

BRIEF REPORT

# Web-Based Nephropathology Teaching Modules and User Satisfaction: The Nephrology On-Demand Experience

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## Abstract

Nephropathology is an integral component of nephrology education. Online teaching sites provide valuable educational materials to learners, but learner satisfaction has not been measured. We developed a nephropathology website and measured learners' satisfaction. The Nephrology On-Demand Histopathology website ([http://blog.ecu.edu/sites/nephrologyondemand/?page\\_id=4502](http://blog.ecu.edu/sites/nephrologyondemand/?page_id=4502)) provided nephropathologic specimens with explanations. Users were asked to complete a Likert-based survey (1—strongly agree . . . 5—strongly disagree) regarding four key areas of content quality: accuracy, currency, objectivity, and usefulness. Learners of all training levels perceived the content quality favorably. The mean ( $\pm$ SD) for accuracy was 1.70 (0.89), currency 1.62 (0.90), objectivity 1.80 (1.01), and usefulness 1.72 (0.95). Nephrology On-Demand Histopathology is a well-received teaching tool to learners of all training levels. Educators may consider using it, as well as other online nephropathology sites, as adjunctive teaching tools.

**Keywords:** education, Internet, web

## INTRODUCTION

Nephropathology is an integral component of nephrology education. The American College of Graduate Medical Education requires that nephropathology be formally taught in nephrology fellowship programs.<sup>1</sup> In addition, both the American Board of Internal Medicine and the American Board of Pediatrics include questions on both its initial certification and recertification examinations that focus on interpretation of nephropathologic specimens (mainly kidney biopsy tissue).<sup>2</sup> Besides learning nephrology through the traditional lecture format found in most nephrology training programs, learners can receive nephropathology education from commercial “board review” courses and through paid or free online teaching sites.<sup>3–5</sup> Given the ways in which learners can be taught nephropathology, it is surprising that there is no published data examining user satisfaction of any learning modality. In our investigation, we report

preliminary results of learner satisfaction using one such modality: an online nephropathology teaching site.

## METHODS

Kidney biopsy specimens were obtained from the Department of Pathology, East Carolina University. Each specimen was de-identified, digitized, and uploaded onto the Nephrology On-Demand Histopathology website ([http://blog.ecu.edu/sites/nephrologyondemand/?page\\_id=4502](http://blog.ecu.edu/sites/nephrologyondemand/?page_id=4502)). Romualdo Talento and Karlene Hewan-Lowe provided a description of the key pathological findings for each specimen. Specimens were categorized by microscopic type (light, electron, and immunofluorescence) and final diagnosis, as well as sorted into mystery cases. As a condition for accessing the content,

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users were required to complete a Qualtrics™-hosted survey. This survey asked about their training level (resident, nurse, etc.), geographic location, and included a Likert survey (1—strongly agree; 2—moderately agree; 3—undecided; 4—moderately disagree; 5—strongly disagree) about the (1) accuracy, (2) currency, (3) objectivity, and (4) usefulness of digital format of the specimens. Google Analytics™ code was inserted into the root files of the website to track geographic usage. Data presented are from 1 January to 11 May 2011. Mean and standard deviations were computed using Qualtrics™.

## RESULTS

During the study period, a total of 81 kidney biopsy specimens for 11 diagnoses were uploaded (Table 1). These diagnoses were organized into 12 mystery cases. There were 1650 views to the website, with approximately 58% coming from the United States, 13% from India, and the remaining from other parts of the world. Sixty-four percent of all users accessed the website from outside a patient-care area (home or library) (Figure 1). Sixty-five out of 73 surveys were completed (89% response rate), with 62% of all learners accessing the website for general or personal interest (Figure 2). Excluding first-time users of the site (22%),

more than 75% of users perceived the content to be accurate, current, objective, and presented in a useful digital format. The mean ( $\pm$ SD) for accuracy was 1.70 (0.89), currency 1.62 (0.90), objectivity 1.80 (1.01), and usefulness 1.72 (0.95) (Table 2).

## DISCUSSION

Our preliminary results highlight two important findings. First, learners of various training levels used our online nephropathology site to satisfy a general interest in the subject and not solely for examination preparation. Second, learners viewed the quality of the content favorably regardless of their training level.

Online nephropathology teaching sites have existed as early as 1994.<sup>6</sup> Early appeal of teaching nephropathology through the Internet was evident by the fact that the medium was ideal for placing text and images side-by-side. In addition, such juxtaposition was easy to program and required little maintenance or updating. As a result, a number of institutions developed an interest in teaching nephropathology through online media. However, given the alternative, perhaps more conventional method of learning nephropathology, it was unclear to what degree online nephropathology sites were used for

Table 1. Nephropathologic diagnoses on the Nephrology On-Demand Histopathology website.

| Diagnosis                                 | Light microscopy | Number of slides   |                     |
|---|------------------|--------------------|---------------------|
|   |                  | Immunofluorescence | Electron microscopy |
| Amyloidosis                               | 3                | 3                  | 2                   |
| Diabetic glomerulosclerosis               | 4                | 0                  | 1                   |
| Fibrillary glomerulonephritis             | 4                | 0                  | 2                   |
| Henoch-Schönlein glomerulonephritis       | 5                | 1                  | 0                   |
| Lupus nephritis                           | 6                | 0                  | 0                   |
| Membranous glomerulonephritis             | 15               | 1                  | 8                   |
| Membranoproliferative glomerulonephritis  | 7                | 0                  | 3                   |
| Necrotizing crescentic glomerulonephritis | 3                | 2                  | 0                   |
| Thrombotic microangiopathy                | 5                | 0                  | 0                   |
| Transplant endarteritis                   | 2                | 0                  | 0                   |
| Transplant glomerulopathy                 | 3                | 0                  | 1                   |
| Total                                     | 57               | 7                  | 17                  |

