From bedside-to-bench-to-bedside

A journey from paediatric oncology nursing into basic research

Having started her career as a staff nurse in paediatric oncology-haematology, Sara Colomer-Lahiguera (right) worked her way into clinical research and then basic research in childhood leukaemia. She argues that nurses’ involvement in all stages of translational research gives them a unique privileged role in healthcare systems.

During my nursing studies, clinical rotations were part of my training and I remember the day I entered the paediatric oncology unit for the first time. I was somehow shocked to see this unit was – literally – the most “active”, with kids shouting and racing in wheelchairs through the corridors, little girls without hair laughing and exchanging stickers, waiting for their daily examination, and parents chatting with other parents. Doctors, nurses, parents and children shared their experiences, their hopes, their fears, their laughs and their tears, and as soon as I entered the unit, I felt I became part of a unique and special family. I could not describe what is it to be a paediatric oncology nurse, but I knew I did not want to be anything else.

The Past – From Bedside to Bench: Life as a Backpack

I graduated in nursing in 2006 at the University of Valencia, in Spain, and I immediately started working as a staff nurse in several paediatric haematology and bone marrow transplantation units in pioneer hospitals. From the beginning, I was determined to develop my professional career in this field, and this is why even moving from one city to another was not a hurdle. At the same time, I always wondered about this twisted disease – why all these treatments with all these side effects? Couldn’t we do it better? These years spent in a clinical environment taught me that, in order to gain deeper understanding of the disease, of the treatment strategies and diagnosis, I needed to move forward.

I therefore obtained a Master’s degree in Clinical Laboratory research followed by another in Biomedical Basic research. Part of my research was performed in the Erythropathology Unit at the Hospital Clinic in Barcelona, and in the Department of Haematology at the Erasmus MC, Rotterdam in The Netherlands. This training qualified me to enter a PhD programme and to learn first hand a molecular and genetic approach to paediatric cancer.

Step by step, I created a specific profile by combining the knowledge of different disciplines such as nursing and basic research, with a personal goal: to contribute to the improvement of the needs and quality of life of these patients. Almost without realising, I was outlining in my curriculum one of the principles of the translational research concept, an interdisciplinary interface between the basic and clinical sciences.

This was not easy, but as a paediatric oncology nurse, I always relayed my experiences and I felt able to reach my goal, not only at the academic, but also at the personal level. As one of my patients once told me: “Don’t see barriers, those are challenges!”.
THE PRESENT – FROM BENCH TO BEDSIDE: 
THE IMPORTANCE OF RESEARCH

I am currently in my final year of doctoral studies at the St Anna Kinderkrebsforschung - Children’s Cancer Research Institute in Vienna, Austria (http://science.ccri.at/). My research focuses on the detection and characterisation of genetic alterations involved in childhood T-cell acute lymphoblastic leukaemia, which accounts for 15% of paediatric leukaemia. Today I think, from a scientific point of view, there is no doubt that we have entered a new era of cancer treatment.

Large-scale genome sequencing studies such as the Cancer Genome Atlas (http://cancergenome.nih.gov/) or the Paediatric Cancer Genome Project (www.pediatriccancergenomeproject.org/site/) are providing a better understanding of the alterations involved in the development of tumours. They have revealed that tumours harbour ‘actionable’ mutations, opening the field to the development of potentially new therapeutic targets, more precise than the standard chemotherapies, which act on all dividing cells, normal and cancerous. They also allowed the stratification of tumours in different subtypes that are often correlated with treatment sensitivity or resistance and clinical outcome, driving an optimisation of patients’ care. In other words, to know the specific genetic alterations of the patient will allow the design of tailored therapeutic strategies, avoiding those treatments that are unlikely to be effective in this particular case, not only at the diagnosis stage, but also in case of cancer recurrence. Welcome to the era of precision – also called “personalised” – medicine!

Translation of all this genomic knowledge acquired in the last decade into clinical application is, however, a slow process producing only few examples, and remains the main challenge for the future and for translational research. This will require implementation of well-designed translational trials, particularly important in case of paediatric oncology, where the eligible population for phase I-II trials is relatively limited due to the low mortality rates from childhood cancer on the one hand, and to the molecular profiling, which creates even smaller subgroups, on the other. All these facts may radically change the routine clinical practice and, as paediatric oncology nurses, we cannot miss this train and we have to look for new opportunities. We need to be creative and develop our expertise and expand our cross-discipline knowledge.

As an example of how essential this bi-directional communication is between the clinics and basic research (“bedside” and “bench”), I refer to a recent case which, in our small daily scale, reflects perfectly the essence of the translational research.
concept and the importance of the interdisciplinary teams in promoting quality health care delivery.

From time to time, we receive in the lab some genetic or molecular enquiries about difficult cases. In this occasion, the case was a patient with a leukaemia relapse, refractory to any kind of therapy, including bone marrow transplantation. Cytogenetic diagnostic showed a translocation in a gene usually not tested as first choice due to its unusual alteration; however, its partner was a mystery. It was at this point where the case was passed onto the basic research lab, seeking advice about the probable partner gene of this translocation.

Based on the clinical information and published literature, we found a case-report paper published a few years ago, describing a rare translocation belonging to a very aggressive group of haematologic malignancies and leading to the activation of a tyrosine-kinase. In this article, the authors performed some in-vitro assays using pre-clinical drugs which showed their efficiency for this particular fusion. We carried out the molecular diagnostics and further confirmation for the presence of this fusion in our patient and sent our findings to the clinicians. This case is an example of how a question came from the bedside to the bench and returned specifically answered to bedside.

**THE FUTURE – BETWEEN BEDSIDE AND BENCH: BUILDING THE BRIDGE**

All these experiences lead me to wonder about the value of nurses’ contributions to the interdisciplinary teams and to the translational research model. If we take a closer look at the scheme of how translational research works, we find a dynamic process, with feedback loops and a first phase known as “bench-to-bedside”, where the findings or the knowledge generated by basic science is translated into the development of new drugs or techniques leading to an improvement in diagnostic, prevention and treatment of disease. We also find within this stage the clinical trials, a second block where the aim is to translate all this knowledge into the everyday clinical practice and ensure it reaches the patients, communities or populations for whom they were intended.

Our profession can easily be at the interface between basic science and clinical practice, combining different perspectives on biology, psychology, and social skill. Historically, we have been present during illness but also integrating health promotion and disease prevention. We are specialists in symptom management and in developing strategies to improve adherence to complicated treatment protocols. We work with vulnerable groups and populations, and we have learned how to find effective and cost-efficient solutions. We have expertise developing, launching and establishing protocols and procedures and one of our valuable skills is communication, which allows us to translate and to adapt the message to the different segments of the population. We have expertise in clinic observations and in data management – this is part of our daily routine. We work bedside in the hospitals, indoors at the operating rooms or diagnostics labs, frontline as community nurses. We treat, we care, we monitor, we collect, we prevent, we listen, we communicate, we teach. As such, we are involved in all the stages of this translational research process and we possess a unique and privileged role within the healthcare systems that could serve us to assume leadership positions in the interdisciplinary teams.

However, if we consider where we are and what our presence is, we find that we are still under-represented in many of the organisations or decision-making groups where we should be one of the essential stakeholders. We have to reclaim our role. And this is especially true for paediatric oncology nurses: there are still many things to do! We must join forces to establish collaborations and create our network to share experiences, knowledge, problems and successes to improve our daily practice and therefore the care of our patients and their families.

A paediatric oncology nursing career means lifelong learning, we still have time!