

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA15210 (European Network for Collaboration on Kidney Exchange Programmes)

STSM title: Research visit Romania - Italy

STSM start and end date: 26/01/2020 to 06/02/2020

Grantee name: Radu Stefan Mincu

PURPOSE OF THE STSM:

This STSM has facilitated the collaboration between the applicant Radu Stefan Mincu (University of Bucharest) and the host, Dr. Antonio Nicolo (University of Padua). The purpose of the visit is to work on a topic related to the quality of transplantation in kidney exchange programmes (KEPs). Traditionally, the optimization objective of KEPs is to maximize the number of transplants at any given stage, possibly with some priority given to pairs having hard to match recipients. Our goal is to understand the impact on long-term KEP behavior of integrating measures of quality in the optimization objective (as a primary concern). To this end, we intend to do computational simulations using a dataset containing the information of Italian pairs transplanted in Padua in the past 10 years.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

Together with Dr. Peter Biro (University of Corvinus) we have decided to work on the topic of quality of transplantation in kidney exchange programmes. We chose as a dataset the Italian data mentioned in the previous section. This dataset is provided to us through the efforts of Dr. Lucrezia Furian (MD), who is also our collaborator. We intend to use some of this information to do computational simulation showing KEP behavior over a longer period (3 years) similar to the method previously used in "IP Solutions for International Kidney Exchange Programmes" (published in the VOCAL 2018 conference, 8th VOCAL Optimization Conference: Advanced Algorithms).

Our discussions resulted in us considering the LKDPI measure of quality. The LKDPI measure (described in "A Risk Index for Living Donor Kidney Transplantation" by Massie et al.) is an index designed to be similar to the KDPI used in deceased donor transplantation and is used to differentiate between different donors. A lower LKDPI value is correlated to a better kidney function and a longer graft survival time. We were able to compute the LKDPI values for the previously executed transplants in Padua in the past 10 years. However, our simulation scenario demands that we attempt to exchange donors as in a KEP scenario and for this setup, we noticed that we are missing some data. We have identified which data we require and we are

currently waiting for this information to be digitized from existing medical records.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

So far, our computational simulation program can read the donor and recipient data and calculate their LKDPI. We can as of now obtain a solution for a KEP stage maximizing an arbitrarily chosen objective (number of transplants / max LKDPI / etc.). In addition to this, the program will automatically arrange the participants on a timeline according to the date of their entry to the KEP and assign them a duration of participation to the KEP (if they are not transplanted within this period, they leave the KEP). At a fixed interval (3 months), a KEP optimization stage is conducted on the pairs that are still in the program. Some pairs leave when the duration of their participation expires, while some exit the KEP after being successfully transplanted.

We have also discussed the implementation of expected graft survival time as a quality measure (as described in “A Kidney Graft Survival Calculator that Accounts for mismatches in Age, Sex, HLA, and Body Size” by Ashby et al.). There are a few issues with our dataset that make using this measure difficult and we are still considering whether we could use it.

FUTURE COLLABORATIONS (if applicable)

We intend to continue to work on the topic of KEP quality and we have discussed following up with at least one additional meeting as soon as the required data becomes available (we have planned a tentative meet-up in April 2020). We are grateful for the data provided by Dr. Lucrezia Furian and her two students who are working hard on making the required missing information available to us.