAVI	Advantages and disadvantages of TAVI	Lack of evidence in TAVI	Impact		
				Financial	Equity	Public health
Inoperable patient (STS > 15%)	Yes	Probably improved efficacy and equal safety	LV function, durability (5 years)	Unfavorable	Negative	Probably negative
High-risk patient (STS 8-15%)	No	Reduces bleeding, mismatch, ARF Increases prosthetic leak	LV function, durability (5 years), rehospitalization, endocarditis	Unfavorable	Negative	Probably negative
Moderate-risk patient (STS 4-8%)	No	Reduces atrial fibrillation, ARF Vascular complications, need for pacemaker	LV function, durability (2 years), rehospitalization, endocarditis, mismatch, quality of life	Unfavorable	Negative	Probably negative
Low-risk patient (STS < 4%)	No	Reduces atrial fibrillation, ARF Vascular complications, need for pacemaker	LV function, durability (3 years), rehospitalization, endocarditis, mismatch, quality of life	Unfavorable	Negative	Probably negative

CONETEC: National Commission for the Evaluation of Health Technologies (Comisión Nacional de Evaluación de Tecnologías de Salud). TAVI: Transcatheter aortic valve implantation. ARF: Acute renal failure. LV: Left ventricular.

treatments, but does not interfere with their adoption by the health system. Therefore, the adoption of new technologies depends on the interest and pressure from the industry, funders, and medical groups. There is also an implicit incentive system for physicians, in which the industry pushes them for adoption of innovations, while funders tend to limit it for financial reasons. (19)

In this context, CONETEC was created in March 2018 to evaluate the impact of new drugs, medical devices, and clinical and surgical techniques and procedures on the population's health. While many local scientific societies study and develop reliable consensuses and guidelines that include these new technologies, those who draft them commonly rely on the direct benefits the innovation would have on the treatment or prevention of the disease rather than on its cost-effectiveness, a situation worsened by the fact that usually the most effective technologies are also the most expensive ones.

In this struggle between the advantages of technological advances and the need to avoid increased costs, certain negotiation scenarios arise. On the one hand, one of the most important factors triggering physicians' adoption of innovations is the reimbursement policy. Funders' acceptance to pay for a new procedure accelerates the diffusion and adoption of technology, and vice versa. (20) On the other hand, the implementation of a system of non-reimbursement of profits for the use of new technologies during an initial evaluation period could discourage the early dissemination of innovation until its real efficacy is determined; but at the same time, it could reduce interest in the development of new medical advances. (21)

There are also ethical considerations regarding the incorporation of innovations that should be pointed out. Some researchers have argued that although physicians' fees represent only 20% of the health care expenditure, they perform 80% of the requested practices. (22) Undoubtedly, the fact of being the decision-maker and self-referential to carry out the new practice, or being the owner of the medical equipment, adds a complicated ethical dimension to the issue. (23, 24)

An additional aspect in the adoption of new technologies is the patients' participation in the evaluation of benefits. With the best of intentions, CONETEC is also including patients' opinion in the decisions. While this is a desirable situation, how patients' views on innovations are formed should be considered. To begin with, the "word of mouth" can be a mechanism for quick acceptance of new procedures, as was

the case with laparoscopic cholecystectomy, in which popularity was not the result of traditional scientific discourse. (25) Another influential phenomenon is the advertising of new products directly to the user, which promotes the patient demanding the physician to apply the innovation. Finally, a social aspect that underlies the adoption of expensive innovations is that they would necessarily be accessible only to groups of patients with high financial resources, which in turn would increase inequity in access and care at the expense of marginalized groups.

Compared with a large part of the developed world, much of the inadequate cost-effectiveness of TAVI in Argentina is due to the high sale price of the device, a situation that could perhaps be alleviated with a reasonable exemption of local taxes.

CONETEC recommendations for the use of TAVI in Argentina are temporary and dynamic, and might change with the emergence of new evidence or other financial models for device implantation. For the time being, CONETEC has made the first responsible technical survey of the cost-effectiveness of TAVI in Argentina. Let us wait for its wide impact on the other actors.

