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Surgery Website as a 24/7 Adjunct to a Surgical Curriculum

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OBJECTIVE: Successfully teaching duty hour restricted trainees demands engaging learning opportunities. Our surgical educational website and its associated assets were assessed to understand how such a resource was being used.

DESIGN: Our website was accessible to all Mayo Clinic employees via the internal web network. Website access data from April 2015 through October 2016 were retrospectively collected using Piwik.

SETTING: Academic, tertiary care referral center with a large general surgery training program. Mayo Clinic, Rochester, MN.

PARTICIPANTS: A total of 257 Mayo Clinic employees used the website.

RESULTS: The website had 48,794 views from 6313 visits by 257 users who spent an average of 14 ± 11 minutes on the website. Our website houses 295 videos, 51 interactive modules, 14 educational documents, and 7 flashcard tutorials. The most popular content type was videos, with a total of 30,864 views. The most popular visiting time of the day was between 8 PM and 9 PM with 6358 views (13%), and Thursday was the most popular day with 17,907 views (37%). A total of 78% of users accessed content beyond the homepage. Average visits peaked in relation to 2 components of our curriculum: a 240% increase one day before our biannual intern simulation assessments, and a 61% increase one day before our weekly conducted Friday simulation sessions. Interns who rotated on the service of the staff surgeon who actively endorses the website had 93% more actions per visit as compared to other users. The highest clicks were on the home banner for our weekly simulation session pre-emptive videos, followed by "groin anatomy," and "TEP hernia repair" videos.

CONCLUSIONS: Our website acted as a "just-in-time" accessible portal to reliable surgical information. It supplemented the time sensitive educational needs of our learners by serving as a heavily used adjunct to 3 components of our surgical education curriculum: weekly simulation sessions, biannual assessments, and clinical rotations. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

COMPETENCIES: Medical Knowledge, Practice-Based Learning and Improvement

KEY WORDS: educational website, surgical curriculum, assessments, faculty endorsement, simulation, website usage data

INTRODUCTION

In 2011, the Accreditation Council for Graduate Medical Education revised the duty hour recommendations in an attempt to improve safety and quality of patient care.[1] In response to these changes, residency program directors demonstrated a marked degree of concern about educating a competent generation of future physicians.[2] These concerns call for usage of innovative training methodologies. With millennials making up the majority of learners in 2017, eLearning is rapidly becoming a part of the mainstream medical education.[3] Web-based multimedia instruction is being increasingly used and has shown to increase learner motivation in medical education.[4-6]

Although there is a general paucity of data showing the clear role of online resources in clinical education,[7] there is a growing body of data supporting usage of web-based

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TABLE 1. Types of Content on the Website

Type	Count	%	Views
Videos	295	80	30,864
Interactive modules	51	14	3473
Files	14	4	413
Flashcards	7	2	2322

education in various fields of medicine.[4,5,8,9] However, usage of such resources to supplement a surgical educational curriculum have rarely been reported.[10,11]

We believe that successfully teaching duty hour restricted trainees demands engaging learning opportunities outside the clinical realm—ideally with 24/7 access. To this end, we developed an educational website as an adjunct to our surgical education curriculum and sought to describe how our learners used this resource.

MATERIALS AND METHODS

Our study was a part of a greater initiative for research in simulation and surgical education, approved by the Institutional Review Board at the Mayo Clinic.

Study Design

Our surgical website was developed, prototyped, and vetted by a small group of Mayo Clinic research personnel and select surgical trainees—starting in January 2015. It was then made accessible to Mayo Clinic employees across all sites (Minnesota, Arizona, Florida, Wisconsin, Georgia, and Iowa) via our internal web network in April 2015. The website was marketed only to trainees within our Mayo Clinic-Rochester, MN, general surgery residency program, but some 65,000 employees could access the site if desired. We then conducted a retrospective review of website usage data from April 2015 to October 2016.

Data Collection and Statistical Analysis

Piwik, an open source analytics software implemented on the website was used to collect the usage data (visits, page views, actions, bounce rate, and duration of usage) over 18 months (April 3, 2015-October 21, 2016). Descriptive statistics (counts, means, and modes) were obtained from Piwik and calculations were done using Microsoft Excel 2010. No power calculation was completed owing to the descriptive and exploratory nature of the study.

Study Definitions

A visit was defined as entrance to the website for the first time, or visiting a page more than 30 minutes after a user's last page view.[12] A page view was the event of access to an individual page or unique URL on the website. Actions were defined as the total of page views, video views, and interactive modules accessed by the users. Bounce rate was calculated as the percentage of visitors who exited the website after simply viewing the homepage.

RESULTS

Website Content

Our website housed a total of 367 separate educational materials. Videos including surgical procedural playlists, simulation videos, and short basic-science clips made up 80% of the website content. Interactive modules composed of educational content like text, images, and videos embedded with questions to increase user engagement was the second most prevalent content type (14%). Educational documents (4%) including publications and procedural guidelines, and flashcards (2%) on various surgical procedures completed the resources. Videos were the most popular content type accessed by our users (63% of all views; Table 1).

Users

A total of 257 users accessed the website during the 18-month period. A total of 33% ($n = 85$) of these users were general surgical residents (postgraduate year [PGY] 1-5) and 67% ($n = 172$) were nonresidents including staff consultants, medical students, researchers, and allied-heath staff. Males accessed the website more frequently than females by total users (144 males and 113 females), general surgery residents (57 males and 28 females), and nonresidents (87 males and 85 females). Within our general surgery residency program 97% of our female residents and 88% of our male residents accessed the website. The average time spent on the site by our female (23 min) and male (18 min) residents was similar.

Usage Overview

Views and Visits

Users viewed the website content 48,794 times on 6313 separate occasions, with an average of 11.5 visits per day. A bounce rate of 22% was seen, meaning the majority of users (78%) went beyond the homepage of the website.

Time

Users spent a mean time of 14 ± 11 minutes per visit. Although *visits* were most frequent between 11 AM and noon (485 visits), followed by 8 AM and 9 AM (466 visits), actual *time* spent on the site occurred most commonly between 7 PM and 9 PM (Table 2 and Fig. 1). The total actions were highest between 8 PM and 9 PM (6358 actions), followed by 7 PM and 8 PM (5689 actions). The actions per visit were highest between 7 PM and 8 PM (25.5 actions per