BESTA NEUROSIM CENTER

FONDAZIONE IRCCS ISTITUTO NEUROLOGICO CARLO BESTA
Sistema Sanitario Regione Lombardia

Besta NeuroSim Center

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Guaranteeing the **safety of patients** is a complex challenge which requires an articulate approach. This is particularly true for the surgical disciplines, and especially for those of higher complexity such as neurosurgery. Thus was born the Besta NeuroSim Center, the **first center for training and neurosurgical simulation in Europe**, which also emerges as the best-equipped simulation center in the world with the state-of-the-art neurosurgical simulators NeuroTouch (leased), ImmersiveTouch (provided by TechMed), Surgical Theater (owned by another company) and the 3-D anatomical visualizer, Virtual Proteins (provided by TechMed).

For years, the Foundation IRCCS Neurological Institute "Carlo Besta" has chosen to address the issue of patient safety in a comprehensive and innovative way, with a systemic approach, by importing some successful protocols in **safety management directly from the world of aviation**. Aware of the obvious similarities between the cockpit and the operating room (complex environment, teamwork, stress, time pressure, risk taking, etc), these algorithms in the aviation sector have been declining in the neurosurgical environment borrowing the systems and training of staff that in aviation have already been determined over the last 10 years to significantly reduce airline accidents. In this program, the staff at Carlo Besta is trained within composite groups, where both young and experienced neurosurgeons, together with the nurses and auxiliary personnel of the operating room, learn to work in a surgical ward **as if it were to "take off", "fly" and "land" an airplane** (Inpatient Safety on Board (ISOB) Program). This part of the training, targeted especially to deal with non-technical aspects, could not be enriched by a training component specifically focused instead on technical skills and manuals (so-called surgical skills) **similar to the flight simulation programs implemented for years in aviation.**

Now, with the birth of the Besta NeuroSim Center, thanks to the brand new simulation systems in **3-D virtual reality** with tactile sensitivity (haptic feedback), we aim to contribute to the training and selection of medical students who have the best manual abilities and the psychological profiles most suitable for a profession in surgery and, more specifically, neurosurgery; always through the simulation (similar to what airplane pilots do), the specialists and the young neurosurgeons will learn how to perform both complex and minor surgical tasks, **without exposing patients to risks** associated with the novice's lack of experience. The simulation lab will also call on neurosurgical experts, permitting them to carry out particularly complex interventions **in a "virtual" environment before operating on a real patient** in the operating room, planning the best strategy and avoiding risks. Thanks to the important national and international collaborations with neurosurgical centers, in imaging and in robotics, the Besta NeuroSim Center will also serve as a platform and permanent laboratory for the optimization of existing simulation systems. It is logical, in fact, to presume that similar to what happens in the world of aviation, in a not too distant future, the simulators could serve as a periodic assessment of the operators' technical abilities which constrain the **maintenance of clinical privileges in surgery**.

The Besta NeuroSim Center would like to propose a **revolutionary training method for the new generations of neurosurgeons** (implementing in the curriculum the educational ISOB and neurosurgical simulation) and identify how to **achieve performance excellence in surgery**, minimizing patient exposure to any type of risk. Our research projects through the creation of an international consortium aim to secure funding by the European Community within the project Horizon 2020.

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