

EBEI: a new index of eye bank efficiency



XVIII

CORSO NAZIONALE SIBO

La rete italiana delle Banche degli Occhi
tra qualità, scienza e tecnologia

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EBEI: Eye Bank Efficiency Index

European Journal of Ophthalmology
OnlineFirst
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<https://doi.org/10.1177/11206721231212772>

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Original research article

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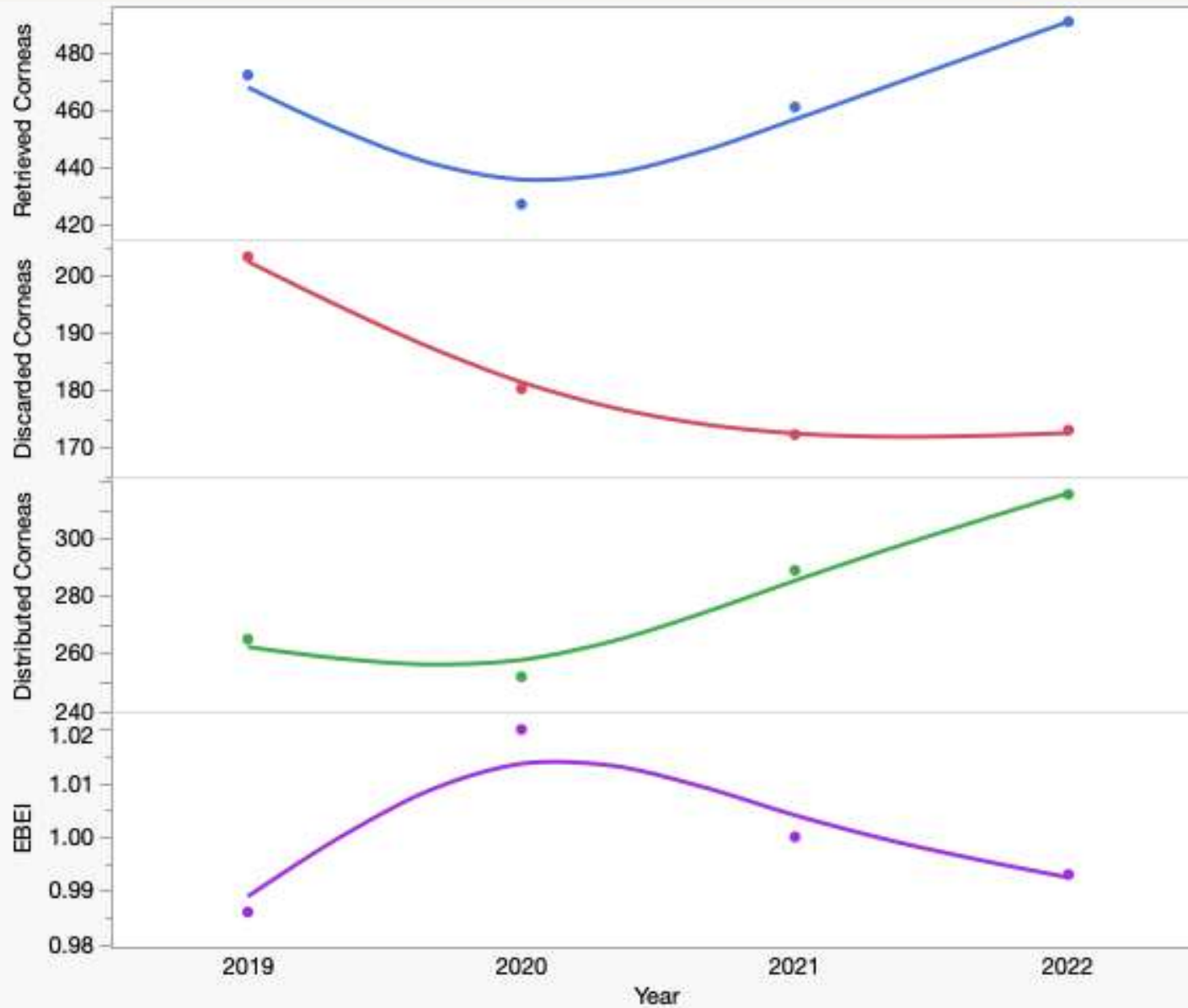
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EBEI =

$$\left(\frac{n^{\circ} \text{ of distributed corneas}}{(n^{\circ} \text{ of procured corneas} - n^{\circ} \text{ of discarded corneas})} \right)$$

