

# **A BRIEF OVERVIEW OF PEDIATRICS TRANSLATIONAL RESEARCH**

**A Case Study by Rahul Tulshiram Ingale, UK**

*(Masters in Pharmaceutical Science, PhD in Clinical Research Student of Texila American University)*

*Email: [ingalerahul@hotmail.com](mailto:ingalerahul@hotmail.com)*

## **ABSTRACT**

Translational research is scientific research that helps to make findings from basic science useful for practical applications that enhance human health and well-being. It is practiced in the medical, behavioral, and social sciences. For example, in medicine it is used to "translate" findings in basic research quickly into medical practice and meaningful health outcomes. Applying knowledge from basic science is a major stumbling block in science, partially due to the compartmentalization within science.<sup>1</sup> Translational research is heralded by some as a savior of the biomedical research enterprise by hastening the translation of biomedical discoveries to improved patient care.<sup>2</sup> Although pediatric translational research is a small part of the overall translational research enterprise, it is important for improving child health and provides new opportunities for researchers from all pediatric disciplines.

This article provides an overview of pediatric translational research. It summarizes its evolution, barriers and challenges. The last section provides recommendations for enhancing pediatric translational research.

**KEYWORDS:-** Pediatric research, hemophilus influenza.

## **INTRODUCTION**

Translational research is a paradigm for research alternative to the dichotomy of basic research and applied research. It is often applied in the domain of medicine but has more general applicability as a distinct research approach. It is also allied in practice with the approaches of participative science and participatory action research. As the field of translational research has become increasingly popular in recent years, it has undergone numerous reiterations, such that the specific meaning of the term "translational research" has itself been redefined several times.<sup>3, 4</sup> Translational research helps turn early-stage innovations into new health products, advancing the innovation to the point where it becomes attractive for further development by the medical industry or healthcare agencies. The technical advances have provided the impetus for some radical changes in the way research itself is conceived and performed.

As a result, enhanced interactions and broader collaborations among researchers with different expertise will be required just to keep up with the rapidly changing state of science. In order for a

multidisciplinary approach to be effective, better ways to collect and share data (e.g. biorepositories) must be identified. In addition, a more rapid translation of information from basic science into useful clinical applications will require the removal of communication barriers and financial roadblocks that currently prevent basic science teams from working with each other and with clinical researchers. This article summarizes its evolution, barriers and challenges and pediatric translational research.

## **THE NEED FOR TRANSLATIONAL RESEARCH:**

Despite enormous health care expenditures, the quality of health care received by our population is suboptimal and variable.<sup>5,6</sup> More than \$2 trillion annually is spent on health care in the United States,<sup>7</sup> amounting to \$6000 per individual and 16% of the gross domestic product. This is more than triple that of many nations.<sup>8</sup> Yet multiple studies have highlighted the relatively poor health of the population and the inconsistent effectiveness of the health care system in the United States<sup>5,9,10</sup> as well as in other nations.<sup>11-16</sup>

The pediatric literature is also teeming with examples of suboptimal health care delivery,<sup>17-19</sup> the relatively poor health of many children,<sup>20-23</sup> disparities in child health,<sup>24,25</sup> and variations in the quality of health care.<sup>26,27</sup>

The future of pediatric research will be enhanced by strengthening traditional biomedical approaches and embracing emerging opportunities. Biomedical discovery and translation of new knowledge, concepts, and devices into better diagnostic and therapeutic options will require more pediatric physician-scientists, rapid adoption of enabling technologies, increased funding for research and research training (including the creation of federally funded pediatric translational research centers), and a broader distribution of research activities across the academic pediatric community.

Rapid improvement of child health outcomes also will be realized through robust health services research in pediatrics, including the application of rigorous quality improvement science that documents and disseminates successful interventions, leading to better access and effectiveness of care. Improving the value of pediatric care is a realistic goal.

## **TRANSLATION OF SCIENTIFIC DISCOVERIES TO IMPROVE HEALTH**

Research and innovation are essential for improving people's health and saving lives. But too many health conditions in the developing world still lack effective, appropriate, and affordable solutions. Pediatrics abounds with examples of the slow translation of research to improved health care. Despite research highlighting preventable causes of childhood asthma,<sup>28</sup> successive national<sup>29-31</sup> and international guidelines for asthma management,<sup>32,33</sup> and effective therapies, studies continue to document the rising prevalence of asthma,<sup>34</sup> variability in the level of health care received by children with asthma,<sup>35,36</sup> and significant asthma morbidity.<sup>37,38</sup>

Investigations have uncovered genetic, biologic, and behavioral causes of childhood obesity<sup>39</sup> or autism,<sup>40</sup> yet effective human studies are needed to prevent and successfully manage these

diseases. Studies of genetic polymorphisms relating to response to medications<sup>41,42</sup> and investigations of levels of risk with environmental exposures<sup>43</sup> are promising but have not yet realized maximum benefit to children's health.

Considering the second level of translational block (from clinical studies to actual practice), a multitude of studies of asthma care, adolescent preventive services, developmental and mental health screening, and a variety of other content areas demonstrate gaps between evidence-based strategies and actual care.<sup>35,44-47</sup> On the other hand, some pediatric examples of rapid and effective translation also exist. Studies of immunization delivery have demonstrated relatively rapid progress from discovery of a new vaccine, such as hemophilus influenzae<sup>48</sup> or conjugate pneumococcal vaccine,<sup>49-51</sup> and widespread implementation leading to improved health of the child population.<sup>52-54</sup>

## **BARRIERS TO EFFECTIVE TRANSLATIONAL RESEARCH**

*General Barriers are as below;*

Infrastructure and organization of research programs

Research environment

Public participation in research

Training of investigators

Inadequate funding

Prioritization of resources and types of research

Inadequate collaboration

*Pediatric-specific barriers;*

Few investigators

Small size of programs

Few subjects

Insufficient leadership positions (including CTSA\* institutions)

Challenges in studying the new morbidities

## **FUNDING OF PEDIATRIC RESEARCH**

It is challenging to distinguish pediatric research from other research because many projects have both a pediatric and nonpediatric component and because few funders maintain data on the proportion of funding allocated to pediatrics. NIH maintains data on types of studies funded.<sup>55</sup> Although total NIH spending on pediatric research has increased since 1993, the proportion of NIH funds for research that is devoted to pediatric research has actually decreased, from 13.1% in 1993 to 10.8% in 2008.<sup>56</sup> The proportion of AHRQ funding allocated to child health– related research is similar to that of NIH.<sup>57</sup> The proportion of all biomedical research that is devoted to pediatric translational research from other federal funders, foundations, or from industry is unknown.

## **CONCLUSION**

Although a number of barriers exist to translation, opportunities also abound, including the potential for enhancements in pediatric translational research. The field of translational research has emerged out of the need to more rapidly and effectively translate scientific discovery into better clinical care and improved health of people. NIH is now promoting translational research through CTSA's and other mechanisms, and both federal and private sources are critical to funding all types of translational research. Enhancements at the local and national levels in pediatric translational research will bridge the promise of scientific discovery with the reality of improved child health, which will ultimately result in improved health care and health outcomes for all.

## **ACKNOWLEDGEMENTS**

I am thankful to Miss Ashvini Shitole for conducting literature search.

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