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EDITORIAL

The arc of a life in critical care research—in memory of Professor Rinaldo Bellomo (1956–2025)

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Prof. Rinaldo Bellomo was a great scientist, but also a loving husband and father, exceptionally gifted physician, a great mentor and a good friend.

With more than 2000 publications in 160 journals and more than 150,000 citations, Professor Rinaldo Bellomo (1956–2025) is among the worlds' most important medical researcher, and the first intensive care physician to be acknowledged by Clarivate^{TM} as an influential scientific mind. He is an outstanding figure in intensive care medicine, and significantly contributed to giving our field the same dignity of other medical disciplines, authoring 23 randomized controlled trials (RCTs) in the New England Journal of Medicine (**Supplemental Table 1**).

With his pivotal studies he contributed to shape and redefine critical care nephrology [1, 2], the concept of glycemic control in the intensive care units [3], the approach to intravenous fluids [4, 5] and the use of vasopressors [6] among others. With his capability of thinking out of the box, his exceptional understanding of physiology, and his dedication to rigorous study he was challenging dogmas, sometimes highlighting harms where others were ensuring benefits. "The biggest minus to knowledge is not that you are ignorant, is that you think you know", and this mantra drove his research activity through the years, aware that "todays' truth will be the source of derision tomorrow". He was both a physiology expert (having one of the world's finest animal laboratories in the world) and a clinical trialist. He was not passive to dogmas, and he challenged them teaching us that any intuition, even the most unpopular, should be followed with rigor and perseverance. Indeed, he believed that in research one should have followed the truth, starting from the clinical problem and searching for the answer, instead of starting from an idea and making everything to prove it right. As a scientific heritage, he leaves us some milestone concepts: (1) the ideal flow of research should start with a deep knowledge of the question of interest, followed by experimental data, a pilot or feasibility study and finally a grant application and a large multinational randomized controlled trial; (2) in the dispute between the supporters of personalized medicine and the pragmatic clinical trialists, he knew the answers for personalization had to be searched within the subgroups of the thousands of patients randomized in mega-trials, and not in personal opinions; (3) he leaves us the concept of "smart research", where clinicians should be able and supported to collect data in a hyper-simplified manner (in the absence of concerns for patients' safety); (4) due to biases and lack of generalizability, single-center and maybe even single-nation trials, should be useful only to generate hypothesis, and as a training for young colleagues to become expert in clinical research; (5) in 2006, starting from the quote of Bertrand Russel "the extent to which beliefs are based on evidence is very much less than believers suppose", he proudly introduced the need of additional dimensions to the quality of the evidence from research: biological plausibility, reproducibility and generalizability [7].

From a clinical point of view, he spent decades studying strategies such as the role of angiotensin II as a vasopressor, and the role of amino acids for the prevention of acute kidney injury [8], two major discoveries that will potentially affect clinical practice and the outcomes of critically ill patients in the next few years.

Despite his outstanding contribution to critical care medicine, he was much more than just a scientist. His merit lies in having built one of the most amazing clinical and scientific networks disseminated all over the world, which is proven by hundreds of co-authors in his works from 70 countries. He was able to build such a network, because he was content driven, benevolent, generous and an interactive and integrative character.

Fig. 1A displays a co-authorship network centred on Professor Rinaldo Bellomo, illustrating the collaborative structure of his scientific output in the field of critical care medicine. Professor Bellomo occupies a dominant, highly interconnected central position within the network, reflecting his prolific scholarship and transformative influence on the field. The dense web of connections radiating from his node underscores both the breadth of his collaborations and the integrative nature of his research leadership. Fig. 1B complements this author-level perspective with a country-level co-authorship map, highlighting international collaboration patterns in critical care research catalysed by Professor Bellomo. Australia emerges as the largest and most centrally positioned node, with strong links to Europe, North America and the Asia-Pacific region. This central role reflects Professor Bellomo's foundational contributions to advancing both the intellectual development and global collaborative fabric of critical care science.

