Telemedicine as an innovative Project-Study in adherence improvement after living kidney transplantation

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Transplantation Unit
• Transplantation Center Freiburg
• Project development

• Project design and method
• Scientific Analysis

• Results
• Conclusion
Transplantation-Center Freiburg

Main focus on Living-Kidney Transplantation:

> 600 Living-Kidney-Transplantations performed in more than 30 years
Transplantation-Center Freiburg

Goal: Longest graft/patient survival

Successfull operation

Best post-operative treatment
Transplanted patients are a special group of patients – they are subject to conflicting constraints:

• Absolutely necessary adherence (treatment fidelity) to the medication

• Granting of open spaces for reintegration into social, familiar and professional environment
Transplant patients – special patient group

High costs for:
- frequent trips to medical facilities
- frequent blood collections
- frequent laboratory examinations
- frequent unplanned inhospitalizations …
Start with a telemedicine project in 2010
Telemedicine in Strasbourg/F and Freiburg/G

Cooperation Project:

Optimized aftercare in organ transplantation with telemedical support to screen medical and psychosocial factors

Project-Duration: July 2010 - April 2014
Project-funding

50% co-funding by the European Union
within the framework of the INTERREG Oberrhein-Program.
What do we expect from the telemedical supported aftercare?
Medical advantages

Key-Factor = Preserving the graft function as long as possible after kidney transplantation

Because of constant high number of patients on the kidney waiting list, due to decreased donor organs, we are forced to act
Economic advantages

- The project may show economical benefits due to the telemedical supported aftercare

- Trying to convince the german insurance companies to create a performance number for telemedical supported aftercare
Project design and method
Focus on a high scientific quality

Prospective, controlled, randomised and open project study:

• 25 Living-Kidney-Recipients* with a conventional aftercare and additionally with a web-based touchscreen monitor

• 25 Living-Kidney-Recipients* only with a conventional aftercare

* 2 drop outs in each group
Method

- Daily data-entry in a defined questionnaire
- Entered data are daily checked by medial-staff
- In case of noticeable entries contact by medical staff with the patient by phone or video-conference
- Additional monitoring of both groups with scientific questionnaires at timepoint 0, 3, 6, 12 months

<table>
<thead>
<tr>
<th>Data for Day 21/3/2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bipp 16</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Ja</strong></td>
</tr>
<tr>
<td><strong>94.5 Kg</strong></td>
</tr>
<tr>
<td><strong>Nein</strong></td>
</tr>
<tr>
<td><strong>3050 ml</strong></td>
</tr>
<tr>
<td><strong>Ja</strong></td>
</tr>
<tr>
<td><strong>35.7 °C</strong></td>
</tr>
<tr>
<td><strong>Danke gut</strong></td>
</tr>
<tr>
<td><strong>114/79 mmHg</strong></td>
</tr>
<tr>
<td><strong>0 mg%</strong></td>
</tr>
<tr>
<td><strong>2450 ml</strong></td>
</tr>
</tbody>
</table>
Data evaluation

Review with *inductive and descriptive* statistics

- Frequency and duration of unplanned hospitalization
- Graft function
- Number of medically necessary journeys
- Adherence concerning the intake of immunosuppressive medication
- Health-and disease-specific quality of life
Data evaluation

Using scientific questionnaires

**Interview BAASIS** (Leuven-Basel Adherence Research Group DeGeest)

→ Measuring instrument for the adherence of transplanted patients

**ESRD-SCL™**

→ Measuring instrument for the disease-specific quality of life

**BSI-18**

→ Measuring instrument for the emotional distress of kidney recipients

**ALL**

→ Measuring instrument for the health-related quality of life
Scientific Analysis:
Results 12 months after Kidney Transplantation (Living-Donation)
Patient’s characteristics 0 months after transplantation

