High-level accessibility review – BTAA
(PubMed - final version)

Primary Point of Contact

Michael Fairchild
Accessibility Consultant

Deque Systems, Inc.
Web: www.deque.com
Email: michael.fairchild@deque.com

Feburary 18th, 2019

deque

High-level accessibility review – PubMed

TABLE OF CONTENTS

PubMed

Summary (top 3 problems for PubMed)

This assessment covers portions of the PubMed application. It is obvious that the developers paid attention to accessibility concerns and used semantic HTML and ARIA in an effort to provide a good user experience to people with disabilities. However, the assessment revealed significant problems with form labeling, keyboard-only navigation, and incomplete application for ARIA. These issues may cause significant frustration for sighted keyboard-only users and screen reader users.

1. **Form controls are not labeled –** Several form controls are missing either programmatic or visual labels. This will cause significant hardship for people who use screen readers because the purpose of form controls is not obvious without the programmatic association. Additionally, people with cognitive, language, or learning disabilities might find forms difficult to use without visual labels.
2. **Visual focus indicators –** There are many instances throughout the application where interactive elements are missing visual focus indicators. For example, the skip links and several buttons in the application are missing visual focus indicators. This will make it difficult for sighted keyboard-only users to complete certain tasks in the application.
3. **Incomplete application of ARIA** – Several parts of the application are missing required ARIA attributes or implement ARIA incorrectly. For example, autocomplete results within a listbox have the menuitem role applied to them instead of the option role. Additionally, many menuitem elements that open submenus are missing the aria-expended="true" attribute when the submenu is open. Many screen reader users will find this lack of information about the interface frustrating.

Accessibility findings

Project wide issues

The issues presented in this section were identified in multiple pages and are recorded here to avoid repetition. These are applicable to each screen. Due to particularities, similar issues are reported on a page per page basis, where applicable.

Automated findings using Axe

- **SC 1.3.1 –** The <ul> is containing the links under the search bar must be structured correctly.
- **SC 1.3.1 –** elements that contain skip links must be contained in a <ul> or <ol>.
- **SC 2.4.1 –** The page should contain landmark regions.
- **SC 2.4.1 –** The 'Sign in to NCB' iframe must have a title.
- **SC 3.1.1 –** <html> element must have a lang attribute.

Issues found through automated testing come from the Axe plugin, an open source accessibility testing tool that is available for Firefox and Chrome. Details here: https://www.deque.com/products/axe/.
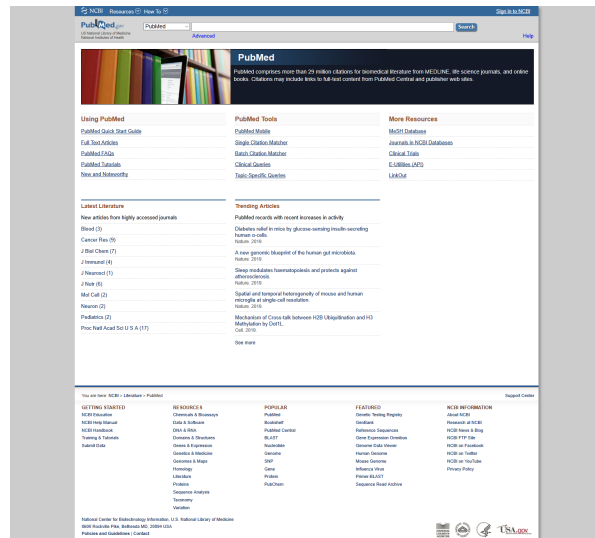
Additional manual findings using NVDA screen reader

- **SC 2.1.1 –** "Resources" and "How to" navigation links must be keyboard operable.
- **SC 2.4.7 –** Skip links must be visible when they receive focus.
- **SC 2.4.7 –** The 'Search' button must have a visual focus indicator.
- **SC 3.3.2 –** The select list to filter the search must have a visible label or title attribute.
- **SC 4.1.2 –** Elements with the meniuitem role must have the aria-expanded="true" attribute when its submenu is visible.
- **SC 4.1.2 –** Autocomplete options must use the option role, not the menuitem role.

1. PubMed home page

Source: https://www.ncbi.nlm.nih.gov/pubmed/

Test case: Test homepage, including dropdowns and searchbox near the top of the page, images, links, reading order, etc.

Automated findings using Axe

- **SC 1.3.1 –** The <ul> is containing the links under the search bar must be structured correctly.
- **SC 1.3.1 –** elements that contain skip links must be contained in a <ul> or <ol>.
- **SC 2.4.1 –** The 'Sign in to NCB' iframe must have a title.
- **SC 2.4.1 –** The page should contain landmark regions.
- **SC 3.1.1 –** <html> element must have a lang attribute.