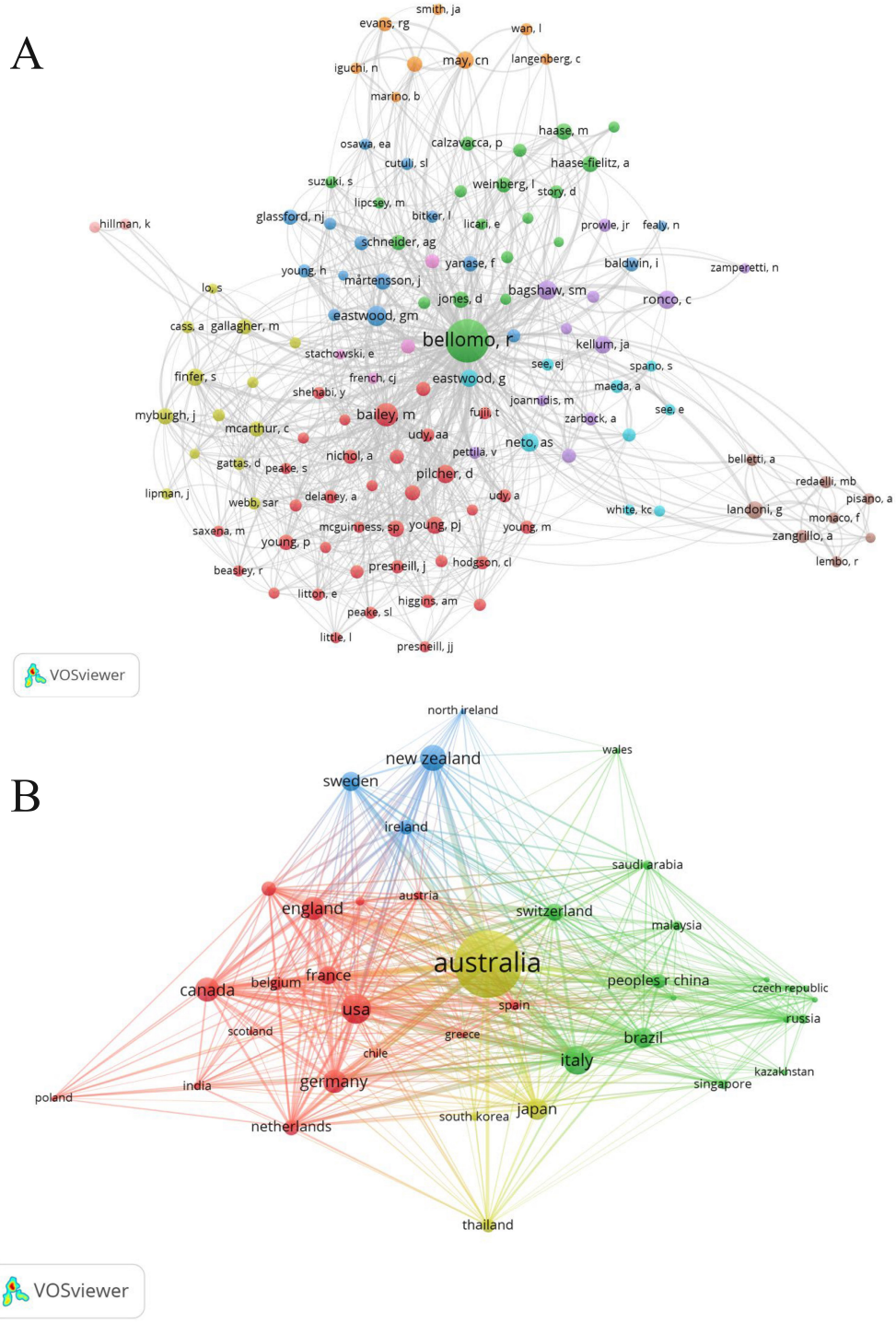

FIGURE 1. Professor Bellomo Co-authorship network. (A) Co-authorship network visualization illustrating the scientific collaboration landscape surrounding Professor Rinaldo Bellomo. (B) Co-authorship network visualization depicting the collaborative research impact of Professor Rinaldo Bellomo.

The capability of Professor Bellomo to connect with people at any time, from everywhere, regardless of the jetlag and dealing with several different topics proves his boundless energy and extraordinary passion for research, collaboration and education. He was extremely cooperative, and despite the determinant contribution in each study, he rarely took for himself the most prestigious position in authorship, having just 41 papers out of 2088, as first author. A summary of Professor Bellomo's top 10 most cited publications is presented in **Supplemental Table 2**. Moreover, hundreds of colleagues acknowledge Professor Bellomo as their mentor, due to his kindness and availability towards anyone who was asking for support, offering his time with relentless enthusiasm, warmth and optimism. He had the gift of making things simple and comprehensible, and this unique talent allowed also the most junior colleagues to benefit and learn from his experience and knowledge. Despite his role, network and influence, he always refused to spend his time on social media, simply replying "Why?" when asked.

