

The UC Clinical Trials Network

Expanding the reach of our clinical research with partnerships, SEO, and good design

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1. Executive Summary

The UC Clinical Trials Network currently powers websites for six University of California institutions to help patients, doctors, caregivers, and researchers find and connect with our clinical trials. The sites are designed for usability and discoverability, with extensive search engine optimization to help drive traffic. The ultimate goal is to promote clinical research across UC Health and enable rapid participant recruitment.

Our early data show that this software platform drives study enrollment and provides an automated and powerful option to improve patient access to clinical studies across the UC campuses.



2. Overall Project Description

Participant under-enrollment in U.S. clinical trials is a known and serious nationwide problem. An estimated 80% of U.S. clinical studies do not meet their enrollment goals, which can lead to scientific challenges, ethical concerns, financial difficulties, and lack of diversity in trial populations. While there are a myriad of reasons for limited enrollment, our project focused on using technology to improve coordination and 'findability' of information about studies at UC. Using publicly available data and modern search engine optimization techniques, coupled with leveraging institutional provenance and our partnerships across the system, we used our own campus as the first demonstration project before applying what we learned to the other UC sites.

In mid-2016, UCSF's Clinical & Translational Science Institute (CTSI) launched [UCSF Clinical Trials](https://clinicaltrials.ucsf.edu), a website allowing patients, clinicians, caregivers, and researchers to find and connect with clinical trials and their study teams (clinicaltrials.ucsf.edu). We designed the website to be comprehensive, usable, and easily findable via popular search engines like Google. But our vision was always bigger. We knew the other UC health campuses had the same challenges as UCSF; the end-goal was to extend our work to cover all clinical trials across UC Health, and this drove many decisions related to technical design and styling of the UCSF site. We architected and coded the UCSF site in a reusable manner with this ultimate objective in mind.

Late in 2016, we were awarded an NIH NCATS administrative supplement to the UCSF CTSI grant; the supplement was intended to "leverage public & institutional data to allow patients and community members to easily survey clinical trials that are actively recruiting across the 5 campuses, and to facilitate multisite trial start-up by identifying experienced local site leaders." With this grant, we secured funding to execute our vision.

By late 2017, we successfully turned the UCSF site into a software-as-a-service platform, powering clinical trials sites for UC San Diego, UC Irvine, and UC Davis (UCLA has not yet launched due to local issues). Subsequently,

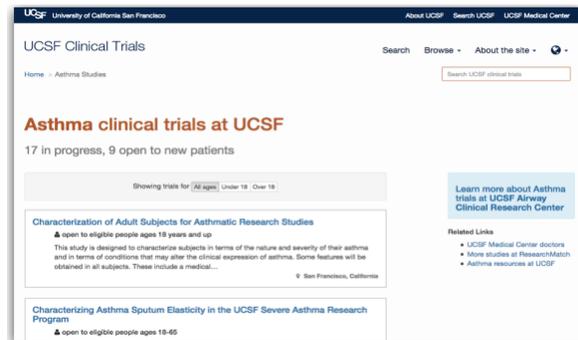
via our work with UC BRAID, the team was connected with the UC Cancer Consortium, which wanted to leverage our work to launch a cancer-specific trials site. They funded the UCSF team and we launched the cancer site in October 2018. The UC Clinical Trials Network now includes clinicaltrials.ucsf.edu, clinicaltrials.ucsd.edu, clinicaltrials.ucdavis.edu, clinicaltrials.icts.uci.edu, clinicaltrials.ucbraid.org, and clinicaltrials.uccancer.org, with UCLA hopefully coming online soon. These sites have delivered thousands of messages from interested members of the public to clinical trials across the UC system.

