Preventing Medical Error through Patient Education: 
A Kidney Donation Case Study

This project explores the role that graphic design can play in improving patient comprehension during inpatient procedures. It is driven by an advocacy to decrease patient suffering and financial expenditure by both patients and hospitals. It is an inquiry for conversation; a proposal for the possibilities and contributions that the designer can bring to the hospital setting. It focuses on living kidney donation as a case study, but its aim is to provide a framework for a larger scope of procedures.

"As many as 98,000 people die in hospitals each year as a result of errors that could have been prevented, resulting in an estimated annual loss of 58 billion dollars to the healthcare system."¹ Error is a consequence of accountability—During an average three-day stay as a donor in a kidney transplant program, patients might see as many as twelve different nurses. Add in a list of doctors, surgeons, pharmacists, dieticians, educators and transplant coordinators, and there is a very complicated network of specialists responsible for patient education. With the frequency and variety of exchanges, there is rarely a thorough record of staff-to-patient interactions—forcing staff members to repeat lessons that others have covered, or worse, leave absent.

Airline pilots keep exact, precise checklists of the conditions of their vessels to avoid mid-air catastrophe, yet hospitals rarely verify a patient's understanding of home care upon discharge. Self-medicating after an inpatient procedure can be more perilous than sitting as a passenger on an airliner—shouldn't hospitals be making the same precautionary checklists to ensure patient comprehension? Embarrassment can inhibit patients from expressing confusion or from asking questions. When discharged, patients are often left with an unclear view of their visit, and confused about their responsibilities when staff members are no longer present. Current patient education materials for living kidney donors are commonly used as either a pre-cursor to the visit, or as an afterthought.

Patients can leave the hospital unable, and often unwilling, to properly care for themselves when they are no longer under the supervision of a physician—incorrect medication is taken, wounds are improperly cleaned, emergency precautions are not taken, and patients do not communicate well with new physicians during checkups. These errors often result in patient readmission. More than 17 percent of patients discharged from a hospital are readmitted within 30 days, resulting in billions of Medicare dollars spent². The moment patients enter the hospital, they need to begin learning about how to care for themselves at home. Preparing a patient for discharge is the first step of the hospital stay process, not the last.

Living donor education is critically necessary to understand the processes involved in transplant procedures. It is also needed to help support the emotional investment made by the patient. Lack of clear information is potentially life threatening. Education tools must cater to the severity of this investment by providing a vessel for reflection, interaction, and discovery. If

patients and doctors are able to document and edit the donor's own journey, health literacy is no longer reached merely through diagrams and definitions, but through personal and tangible relationships.

With the hustle and flow of inpatient activity, hospital staff are constantly photocopying documents in order to ensure proper record keeping. But after several generations of replication, text and image often become muddy; jeopardizing the legibility of the document. By making these considerations with graphic and typographic choices, education tools can be modeled to survive the jaws of copier machines with greater integrity.

Vague photography and ambiguous clipart end up doing more to impede the legibility of education tools than improve them. Verbal cues by hospital staff are invaluable, but both text and image are necessary to accompany these cues in order to aide a patient’s understanding of their surgery. Too often, low-resolution photography is used, burdened with a heftier responsibility than it can handle.

By graphically reinterpreting these images with simpler, more comprehensible forms called pictograms, complex subjects can become much more manageable. Pictograms are graphic representations of concepts, objects, or processes, and can be used to make long-winded verbal or written cues easier to grasp.

Children can use pictograms to understand new concepts in school, just as passengers in airports can use them to navigate a foreign setting. But contrary to the curiosity of the classroom, or the thrill of flying across the world, the hospital setting provides a foreign experience that yields discomfort and confusion. Pictograms with humanistic qualities are not only recognizable, but also accessible, understandable, and comfortable. A universal picture language will allow non-fluent patients to better understand processes and themes.

Some images notate location rather than instruction. Below, diagrams of the urinary system and the kidney are used to give patients a better understanding of their kidneys, and how they work with the rest of their body. Hospital staff can discuss these images with patients, using them as teaching references to aid verbal explanations. Diagrams can use notational cues—such as arrows or rule lines—to help point out parts of the image.