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>CONTROL-GROUP</th>
<th>TREATMENT-GROUP</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years: Median (Range)</td>
<td>51 (19-66)</td>
<td>46 (18-59)</td>
<td>*0.23</td>
</tr>
<tr>
<td>Sex, male</td>
<td>47,8%</td>
<td>60,9%</td>
<td>**0.55</td>
</tr>
<tr>
<td>Cumulative time on dialysis in months: Median (Range)</td>
<td>17 (0-134)</td>
<td>17 (0-134)</td>
<td>*0.85</td>
</tr>
<tr>
<td>ABO-incompatible Transplantation</td>
<td>26,1%</td>
<td>30,4%</td>
<td>**1.00</td>
</tr>
<tr>
<td>HLA-Mismatches ≤ 4</td>
<td>43,5%</td>
<td>47,8%</td>
<td>**1.00</td>
</tr>
<tr>
<td>First kidney transplantation</td>
<td>82,6%</td>
<td>82,6%</td>
<td>**0.83</td>
</tr>
<tr>
<td>Postoperative complications (SAE)</td>
<td>52,2%</td>
<td>47,8%</td>
<td>**1.00</td>
</tr>
<tr>
<td>Renal function after Transplantation / GFR in ml: Median (Range)</td>
<td>57,99 (13,60-82,92)</td>
<td>53,99 (38,48-81,95)</td>
<td>*0.98</td>
</tr>
</tbody>
</table>

*Mann-Whitney-U-Test  **Fischer-Exact-Test
Results „Adherence in regard to immunosuppressive medication“

The Control group was in median 95.5% unplanned in hospital

The Telemedicine group was in median 95.5%

The Control group was in median 94% unplanned in hospital

The Telemedicine group was in median 98%

The Control group was in median 94% unplanned in hospital

The Telemedicine group was in median 99%

No significant difference *p = 0.343

Significance *p = 0.026

High significance *p = 0.003

*Mann-Whitney-U-Test
Results „Frequency of unplanned hospitalizations“

The **Control group** was in median
1 x unplanned in hospital (in total 36 x)

The **Telemedicine group** was in median
0 x unplanned in hospital (in total 15 x)

This corresponds to a reduction of 57%!

The **Control group** was in median
2 x unplanned in hospital (in total 48 x)

The **Telemedicine group** was in median
0 x unplanned in hospital (in total 19 x)

This corresponds to a reduction of 60%!

Statistic Analysis: Hauschke, Bogatyreva IMBI Freiburg, Schmid A, University Hospital Freiburg. April 2014
**Results „Duration of unplanned hospitalizations“**

In the **Control group**, the average duration was 15 days (in total 347 days).

The **Telemedicine group’s** average duration was 5 days (in total 125 days).

This corresponds to a **reduction of 64%**!

In the **Control group**, the average duration was 18 days (in total 422 days).

The **Telemedicine group’s** average duration was 6 days (in total 139 days).

This corresponds to a **reduction of 67%**!

*Statistical Analysis: Hauschke, Bogatyreva IMBI Freiburg, Schmid A, University Hospital Freiburg. April 2014*
Results - Summary

- Reduced frequency of unplanned hospitalizations
- Reduced duration of unplanned hospitalizations

- Significant higher adherence to immunosuppressive medication
- Higher quality of life: Less cortisone side effects
- Higher quality of life: Less cardiac & renal dysfunction

- Same maintenance of graft function in both groups but the telemedical supported group reached this result with less costs because of a higher adherence and reduced unplanned hospitalizations
Conclusion 1

The Freiburg-Project confirms the evidence that telemedical supported aftercare in living kidney transplantation gives recipients:

- Medical and psycho-social benefit
- An easier reintegration
- A better management of disease-symptoms
- Time and cost savings without any restriction in the quality of supply by creating a win-win situation for patients and health facilities
Conclusion 2

The Freiburg-Project shows also, that telemedicine in general is particularly suitable for patients:

• with the need for specialized care
• who live far away from their medical center
• who must be continuously monitored

Telemedicine is an innovative and effective option in modern medicine
Thanks: Projectwork = Teamwork

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Ilka Schlitter, Administration, Uni Freiburg

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Lioudmila Bogatyreva, IMBI Freiburg

Andreas Vogt, Nicole Battenfeld
Jan-Willem de Ruiter M. Sc., Dr. Anke Rickers, Dr. Jörg Pauly,

Thanks the 46 patienten for participating
Thanks to the Nephrologists for cooperating
Thank you very much for your kind attention
Project Design Flowchart

- Study Start
- Hospitalization
- Randomization
- Transplantation
- Data Collection

October 2011

- Computer-generated
- Randomlist for Patients
  \( n = 50 \)

September 2011

- Tele-medicine group
- Control group

Timepoints (months)

<table>
<thead>
<tr>
<th>Time</th>
<th>0</th>
<th>3</th>
<th>6</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
</tr>
</tbody>
</table>

Oct. 2011 – April 2014

- Questionnaires
- Interviews
- Medical Data
- Economic Data

April 2014

- Endpoint of Data collection

April 2014