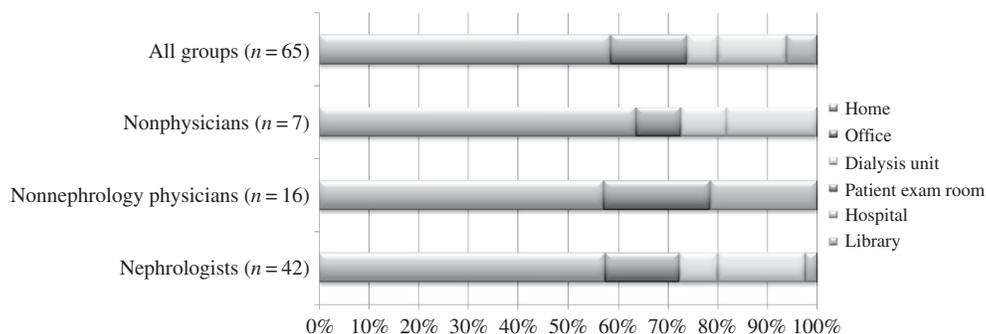


Figure 1. Access location by learner type of the Nephrology On-Demand Histopathology website.

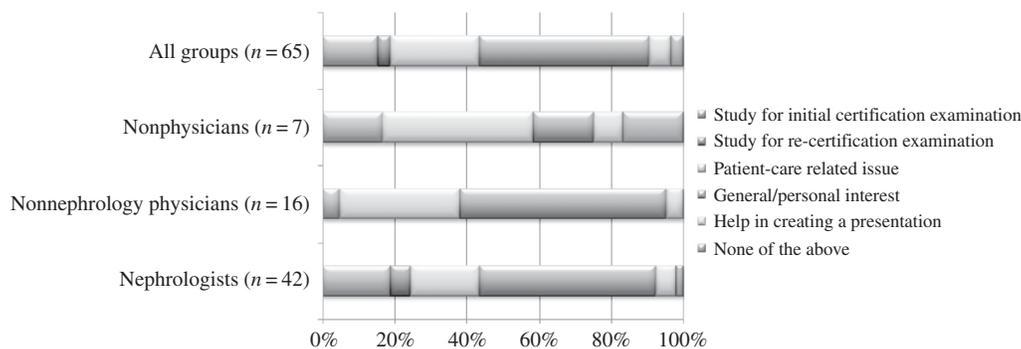


Figure 2. Reasons for accessing the Nephrology On-Demand Histopathology website by learner type.

Table 2. Learner perception of content on the Nephrology On-Demand Histopathology website.

| Question: Information is . . .       | Learner group                     | Strongly agree (%) | Moderately agree (%) | Undecided (%) | Moderately disagree (%) | Strongly disagree (%) | Mean score | Standard deviation |
|--------------------------------------|-----------------------------------|--------------------|----------------------|---------------|-------------------------|-----------------------|------------|--------------------|
| Accurate                             | All groups                        | 52                 | 30                   | 16            | 0                       | 2                     | 1.7        | 0.89               |
|                                      | Nephrologists (n = 42)            | 48                 | 32                   | 16            | 0                       | 3                     | 1.77       | 0.96               |
|                                      | Nonnephrology physicians (n = 16) | 62                 | 31                   | 8             | 0                       | 0                     | 1.46       | 0.66               |
|                                      | Nonphysicians (n = 7)             | 50                 | 17                   | 33            | 0                       | 0                     | 1.83       | 0.98               |
| Current                              | All groups                        | 60                 | 22                   | 16            | 0                       | 2                     | 1.62       | 0.9                |
|                                      | Nephrologists                     | 48                 | 32                   | 16            | 0                       | 3                     | 1.77       | 0.96               |
|                                      | Nonnephrology physicians          | 85                 | 0                    | 15            | 0                       | 0                     | 1.31       | 0.75               |
|                                      | Nonphysicians                     | 67                 | 17                   | 17            | 0                       | 0                     | 1.5        | 0.84               |
| Objective                            | All groups                        | 52                 | 24                   | 18            | 4                       | 2                     | 1.8        | 1.01               |
|                                      | Nephrologists                     | 45                 | 29                   | 19            | 3                       | 3                     | 1.9        | 1.04               |
|                                      | Nonnephrology physicians          | 69                 | 15                   | 8             | 8                       | 0                     | 1.54       | 0.97               |
|                                      | Nonphysicians                     | 50                 | 17                   | 33            | 0                       | 0                     | 1.83       | 0.98               |
| Presented in a useful digital format | All groups                        | 54                 | 26                   | 16            | 2                       | 2                     | 1.72       | 0.95               |
|                                      | Nephrologists                     | 48                 | 32                   | 16            | 0                       | 0                     | 1.77       | 0.96               |
|                                      | Nonnephrology physicians          | 62                 | 23                   | 8             | 8                       | 0                     | 1.62       | 0.96               |
|                                      | Nonphysicians                     | 67                 | 0                    | 33            | 0                       | 0                     | 1.67       | 1.03               |

examination preparation. Our preliminary results suggest that Nephrology On-Demand Histopathology website was not exclusively used for examination preparation. Approximately 50% of learners used the website for personal interest, with less than 20% using the site for examination preparation. This preference was seen in all learner groups. Equally notable is that learners of all training backgrounds viewed the content favorably. More than 65% of learners had positive views on the four key areas of content quality. As a result, we conclude that our nephropathology site was valuable to a variety of learners and educators may consider using this teaching alternative as a readily available didactic tool.

**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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