Characterizing Organ Donation Awareness from Social Media

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Agenda

1) Transplant of Human Organs;

2) Related Works
   I. Organ Transplantation
   II. Organ Donation

3) Social Media and Organ Donation
   I. Awareness Signature
   II. Geographical Variations
   III. Organ-Aware Users

4) Limitations and Future Works
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4) Limitations and Future Works
SUCCESSFUL HOMOTRANSPLANTATION OF THE HUMAN KIDNEY BETWEEN IDENTICAL TWINS

John P. Merrill, M.D., Joseph E. Murray, M.D., J. Hartwell Harrison, M.D.
and
Warren R. Guild, M.D., Boston

This report documents the successful transplantation of a human kidney from one identical twin to another. The function of the homograft remains excellent 12 years later. One of the patients whose illness had begun with edema and hypertension was found to have suffered extreme atrophy of both kidneys. Because of the...
Organ Shortage Crisis
Every ten minutes, someone is added to the national transplant waiting list [1].

On average, 22 people die each day while waiting for a transplant [1].

Organ Shortage Crisis

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Extended criteria donors in liver transplantation Part I: reviewing the impact of determining factors


aDepartment of Organ Transplantation, Faculty of Medicine, Institute of Surgery, University of Debrecen, Debrecen, Hungary; bClinic of Transplantation and Surgery, Semmelweis University, Budapest, Hungary; cDepartment of Surgery, Division of Hepatopancreatobiliary and Transplant Surgery, Erasmus MC, University Medical Center Rotterdam, Rotterdam, The Netherlands; dDepartment of Internal medicine and Gastroenterology, Polyclinic of Hospitallers Brothers of St. John of God, Budapest, Hungary; eDepartment of Surgery, Nagasaki University Graduate School of Biomedical Sciences, Nagasaki, Japan

Abstract

The definition and factors of extended criteria donors have been developed in parallel with the evolution of the field.
Previous Works

DOI 10.1007/s13278-012-0089-1

ORIGINAL ARTICLE

Understanding organ transplantation in the USA using geographical social networks

Srividhya Venugopal · Evan Stoner · Martin Cadeiras · Ronaldo Menezes
Previous Works

Brief Communication

The Impact of Proposed Changes in Liver Allocation Policy on Cold Ischemia Times and Organ Transportation Costs

D. A. DuBay¹, P. A. MacLennan¹, R. D. Reed¹, M. Fouad², M. Martin², C. B. Meeks³, G. Taylor³, M. L. Kilgore⁴, M. Tankersley⁵, S. H. Gray¹, J. A. White¹, D. E. Eckhoff¹ and J. E. Locke¹

¹Department of Surgery-Transplantation, University of

Abbreviations: ANOVA, analysis of variance; BMI, body mass index; DRI, donor risk index; HCC, hepatocellular carcinoma; LSAM, liver simulation allocation model; MELD, Model for End-Stage Liver Disease; OPO, organ procurement organization; UAB, University of Alabama Birmingham; UNOS, United Network for Organ Sharing
Previous Works

Factors Influencing Families’ Consent for Donation of Solid Organs for Transplantation

Laura A. Siminoff, PhD
Nahida Gordon, PhD
Joan Hewlett, PhD
Robert M. Arnold, MD

Context  Transplantation has become the therapy of choice for patients with organ failure. However, the low rate of consent by families of donor-eligible patients is a major limiting factor in the success of organ transplantation.

Objective  To explore factors associated with the decision to donate among families of potential solid organ donors.

Design and Setting  Data collection via chart reviews, telephone interviews with health care practitioners (HCPs) or organ procurement organization (OPO) staff, and
Organ Shortage Crisis

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Previous Works

Identifying potential kidney donors using social networking web sites

Chang A, Anderson EE, Turner HT, Shoham D, Hou SH, Grams M.
Identifying potential kidney donors using social networking web sites.

Abstract: Social networking sites like Facebook may be a powerful tool

Alexander Chang⁹, Emily E. Anderson⁸, Hang T. Turner⁶, David Shoham⁷, Susan H. Hou⁸ and Morgan Grams⁹
Cultural carrying capacity: Organ donation advocacy, discursive framing, and social media engagement

Christopher A. Bail

Department of Sociology, Duke University, USA
Previous Works

Social Media and Organ Donor Registration: The Facebook Effect

A. M. Cameron¹,*, A. B. Massie¹,², C. E. Alexander³, B. Stewart⁴, R. A. Montgomery¹, N. R. Benavides⁵, G. D. Fleming⁶ and D. L. Segev¹,²

Introduction

Currently, the need for organs vastly outpaces the available supply, with over 100,000 Americans waiting on an organ transplant waitlist (1). Further, the waitlist is probably an
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Research Question

What is the extent in which online social activities on Twitter is associated with aspects of organ donation?
You can register your donation decision in honor of Bryan here: driven2savellives.org.

