



SHORT COMMUNICATION

# Bridging the gap between clinical pharmacology and rational drug prescribing 2.0: An up-date after 30 years

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Fully aware of the unusual timing of submitting a commentary 30 years later, we want to reflect on the June edition of the British Journal of Clinical Pharmacology (BJCP) (1993), which featured four research articles on education in clinical pharmacology and therapeutics (CPT) written by our former professor, Theo de Vries, and an editorial highlighting the imperative to improve CPT education, specifically by paying more attention to rational drug prescribing for common diseases.<sup>1–5</sup> This plea was illustrated by five cartoons (Figure 1) and formed the basis for the World Health Organization's (WHO) Guide to Good Prescribing and its 6-step. The first four cartoons portrayed the suboptimal state of CPT education as a metaphorical 'Clinical Pharmacology Continent' (CPC) and a 'General Practitioners Island' (GPI), with a large gap between them. While clinical pharmacologists investigated new drug therapies, general practitioners frequently found themselves unprepared when making rational treatment decisions.<sup>1</sup> The final cartoon introduced a solution: problem-based learning education, depicted as a bridge connecting the

continent and the island. Over the past 30 years, considerable progress has been achieved in bridging the gap. Therefore, we intend to illustrate this transformation with a similar cartoon (Figure 2).

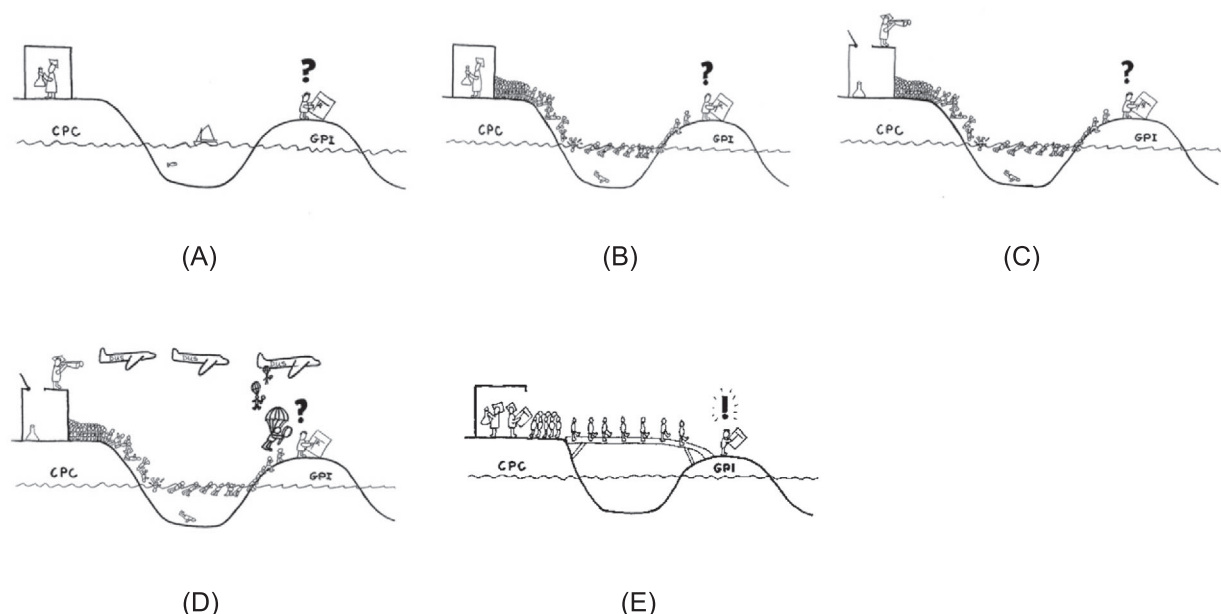
An increasing number of European medical schools have integrated problem-based learning into their curricula, although many have not yet done so in their CPT curriculum (e.g., via the WHO Guide to Good Prescribing and its 6-step).<sup>6</sup> Problem-based learning shifts the role of clinical pharmacologists from educators who provide knowledge that needs to be learned by rote, to teachers who guide students in solving patient cases by means of reasoning and discussion. Studies have shown that this problem-based approach is more effective in teaching CPT to medical students than the traditional way of learning (e.g., lectures and self-studying).<sup>7–13</sup>

Problem-based learning varies from solving paper case vignettes, which are still the cornerstone in CPT education, to e-learning, simulation (also virtually), games, real paper-based patient cases, and ultimately to the direct treatment of real patients under supervision (workplace learning). This enrichment of the learning context by incorporating a high level of realism has proven highly effective, probably

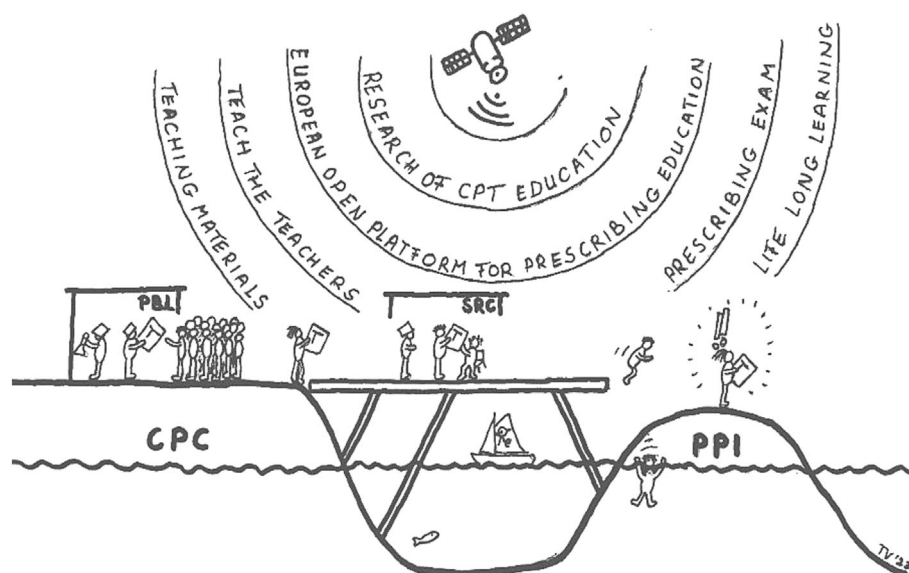
The authors confirm that the Principal Investigator for this paper is Jelle Tichelaar.