Finally, as a result of patient-initiated messages sent via our system to study teams, we have early indications that the site has positively impacted study enrollment. For example, earlier this year, we followed up with a study at UCSF that had 100+ study contacts via the website’s “I’m Interested” button. The statistics from these online contacts are promising: over half registered for the study! As we see the traffic grow via our efforts to optimize and promote research studies, we hope to contribute to recruitment efforts and positively impact many studies across UCSF and UC Health.

3. How it Works



The **home page** offers a type-ahead search with support for synonyms. For example, if you type “renal cancer,” results for “kidney cancer” also appear.



Landing pages for Conditions list every open trial for a particular health condition. At UCSF, there are 1000+ condition pages, ranging from adenocarcinoma to zinc deficiency.



Trial-specific pages describe a particular clinical trial, and when possible, allow users to contact a trial team via the “I’m Interested” button. UCSF has 1,600+ trial pages.

3A. Data Sources

Most UC campuses have department, condition, and/or lab websites listing trials in their area, but these don’t cover all—or even most—of the trials enrolling for a given condition. The UC Clinical Trials Network sites address these gaps, ensuring complete coverage of open trials. When seeking comprehensive data sources, we found that internal clinical trial databases were not vetted for external sharing. Instead, we chose to build on ClinicalTrials.gov, a fully public clinical trials database which all NIH researchers are required to keep updated; starting with public data ensures that proprietary data are not disclosed. However, ClinicalTrials.gov data can be complex and does not use language that is easily understandable to most patients and their caregivers. We used a variety of techniques to clean and simplify the data, including rule-based natural language processing (NLP).

For example, in the source data, we found that researchers had tagged their trials with almost fifty unique variants of “HIV” and/or “AIDS”; we clustered these into a single “HIV/AIDS” trials group, making it easier to navigate the site and find these studies.

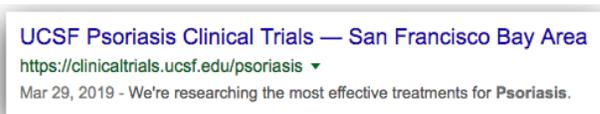
3B. Technical Architecture

The system is developed as two separate components. The first digests Clinicaltrials.gov data, applies site-specific business logic, and generates a JSON representation of each site’s trials. Then a static site generator turns the JSON into standalone sites, via Handlebars templates, HTML with Bootstrap styles, and vanilla JavaScript. Sites use a common web architecture, with customized headers, footers, and styles. There’s more on our process on the UC IT blog, <https://cio.ucop.edu/five-ucs-benefit-from-ucsfs-clinical-trials-website-strategies/>

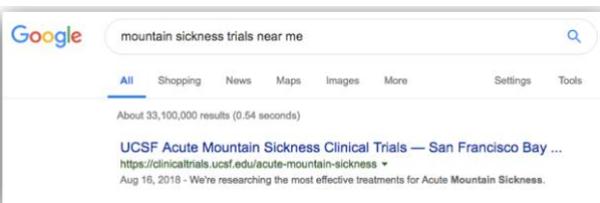
3C. Discoverability

One critical test of a website’s success is whether it’s actually used. We invested much of our development time on discoverability, specifically Search Engine Optimization (SEO), targeting users of search engines like Google and Bing. As of March 2019, 57% of UCSF Clinical Trials site users were arriving via search engines. In particular, we ensured that users could access the site via a wide range of optimized landing pages (e.g. “breast cancer trials”), instead of solely the home page of the site. Among UCSF Clinical Trials users arriving via search engines, only 8% arrive on the home page, versus 51% on condition pages, and 37% on trial pages. Additional SEO techniques used include:

- Page title, description, and URL patterns are copywritten to appeal to search engine users
- Condition and trial pages use geographic indicators to ensure that, for example, Google searches near San Francisco are more likely to show our UCSF site as a top result, even if “UCSF” or “San Francisco” aren’t entered in the search
- Social media metadata ensure that page previews look compelling when shared on Facebook & Twitter
- Last-updated dates help search engines understand that our content is current and timely
- Getting incoming links from other sites is one of the most critical parts of SEO. UCSF did this by working closely with the Medical Center and campus communicators to get links back to our website. We shared this guidance and our actual messaging to help our partners at the other campuses to do the same.