From the bottom of my heart, thank you! 🌟
Tweets Communicating Transplant

@jcsalas_17

Its transplant day !!! Grandma just left for her kidney please see the gofundme account to help with transplant costs anything helps❤️🙏

7:49 AM - 18 Apr 2017

4 RETWEETS 8 LIKES
Diverse Tweets on Organ Donation

Jim Jones @jbubbag · Apr 4
Replying to @Driven2Save
Because I received a Liver from a 22 yr old man gone to soon and words will never be enough to express my gratitude to my unknown donor.

Charl JFT96 Hennessy @charlhennessey1 · Mar 26
Replying to @charlhennessey1
Even within her own grief, Violet’s mum had her kidneys & pancreas donated to help other children who desperately need organ donation 😍

Ryan J. A. Hoover @RyanJAHoover · 1 Nov 2012
Organ donation lecture in nursing class today @RochesterCTC - who knew you could donate part of an intestine???
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Data
Gauging Indicators of Organ Donation

Context
- donor
- donation
- donate
- transplant
- transplantation

+ Organ identifier
- heart
- intestine
- lung
- pancreas
- liver
- kidney
Inferring Locations from Self-Reported Information

Diego Pinheiro
@diegompin
Ph.D. Student in Computer Science at Florida Institute of Technology

Palm Bay, FL
Joined August 2009

OpenStreetMap

Latitude Longitude

City, County State, Country
Descriptive Statistics

Table I. Statistics of the dataset used in this paper. The dataset contains collected tweets from users regarding organ donation.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Data Collection</td>
<td>Apr 22\textsuperscript{th} 2015</td>
</tr>
<tr>
<td>Finish Data Collection</td>
<td>May 11\textsuperscript{th} 2016</td>
</tr>
<tr>
<td>Number of Days</td>
<td>385</td>
</tr>
<tr>
<td>Tweets collected</td>
<td>134,986</td>
</tr>
<tr>
<td>Number of Users</td>
<td>71,947</td>
</tr>
<tr>
<td>Avg. Tweets / Day</td>
<td>350</td>
</tr>
<tr>
<td>Avg. Tweets / User</td>
<td>1.88</td>
</tr>
<tr>
<td>Organs mentioned / Tweet</td>
<td>1.03</td>
</tr>
<tr>
<td>Organs mentioned / User</td>
<td>1.13</td>
</tr>
</tbody>
</table>

\(^{a}134,986\) out of 975,021 tweets could be identified as from USA users.
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Awareness Signature

Alabama

[Bar chart showing relative values for Heart, Kidney, Liver, Lung, Pancreas, and Intestine on a logarithmic scale ranging from $10^{-5}$ to $10^{-1}$]
Awareness Signature
## Awareness Signature

### State-Level Awareness Patterns

The following table and heatmap illustrate state-level awareness patterns across different states. The heatmap uses a color scale ranging from 0.00 to 0.36 to represent the Bhattacharyya Distance between states. The states are color-coded based on their awareness signatures, with a legend at the bottom right indicating the color gradient.

**Table: State Awareness Signatures**

<table>
<thead>
<tr>
<th>State</th>
<th>Awareness Signature</th>
<th>Awareness Signature</th>
<th>Awareness Signature</th>
<th>Awareness Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Alaska</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Arizona</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Arkansas</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>California</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Nebraska</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>US Virgin Is.</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
<td>![Bar Chart]</td>
</tr>
</tbody>
</table>

**Heatmap: Bhattacharyya Distance**

The heatmap visually represents the Bhattacharyya Distance between states. The darker the color, the higher the distance, indicating less similarity in awareness patterns. The states are arranged in a grid, with the x-axis representing states from west to east and the y-axis from south to north. The color bar at the right side of the heatmap indicates the intensity of the distance with colors ranging from light blue (low distance) to red (high distance).
Awareness Signature
Awareness Signature

North Dakota
New Hampshire
Wyoming
N Mariana Is
Hawaii
Utah
Montana
Mississippi
Louisiana
Tennessee
Alaska
Connecticut
Colorado
Rhode Island
Delaware
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Geographical Variations

\[ RR_{ir} = \frac{\rho_{ir}}{\rho_{in}} \]
Geographical Variations

Twitter Conversations of Organ Transplantation and Donation in US

Heart
Kidney
Liver
Lung

Solid Organs
Red: Heart
Orange: Kidney
Green: Liver
Blue: Lung
N/A

Massachusetts +2
8% lung
36% kidney

Rhode Island +2
19% liver
39% kidney

Louisiana +1
19% liver

Solid Organs:
- Red: Heart
- Orange: Kidney
- Green: Liver
- Blue: Lung
- N/A

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Limitations and Future Works

1. Demographic Bias on Twitter;
2. Improve Data Collection;
3. Infer Demographics;
4. Multilevel Approach;
5. Real-Time Monitoring.
Acknowledgments

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