Raúl A. Borracci

REFERENCES

1. Comisión Nacional de Evaluación de Tecnologías de Salud – CONETEC. Implante Transcatéter de válvula aórtica en la estenosis aórtica severa. Informe de Evaluación de Tecnologías Sanitarias Nº07, Buenos Aires, Argentina. Noviembre 2019. Disponible en www.argentina.gob.ar/salud/conetec

2. Black WC. The cost-effectiveness plane: a graphic representation of cost-effectiveness. Med Des Making 1990;10:212-5. https://doi.org/10.1177/0272989X9001000308

3. Vipparthy SC, Ravi V, Avula S, Kambhatla S, Mahmood M, Kabour A, et al. Meta-Analysis of Transcatheter Aortic Valve Implantation Versus Surgical Aortic Valve Replacement in Patients With Low Surgical Risk. Am J Cardiol 2019 Nov 8. pii: S0002-9149(19)31222-6. https://doi.org/10.1016/j.amjcard.2019.10.036

4. Rawasia WF, Usman MS, Mujeeb FA, Zafar M, Khan SU, Alkhouli M. Transcatheter versus surgical aortic valve replacement in low surgical risk patients: A meta-analysis of randomized-controlled trials and propensity-matched studies. Cardiovasc Revasc Med 2019 Oct 24. pii: S1553-8389(19)30641-4. https://doi.org/10.1016/j.carrev.2019.09.016

5. Witberg G, Landes U, Lador A, Yahav D, Kornowski R. Meta-Analysis of Transcatheter Aortic Valve Implantation Versus Surgical Aortic Valve Replacement in patients at Low Surgical Risk. EuroIntervention 2019 Oct 1. pii: EIJ-D-19-00663. https://doi.org/10.4244/EIJ-D-19-00663

6. Siontis GCM, Overtchouk P, Cahill TJ, Modine T, Prendergast B, Praz F, et al. Transcatheter aortic valve implantation vs. surgical aortic valve replacement for treatment of symptomatic severe aortic stenosis: an updated meta-analysis. Eur Heart J 2019;40:3143-53. https://doi.org/10.1093/eurheartj/ehz275

7. Takagi H, Hari Y, Nakashima K, Kuno T, Ando T; ALICE (All-Literature Investigation of Cardiovascular Evidence) Group. A meta-analysis of ≥5-year mortality after transcatheter versus surgical aortic valve replacement. J Cardiovasc Surg (Torino) 2019 Oct 25. https://doi.org/10.23736/S0021-9509.19.11030-0

8. Sá MPBO, Cavalcanti LRP, Sarargiotto FAS, Perazzo ÁM, Rayol SDC, Diniz RGS, et al. Impact of Prosthesis-Patient Mismatch on 1-Year Outcomes after Transcatheter Aortic Valve Implantation: Meta-analysis of 71,106 Patients. SurgBraz J Cardiovasc 2019;34:318-26. https://doi.org/10.21470/1678-9741-2019-0073

9. Bjursten H, Rasmussen M, Nozohoor S, Götberg M, Olaison L, Rück A, et al. Infective endocarditis after transcatheter aortic valve implantation: a nationwide study. Eur Heart J 2019;40:3263-9. https://doi.org/10.1093/eurheartj/ehz588

10. Inoue S, Nakao K, Hanyu M, Hayashida K, Shibahara H, Kobayashi M, et al. Cost-Effectiveness of Transcatheter Aortic Valve Implantation Using a Balloon-Expandable Valve in Japan: Experience From the Japanese Pilot Health Technology Assessment. Value Health Reg Issues 2019;21:82-90. https://doi.org/10.1016/j.vhri.2019.07.013

11. Zhou J, Liew D, Duffy SJ, Walton A, Htun N, Stub D. Cost-effectiveness of transcatheter aortic valve implantation compared to surgical aortic valve replacement in the intermediate surgical risk population. Int J Cardiol 2019;294:17-22. https://doi.org/10.1016/j.ijcard.2019.06.057