By taking this communicative role, pictograms must provide enough flexibility to cater to the narrative of the hospital, yet maintain enough rigidity to communicate to diverse cultures and demographics. But, their appearance can often mistakably portray a variety of messages beyond that which the idea or noun actually is. Is a person is not just a person; is it a man? Is it a woman? Is he/she old? Young? Short? Tall? The responsibilities of the system require an approach that is syntactic, semantic, and above all, humanistic.

Early pioneers of pictographic communication were Otto and Marie Neurath: founders of ISOTYPE (International System of Typographic Picture Education). Organized under the self-proclaimed title of transformer — the transformer’s role was to put information into visual form. Over ISOTYPE’s history, thousands of pictograms were developed to explain complex visual processes. Following the death of Otto in 1945, Marie pushed ISOTYPE into third-world settings and illiterate communities. Information was made comprehensible through the development of generalized “characters” that would then be repeated to illustrate specific roles or actions.
Current patient-education materials for living kidney donors are used as either a precursor to the visit or as an afterthought. Often in an 8.5 × 11 photocopied format; typographic, editorial, and graphic considerations are not made. Images are unrelated to the text — which is written too technical for the average patient. The document is not discussed with patients, but rather stands alone as a device for personal education. Consequently, patients rarely look after it as property.

Budget is of immediate concern when developing education materials for a hospital system. Patient education is not organized by hospital management, putting each transplant program in charge of developing education materials. This results in an inconsistent array of books, pamphlets, and documents. A design which takes advantage of low-cost production will be most acceptable and beneficial. Since editorial changes are often implemented, it is important to consider a document that is additive and subtractive — a document which will not require a full reprinting when one sentence needs change. But the most difficult question then arises, how might you produce a document that can be universally produced, yet can be personalized?

The proposed format looks at a 3-ring binder as host for the different documents, pamphlets, and forms that are used for patient education. To reduce printing costs, it uses a limited palette of two colors, and standardizes the page size to 8.5 × 11 inches. In doing so, the pages are simple to reproduce, photocopy, and file. Binders have proved their worth for organizing complex information, and can be integrated into nearly all hospital filing systems.

Oftentimes, when patients step into a hospital document, they are lost in a sea of babble that might as well be a foreign language. Hierarchy—the organization and ranking of text elements such as titles, body text, and captions—is rarely considered, forcing readers to reinterpret the document every time they turn the page.

Hierarchy can act as a life-preserver when patients are drowning in confusion. By keeping primary elements (titles, body text) consistently in the forefront, secondary elements (instructions, captions, images) can then be deviant, creating a vibrant interplay of text and image. This approach turns the document into a visual encyclopedia, allowing for a non-linear reading of the text.

Doctors use education tools to answer patient questions, so by framing each subject or topic with a question, such as “How will I recover after my surgery?”, the tool is able to voice the curiosity of the patient, and reinforce the instruction and explanation by the doctor. This becomes a navigational element; guiding patients through their journey, and forming waypoints so that they might stop along the way, or remember where it is that they went. My goal for an improved education tool is to allow patients to create a personal setting for their experience; to allow patients and doctors/nurses to interact with one another regarding their talk; and for patients to document their thoughts and instructions.

The design of this education book allows for questions to be answered both visually and verbally. Some spreads may be more image-based if the material calls for visual explanations, while some may be primarily text-based. The system is rigid enough to stay familiar to users, yet fluid enough to make engaging visual statements.

Each of the four sections in the binder contains editable forms.
Typical legal documents, and reflective documents more akin to writing in a journal, might be included. Before admission, hospital staff strongly suggest that patients keep a journal. But without providing a venue for note-keeping, patients will rarely do so. By integrating such items into education books, patients will be more obliged to ask, discuss, and observe their transplant experience. Staff are encouraged to write on these forms as well, allowing them to connect with patients on a more personal level, and to provide additional notations that will be helpful after they’ve been discharged.