Range of values

- < 1 → the number of distributed corneas is lower than the number of corneas the EB deemed feasible for transplant
- $= 1$ → the number of distributed corneas matches the number of retrieved corneas deemed transplantable
- > 1 → If the number of distributed corneas exceed the number of corneas retrieved and deemed transplantable



	Mean (SD) ^a	Percentage variation ^b	p
Retrieved Corneas (by month)			
2019	468.4 (33.4)		0.0146
2020	432.4 (55.8)	-7.7%	
2021	463.7(27.30)	+1.5%	
2022	504.7 (27.6)	+7.5%	

Distributed Corneas (by month)			
2019	257.0 (40.7)		0.1708
2020	278.7 (65.8)	+8.4%	
2021	280.3 (57.1)	+9.1%	
2022	322.0 (45.9)	+25.3%	

Discarded Corneas (by month)			
2019	200.6 (33.8)		0.1269
2020	163.7 (37.4)	-18.4%	
2021	186.3 (25.1)	-7.1%	
2022	174.9 (12.0)	-12.8%	

Annual	EBEI	Percentage variation ^a
2019	0.986	
2020	1.020	+3.4%
2021	1.000	+1.4%
2022	0.993	+0.7%

$$EBEI = \left(\frac{n^{\circ} \text{ of distributed corneas}}{(n^{\circ} \text{ of procured corneas} - n^{\circ} \text{ of discarded corneas})} \right)$$

Why the need for a new index of eye bank efficiency?

- In the vast majority of the literature, raw data reporting only
- “Transplant rate” (TR) is the only alternative nowadays used for evaluating Eye Bank Efficiency but more complex bunch of data
- Difficult to compare with other EB

TR: Cornea transplanted

Cornea recovered for transplant purpose

Transplant & Conversion Rates - U.S. Eye Banks					
Month	Transplant Rate	Conversion Rate	Death Referrals	Transplant Eligible Referrals	Transplant Intended Corneas Recovered
Jan. 2023	69.6%	30.4%	78,392	17,554	10,573
Feb. 2023	70.5%	31.2%	66,782	15,617	9,683
Mar. 2023	70.1%	33.5%	71,427	16,533	10,984
Apr. 2023	69.2%	33.3%	66,429	15,707	10,393
May 2023	70.7%	34.0%	66,079	15,702	10,542
Jun. 2023	68.5%	32.6%	63,485	15,714	10,117
Jul. 2023	68.1%	35.3%	61,813	15,535	10,834
Aug. 2023	67.7%	34.2%	64,092	16,404	11,082
Sep. 2023	67.2%	32.2%	63,008	16,663	10,615
Oct. 2023	67.6%	34.3%	65,073	16,957	11,493
Nov. 2023	67.6%	34.1%	62,456	16,000	10,720
Dec. 2023	66.4%	30.8%	71,320	16,650	10,061
2021 Total	68.1%	31.5%	941,499	187,980	117,177
2022 Total	70.7%	29.5%	885,772	191,697	112,155
2023 Total	68.6%	33.0%	800,356	195,036	127,097
2023 Avg.	N/A	N/A	66,696	16,253	10,591
Std. Dev.	1.4%	1.6%	4,826	639	492

*Transplant rate is the number of corneas used for transplant divided by the number recovered for transplant.
 Conversion rate is the number of transplant donors divided by the number of transplant eligible referrals.

EBEI is as good as a CAFE is...