An example Google listing shows our SEO optimizations: a simple page title (including institution name, condition, and targeted geography), a clean URL, a last-updated date, and a readable description that doesn’t duplicate the title



By implementing local SEO best practices, we ensure that a Google search run in San Francisco shows our site as a top result, even if the user doesn’t type “UCSF” or “San Francisco”



Because trial names can be long and complicated, we make sure that breadcrumbs and page titles feature the condition name, to help users understand what they’re looking at

3D. Accessibility

When developing the Clinical Trials platform, we worked to have it meet a variety of use cases to support the diverse audiences we want to serve:

- We consistently use methods to support people with older browsers, visual impairments, or slower networks (e.g., semantic HTML, progressive web design)
- We use increased color contrast and ARIA (Accessible Rich Internet Applications) metadata to increase accessibility for people who are colorblind or use screen readers
- When users contact a trial by clicking the “I’m Interested” button, we ask the fewest possible required questions on the form, to maximize completion rates, support user privacy, and reduce exposure to protected health information
- We include a comprehensive medical thesaurus in the site’s internal search engine, so users don’t need to know medical terminology, e.g. “kidney cancer” will match “renal cancer”
- We designed the site to be mobile-friendly, which is particularly important for younger, lower-income, and Black and Hispanic populations who are more likely to own smartphones but not have home broadband. 38% of visits to UCSF Clinical Trials now come from mobile devices

4. How the Network Was Built Out

4A. UCSF Clinical Trials, launched 2016

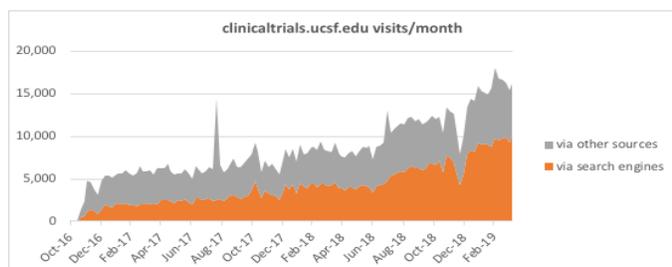
The UCSF Clinical Trials website was funded by UCSF’s CTSI and the UCSF IT Governance Committee on Research Technology (CRT) as a replacement for the legacy clinical trials directory operated by the UCSF Medical Center. We launched the new site in 2016, and within a month, it was getting nearly twice as many visits as the system it replaced (visits per month graph below). Our team then received additional intramural funding from the CRT and support from the UCSF Differences Matter Research Action Group for Equity, both of which helped us provide additional trial filtering options, multilingual help pages, enhanced accessibility, and data exports.

4B. UC Clinical Trial Network, launched 2018

In late 2016, the NIH supplement grant funded us to enable rollout of Clinical Trials and Profiles sites with UC Davis, UCLA, UCSD, and UC Irvine as sub-awardees. We worked closely with campus partners to launch the new sites, with initial operational support from UC BRAID. The funding was used to turn the UCSF Clinical Trials backend into a software platform that could be offered as a hosted system.

Along with moving to the hosted platform, we worked with the other campuses to customize and launch their new sites. We identified and built relationships with implementers at each partner campus, offered support as they worked with local stakeholders, helped them meet their institution’s brand guidelines, customized websites to accommodate preferences on which trials to include, used targeted geographic indicators, supported different ways a trial team might want to receive inquiries, and integrated with local web analytics. After launch, the UCSF team continues to provide support to partners, including marketing tactics to support local efforts. For UCLA, we continue to support this endeavor as they work through their internal processes.

The UC Health Cancer Consortium contacted UCSF in mid-2018 to develop and host their website, limited to cancer trials across the UC system. Working closely with the UC Health Communications Director and his team to meet their specific requirements, we launched in late 2018, just three months after initial contact.