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**FIGURE 1** The state of education in clinical pharmacology and therapeutics in 1993. (A) There was a yawning gap between the Clinical Pharmacology Continent (CPC) and the real world of prescribing at the General Practitioners Island (GPI). (B) Without sufficient teaching the students were seen struggling towards prescribing practice. (C,D) Ever alert to a good research opportunity the response of clinical pharmacologists was to scramble the Drug Utilisation Study Airforce to inspect the problem, literally overlooking the fact that the problem is just below their feet. (E) The solution was to bridge the gap by sufficient problem-based education in Clinical Pharmacology and Therapeutics.



**FIGURE 2** The current state of education in clinical pharmacology and therapeutics. Clinical pharmacologists conduct lectures and host small working group sessions on their 'Clinical Pharmacology Continent' (CPC). Problem-Based Learning (PBL), with Student-Run Clinics (SRC) as a notable example, forms the basis to bridge the gap with the 'Prescribing Practice Island' (PPI). At the end, the bridge has been shortened slightly because the last step towards full responsibility and independence remains 'a leap of faith' (which sometimes results in a wet suit). After this, lifelong learning starts. This entire framework is underpinned by the internet, providing not only content but also evidence-based support, with unrestricted access to online educational resources and fostering global collaboration.

because it increases motivation by giving students a sense of responsibility and autonomy in an authentic environment, which is also partially explained by the self-determination theory.<sup>14,15</sup> An advanced form of workplace learning is the Student-Run Clinic (SRC), in which

students run, in an interprofessional setting, an (out)patient clinic, including its administration, finances and appointments, under minimal supervision.<sup>16,17</sup> Initially developed in the United States in the mid-1990s to assist the uninsured population,<sup>18</sup> SRCs have gained

recognition and are now part of medical curricula (also for insured patients).<sup>18–21</sup> For example, SRCs tailored to CPT form an integral part of Dutch medical curricula, and not only improved CPT education but also patient safety and interprofessional collaborations.<sup>22–27</sup> An international and interprofessional CPT SRC project has been set up recently.<sup>28</sup>

Since 1993, another advance in CPT education is the Internet. The Internet makes educational materials readily accessible and enables large-scale research on education to be carried out. To promote uniformity in CPT education across Europe, the European Association for Clinical Pharmacology and Therapeutics (EACPT), together with the WHO and European Commission, has put considerable effort into harmonizing and modernizing CPT education. This has led to the development of key learning outcomes, a list of key medicines for medical education, the European Prescribing Exam, the Clinical Pharmacology and Therapeutics Teach the Teacher (CP4T) programme and The European Open Platform for Prescribing Education (EurOP<sup>2</sup>E), all of which have contributed to the advancement of CPT education in Europe.<sup>29–32</sup> Moreover, the education section of the International Union of Basic and Clinical Pharmacology (IUPHAR) has introduced the online Pharmacology Education Project,<sup>33</sup> the British Pharmacological Society has launched the online Prescribing Safety Assessment,<sup>34,35</sup> and, more recently, a new project group has been set up to create a core pharmacology curriculum for European medical schools (Core Concepts of Pharmacology in Europe, PharmCoreCon-EU). Other examples of online educational materials are the Teaching Resource Centre (TRC),<sup>36</sup> Interactive Clinical Pharmacology (ICP)<sup>37</sup> and The Medicine of the Week.<sup>38</sup> EurOP<sup>2</sup>E, accessible via [www.prescribingeducation.eu](http://www.prescribingeducation.eu), could be instrumental in facilitating the dissemination of research findings and in fostering collaboration among educational institutions across Europe.

The educational bridge formed by problem-based learning, SRCs, and Internet-enabled progress is approaching the General Practitioner Island, or, as we would prefer to call it, Prescribing Practice Island (PPI), since it involves all medical doctors after their basic medical training. However, the transition from medical student to newly graduated doctor with prescribing responsibilities can still be challenging, underscoring the ongoing importance of research and curriculum development in CPT education. Through the EuroPE<sup>+</sup>, EuroP<sup>2</sup>E and CP4T programmes, we aim to continue the legacy of Professor Theo de Vries by harmonizing and modernizing CPT education across medical schools. Our goal is to provide free access to educational resources and courses (for teachers and students), and to revise both the WHO Guide to Good Prescribing and the WHO Teacher's Guide to Good Prescribing.<sup>39</sup> We encourage CPT educators to use these resources and to share their best practice, with the ultimate aim of fully bridging the gap between the Clinical Pharmacology Continent and the Prescribing Practice Island. In the next 30 years, we envision a future where there are no distinct entities on a continent or an island but rather an integrated educational experience in an authentic clinical practice setting, with clinical pharmacologists and prescribing doctors collaborating in teaching and education.

## AUTHOR CONTRIBUTIONS

Erik M. Donker, Michiel J. Bakkum and Jelle Tichelaar conceptualized the study and wrote the original draft. Milan C. Richir was responsible for conceptualizing, revising and editing. All the authors approved the final version.

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## CONFLICT OF INTEREST STATEMENT

All other authors declared no competing interests for this work.

## DATA AVAILABILITY STATEMENT

Not applicable.

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