If patients and staff are constantly editing the donor book together, it becomes a keepsake of their journey. Patients will then be much more likely to use it and take care of it. The book will stand as a record of their experience, and can be referenced when patients return for check-ups.

The inside of the fold-over document in the binder (shown below) contains visual references and explanations on the right side, and a form to fill out on the left side. Organizing this information side-by-side helps patients to comfortably fill out the forms without having to ask for continual help from a staff member. For the non-legal document below, patients can keep track of conversations that they have with staff members, and can reference what roles each of those members actually play in their transplant experience.

Additional 3-hole-punched black and white 8.5 × 11 forms are housed in this 11 × 17 folded document. After documents have been filled in, signed, and edited, staff can photocopy these notes and file accordingly. This leaves both the patient and hospital a record of each step in the surgery process. Forms can be removed and replaced with ease.

Health literacy is a stronger predictor of health than age, income, employment, education, or racial/ethnic groups. The role of the graphic designer in the healthcare setting is to restructure patient education so that health literacy might make predictions of good health more often. There is a wealth of research available, and a great amount of action that can be taken, to further this conversation. Investing in health literacy to discuss, organize, and build new tools for patient education could significantly diminish patient readmission. If patients are given the tools to make educated and safe decisions after being discharged from hospitals, they will lessen their chances of making medical errors. By reducing patient readmissions, hospitals can save money, manpower, resources, and precious time to focus on what they do best—saving lives.
Above: Diagram and image of proposed education binder.
How Will I Recover After My Surgery?  
Cómo a Recuperar Después de Mi Cirugía?

**English**

Recovery after your surgery starts in the Post-Anesthesia Care Unit (PACU). This unit is dedicated to monitoring your needs and ensuring your safety after surgery.

Although it may seem that you have only taken a nap in the PACU, it is important to get up and move around as soon as possible. This will help you to get back to your normal routine and prevent any complications.

**Español**

El recupero de la cirugía comienza en la Unidad de Cuidados Pós-ánesthesia (PACU). Este apartado se dedica a velar por tus necesidades y seguridad después de la cirugía.

Aunque parezca que solo has dormido en la PACU, es importante que te levantes y te muevas lo antes posible. Esto te ayudará a recuperarte de manera normal y prevenir cualquier complicación.

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**English**

If you have any questions or concerns about your recovery, please do not hesitate to ask your healthcare provider.

**Español**

Si tienes alguna pregunta o preocupación sobre tu recupero, no dudes en preguntar a tu proveedor de salud.

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**English**

Key Terms:

- **Antibiotics**:  
  - Discontinued after 24-48 hours  
  - Provided for 24-48 hours

- **Monitoring**:  
  - Vital signs
  - Oxygen saturation
  - Blood pressure
  - Respiration rate

- **Post-Anesthesia Care Unit (PACU)**:  
  - Unit for monitoring and caring for patients after surgery

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**English**

After a successful surgery, you will be brought to your hospital and kept under observation. You may speak to the receptionist of your surgery shortly after.

**Español**

Después de un cirugía exitosa, te trae al hospital y mantenido bajo observación. Puedes hablar con el recepcionista de tu cirugía después de un tiempo.

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**English**

How Should I Take Care of My Wound?  
Cómo Debo Cuidar de Mi Herida?

**English**

After a successful surgery, hospital staff will check that your wound is healing and that you are well on your way to a full recovery. To help with this, they will provide you with instructions on how to care for your wound.

**Español**

Después de un cirugía exitosa, el personal del hospital se asegurará de que tu herida está cicatrizando correctamente y que estás bien en tu camino hacia una recuperación completa. Para ayudarte con esto, te proporcionarán instrucciones sobre cómo cuidar de tu herida.

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**English**

**Key Terms**:

- **Antibiotics**:  
  - Discontinued after 24-48 hours
  - Provided for 24-48 hours

- **Monitoring**:  
  - Vital signs
  - Oxygen saturation
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- **Post-Anesthesia Care Unit (PACU)**:  
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Above: layout examples for proposed document.
3 Conversations with My Transplant Team
Conversaciones con Mi Equipo del Transplante

Above: editable form design
and fold-over system.
Bibliography