Beside his scientific knowledge, Rinaldo had a great overall general culture beyond medicine, being able to lead conversations on history, philosophy, literature and politics. It was a pleasure to discuss such topics with him, and always had interesting point of views to share. His knowledge of general culture can be seen in his major studies, for example the clear reference to Dumas's *The Three Musketeers* in his vasopressor trials ATHOS [6], ARAMIS [9] and PORTHOS [10].

He leaves a legacy behind him [11], with the most nourished group collected in the Australian and New Zealand Intensive Care Society Clinical Trials Group, but, as above mentioned, spread all over the world. Despite he was born and graduated in Italy, he never identified himself as Italian, having worked in the United States, in South Africa and in Australia. However, he would still occasionally speak Italian—with the native accent—with those countrymen he liked the most.

After the sorrow for having lost a mentor and a friend, Rinaldo's legacy will now have to collect his scientific heritage, and continue his immense and enduring contribution to the field of critical care medicine, in honor of his memory and the discipline and patients he devoted his life to. The starting point will be the 54 ongoing trials that he was running, keeping in mind his favourite words: "We should make the important measurable, not the measurable important".

AVAILABILITY OF DATA AND MATERIALS

The data are contained within this article and supplementary material.

AUTHOR CONTRIBUTIONS

GL—Conception and revision of the manuscript. MBR—Drafting, revision and literature synthesis. Both authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. Giovanni Landoni is serving as the Editor-in-Chief, and Martina Baiardo Redaelli is serving as one of the Editorial Board members of this journal. Full responsibility for the editorial process for this article was delegated to JLV and AC.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.signavitae.com/mre-signavitae/article/1934785184040665088/attachment/Supplementary%20material.docx.

REFERENCES

[1] Ronco C, Bellomo R. Critical care nephrology: the time has come. Nephrology Dialysis Transplantation. 1998; 13: 264–267.

[2] Bellomo R, Ronco C, Kellum JA, Mehta RL, Palevsky P; Acute Dialysis Quality Initiative workgroup. Acute renal failure—definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) group. Critical Care. 2004; 8: R204–R212.

[3] NICE-SUGAR Study Investigators; Finfer S, Chittock DR, Su SY, Blair D, Foster D, Dhingra V, *et al*. Intensive versus conventional glucose control in critically ill patients. The New England Journal of Medicine. 2009; 360: 1283–1297.

[4] Finfer S, Micallef S, Hammond N, Navarra L, Bellomo R, Billot L, *et al*. Balanced multielectrolyte solution versus saline in critically ill adults. The New England Journal of Medicine. 2022; 386: 815–826.

[5] Myburgh JA, Finfer S, Bellomo R, Billot L, Cass A, Gattas D, *et al*. Hydroxyethyl starch or saline for fluid resuscitation in intensive care. The New England Journal of Medicine. 2012; 367: 1901–1911.

[6] Khanna A, English SW, Wang XS, Ham K, Tumlin J, Szerlip H, *et al*. Angiotensin II for the treatment of vasodilatory shock. The New England Journal of Medicine. 2017; 377: 419–430.

[7] Bellomo R, Bagshaw S. Evidence-based medicine: classifying the evidence from clinical trials—the need to consider other dimensions. Critical Care. 2006; 10: 232.

[8] Landoni G, Monaco G, Ti LK, Baiardo Redaelli M, Bradic N, Comis M, *et al*. A randomized trial of intravenous amino acids for kidney protection. The New England Journal of Medicine. 2024; 391: 687–698.

[9] See EJ, Clapham C, Liu J, Khasin M, Liskaser G, Chan JW, *et al*. A pilot study of angiotensin II as primary vasopressor in critically ill adults with

vasodilatory hypotension: the ARAMIS study. Shock. 2023; 59: 691–696.

[10] Coulson TG, Paul E, Miles LF, Pilcher D, Marasco SF, Frei D, *et al*. A Prospective double-blind, randomised controlled trial comparing angiotensin II to norepinephrine to reduce length of hospital stay in cardiac surgery patients (the PORTHOS study protocol). BMJ Open. 2025; 15: e095099.

[11] Serpa Neto A, Young P. In memory of professor Rinaldo Bellomo: a giant of intensive care medicine. Critical Care and Resuscitation. 2025; 27: 100110.

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