5. Measuring Success

5A. At UCSF

As the longest-running website within the UC Clinical Trials Network, UCSF is the best example of a mature implementation. As of March 2019, the site’s traffic continues to rise, with 89% of trials viewed at least once per month. People arrive at the site from various sources, but search engines are by far the single biggest source,

responsible for 57% of visits. Other sources vary, ranging from links from other UCSF websites (9%) to social media (6%). The site is regularly shared by the public on Facebook, Reddit, Twitter, and various condition-specific patient forums and blog communities.

Most critically, the system helps members of the public contact trial teams with over 120 clicks per week (and growing) to the “I’m Interested” button on specific study’s pages. We are working to follow up with study teams to better understand the enrollment funnel, share success tactics with the network, and continue to improve the system as applicable. We were recently informed by the Clinical Research Coordinator (CRC) for UCSF’s Study to Understand Gaining Access to Blood Glucose Records (SUGAR) that the study incorporated the UCSF Clinical Trials site page as a core part of their recruitment efforts, even briefly making our page the landing page for some of their own marketing. Over a couple of months, 100+ people clicked on the “I’m Interested” button from the SUGAR page on our site. Moreover, an astounding 54% of users subsequently registered for the study and 16% consented and enrolled. While the enrollment rates for every study will be different, we are thrilled with these early results and hope our work will contribute to recruitment efforts and positively impact many studies across UCSF and UC Health.

5B. Across the UC System

Among the second wave of Clinical Trials Network sites, UCSD is furthest along in their implementation. Within a few months of launch, UCSD Clinical Trials is hitting traffic and contact targets that UCSF took longer to hit. All five of the new UC sites are seeing growing traffic, as they build upon UCSF’s work. We continue to improve the sites’ traffic and relevance, and we are honored that the UC Health campuses and UC Cancer Consortium trust UCSF to host these sites in support of clinical research across the University of California.

6. Testimonials

“UCSD and UC BRAID see the value of the UC Clinical Trials Network and the promise that this work will support clinical trial recruitment and partnerships across UC. This light-weight, rapid deployment approach using public data is exactly the right way to do it and I’m confident this team can execute. In fact, the NIH’s Accrual to Clinical Trials (ACT), which connects nearly 50 academic medical centers, has seen a demonstration of the platform and asked UC BRAID to expand it to the entire ACT network. It will be the gold standard for how we reach out to patients for clinical trials across the country.”

—Gary S. Firestein, MD, Dean and Associate Vice Chancellor for Clinical and Translational Research, UCSD

“Thanks to CTSI for being incredibly responsive to our request to add materials in the languages that are spoken by a substantial proportion of Californians, San Franciscans, and UCSF patients. This was one of the first official UCSF sites to include information in Spanish, Chinese, and Vietnamese in addition to English, making the site more welcoming and inclusive to the non-English speaking communities that UCSF serves.”

—Tung Nguyen, MD, Professor, Dept. of Medicine, UCSF, Chair, Research Action Group, UCSF Differences Matter Initiative

“I LOVE the new UCSF Clinical Trials website! The best feature is the ‘I’m Interested’ button for prospective participants. I really like pushing prospective participants there because the site generally answers any question that they have. Then when they click ‘I’m Interested’ I have a templated response for what their next steps are.”

—Xochitl E Butcher, UCSF Clinical Research Coordinator, SUGAR study

“It’s much easier to navigate and to connect with a study that you might be able to participate in, right here in the Bay Area. The website makes these studies easier to find by search engines, so if people are researching a particular condition online, and they are located in the Bay Area, it’s likely that applicable UCSF studies will appear in their search results.”

—Vanessa Jacoby, MD, Assoc. Prof, Dir., UCSF CTSI Participant Recruitment Program, quoted in *Berkeley Wellness Letter*