12. Geisler BP, Jørgensen TH, Thyregod HGH, Pietzsch JB, Søndergaard L. Cost-Effectiveness of Transcatheter versus Surgical Aortic Valve Replacement in Patients at Lower Surgical Risk: Results from the NOTION Trial. EuroIntervention 2019 Aug 20. pii: EIJ-D-18-00847. https://doi.org/10.4244/EIJ-D-18-00847

13. Orvin K, Zekry SB, Morelli O, Barabash IM, Segev A, Danenberg H, et al. Long-Term Functional and Structural Durability of Bioprosthetic Valves Placed in the Aortic Valve Position via Percutaneous Rout in Israel. Am J Cardiol 2019;124:1748-56. https://doi.org/10.1016/j.amjcard.2019.08.043

14. Rheude T, Pellegrini C, Cassese S, Wiebe J, Wagner S, Trenkwalder T, et al. Hemodynamic structural valve deterioration following transcatheter aortic valve implantation with latest-generation balloon-expandable valves. EuroIntervention 2019 Sep 10. pii: EIJ-D-19-00710.

15. Van Belle E, Vincent F, Labreuche J, Auffret V, Debry N, Lefevre T, et al. Balloon-Expandable versus Self-Expanding Transcatheter Aortic Valve Replacement: A Propensity-Matched Comparison from The France-TAVI Registry. Circulation 2019 Nov 16. https://doi.org/10.1161/CIRCULATIONAHA.119.043785

16. He C, Xiao L, Liu J. Safety and efficacy of self-expandable Evolut R vs. balloon-expandable Sapien 3 valves for transcatheter aortic valve implantation: A systematic review and meta-analysis. Exp Ther Med 2019;18:3893-904. https://doi.org/10.3892/etm.2019.8000

17. Acconcia MC, Caretta Q, Monzo L, Tanzilli G, Sili Scavalli A, Sergi D, et al. Effectiveness of the new generation transcatheter aortic valve in the real life studies. Review and meta-analysis. Eur Rev Med Pharmacol Sci 2019;23:8018-27. https://doi.org/10.26355/eurrev_201909_19018

18. Asgar AW, Ouzounian M, Adams C, Afilalo J, Fremes S, Lauck S, et al. 2019 Canadian Cardiovascular Society Position Statement for Transcatheter Aortic Valve Implantation. Can J Cardiol 2019;35:1437-48. https://doi.org/10.1016/j.cjca.2019.08.011

19. Borracci RA, Giorgi MA, Giorgi G, Darú V, Manente D, Tajer CD, et al. Diffusion and adoption of health care innovations in cardiology, in Argentina. Rev Med Chile 2013;141:49-57. https://doi.org/10.4067/S0034-98872013000100007

20. Gelijns AC, Fendrick AM. The dynamics of innovation in minimally invasive therapy. Health Policy 1993;23:153-66. https://doi.org/10.1016/0168-8510(93)90013-F

21. James AE. The diffusion of medical technology: Free enterprise and regulatory models in USA. J Med Ethics 1991;17:150-5. https://doi.org/10.1136/jme.17.3.150

22. Eisenberg JM, Schwartz JS, McCaslin FC, Kaufman R, Glick H, Kroch E. Substituting diagnostic services: New tests only partly replace older ones. JAMA 1989;262:1196-200. https://doi.org/10.1001/jama.1989.03430090058033

23. Highes DR, Sunshine JH, Bhargavan M, Forman H. Physician self-referral for imaging and the cost of chro¬nic care for Medicare beneficiaries. Med Care 2011;49:857-64. https://doi.org/10.1097/MLR.0b013e31821b35ee

24. Reschovsky J, Cassil A, Pham HH. Physician ownership of medical equipment. Data Bull (Cent Stud Health Syst Change) 2010;36:1-2.

25. Gelijns AC, Fendrick AM. The dynamics of innovation in minimally invasive therapy. Health Policy 1993;23:153-66. https://doi.org/10.1016/0168-8510(93)90013-F