- **C**omprehensive

depict overall activity of Eye Banks

- **A**pplicable

no specific metrics needed for calculation

- **F**lexible

easy comparison regardless the time-frame or EB size

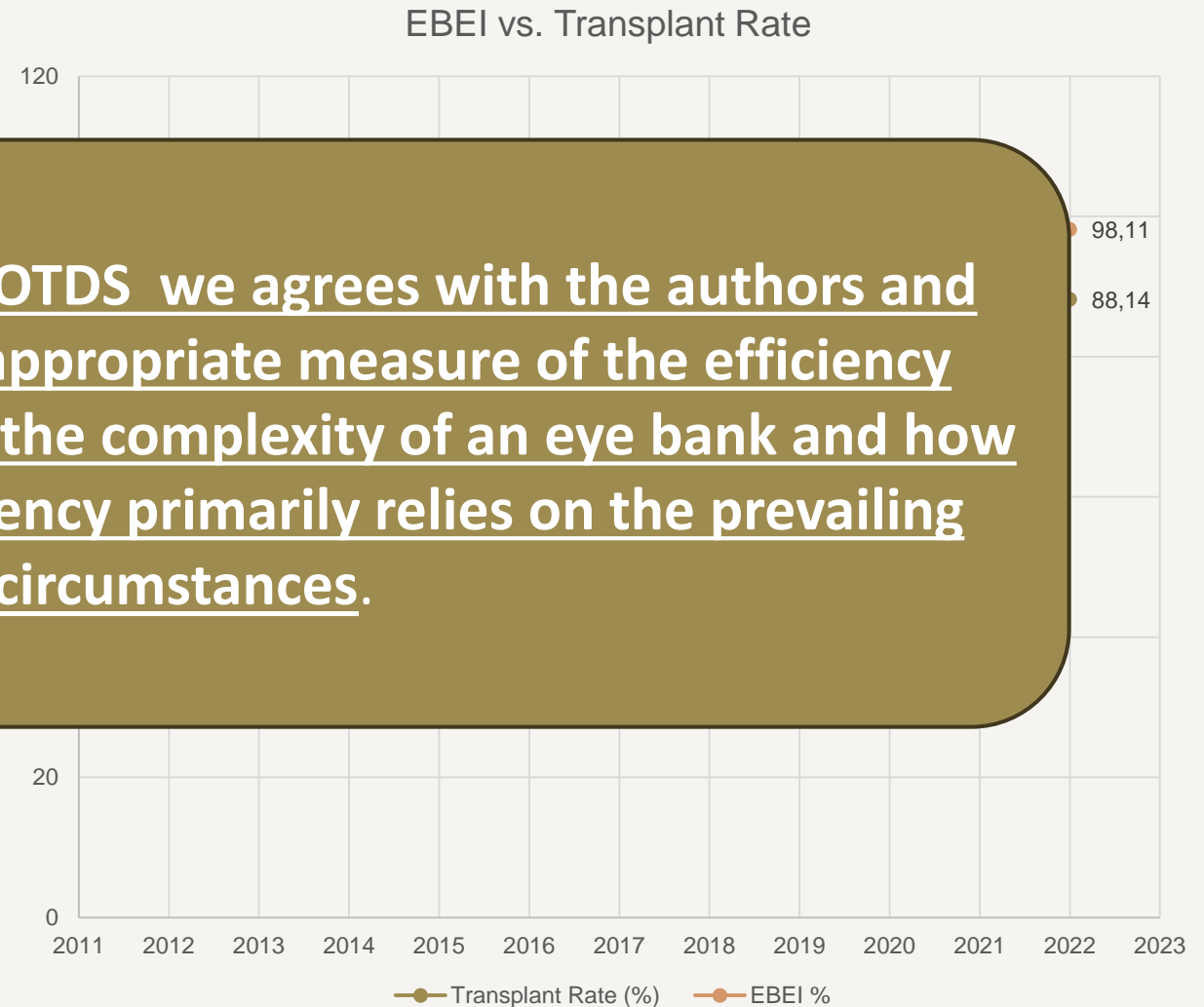
- **E**fficient

external validation

EBEI: external validation from EBAANZ

- 2012-2014 (Optisol Medior)
- No direct correlation between EBEI and Transplant Rate
- 2019-2022 (COVID-19 restrictions)

In conclusion, the NSW OTDS we agrees with the authors and believe the EBEI is an appropriate measure of the efficiency levels. The EBEI captures the complexity of an eye bank and how the fluctuation in efficiency primarily relies on the prevailing circumstances.



EBEI: external validation from EBAA

“I appreciate the critical thought, since the American measurement system is uniquely robust and so specific that the European model is not a direct analogue. I've tested EBEI and it appears that we have a measure that is unique from "transplant rate", while being a fair measure of eye bank efficiency, as was intended.”

Personal communication with Brian Philippy,
Chair of Statistics for the Eye Bank Association of America

Take home messages

- EBEl is a new metric of eye bank efficiency
- It provides estimates of eye bank activity different than those pictured by existing metrics (ie, Transplant Rate)
- The reliability and efficacy of EBEl has been already proved by independent external validation analyses

“The widespread adoption of the EBEI promises a new era of accuracy and reliability in Eye Bank data analysis.”

O'Connor A, et al. *EJO*. 2024
Accepted for publication ahead of print