Additional manual findings using NVDA screen reader

- **SC 2.1.1 –** "Resources" and "How to" navigation links must be keyboard operable.
- **SC 2.4.7 –** Skip links must be visible when they receive focus.
- **SC 4.1.2 –** elements with the meniuitem role must have have the aria-expanded="true" attribute when its submenu is visible.
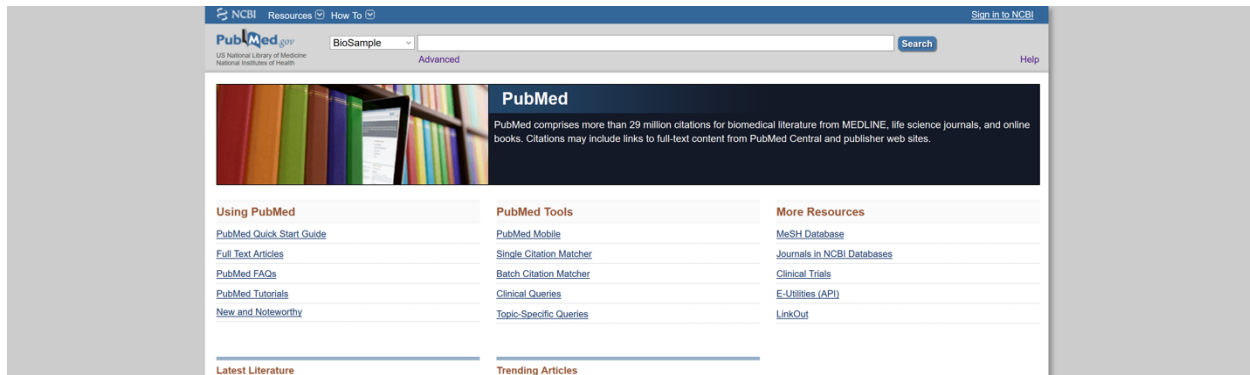
Note on the search form

Issues relating to the search form are logged under the 'Search form' page.

2. Search form

Source: https://www.ncbi.nlm.nih.gov/pubmed/

Test case: From the initial page, search for: infantile hemangioma propranolol (should autofill/complete)

Automated findings using Axe

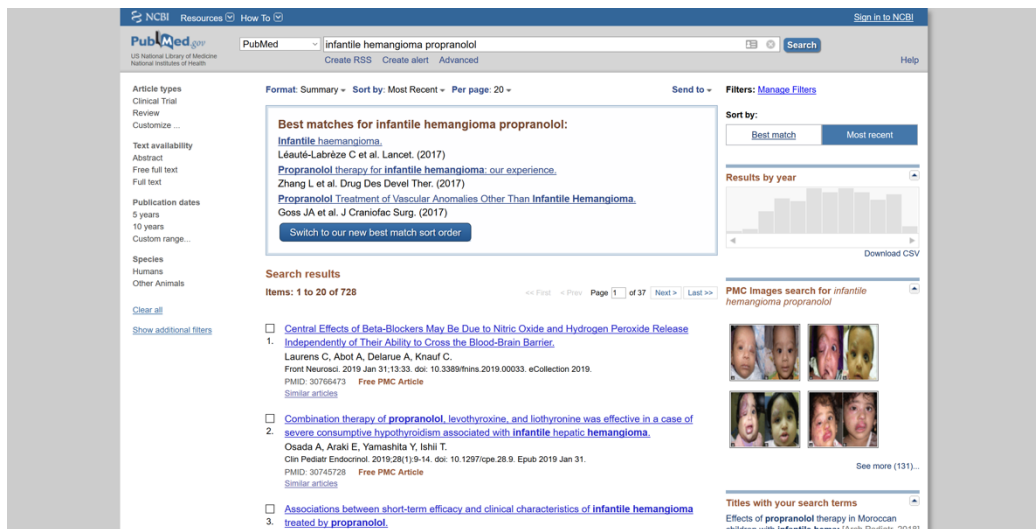- None found (beyond the issues listed under 'PubMed home page'.

Additional manual findings using NVDA screen reader

- **SC 2.4.7 –** The 'Search' button must have a visual focus indicator.
- **SC 3.3.2 –** The select list to filter the search must have a visible label or title attribute.
- **SC 4.1.2 –** Autocomplete options must use the option role, not the menuitem role.

3. Search results

Source: https://www.ncbi.nlm.nih.gov/pubmed/?term=infantile+hemangioma+propranolol

Test case: Test search results page from above search, including text, links, any images/graphs, checkboxes, reading order, ability to get to next page of results, etc. Test format and limits on search results page. Can one change format from summary to detailed (dropdown/down arrow near top) with mouse only and select last 5 years from "publication dates" and select "show additional filters" on the left.

Automated findings using Axe

- **SC 1.4.2** – Inactive pagination links must have sufficient color contrast.
- **SC 1.4.2** – Source text under "Titles with your search terms" must have sufficient color contrast.
- **SC 4.1.1** – IDs of active elements must be unique.
- **SC 3.3.2** – Checkboxes for results elements must have programmatic labels.
- **SC 3.3.2** – 'Search details' textbox must have a programmatic label.
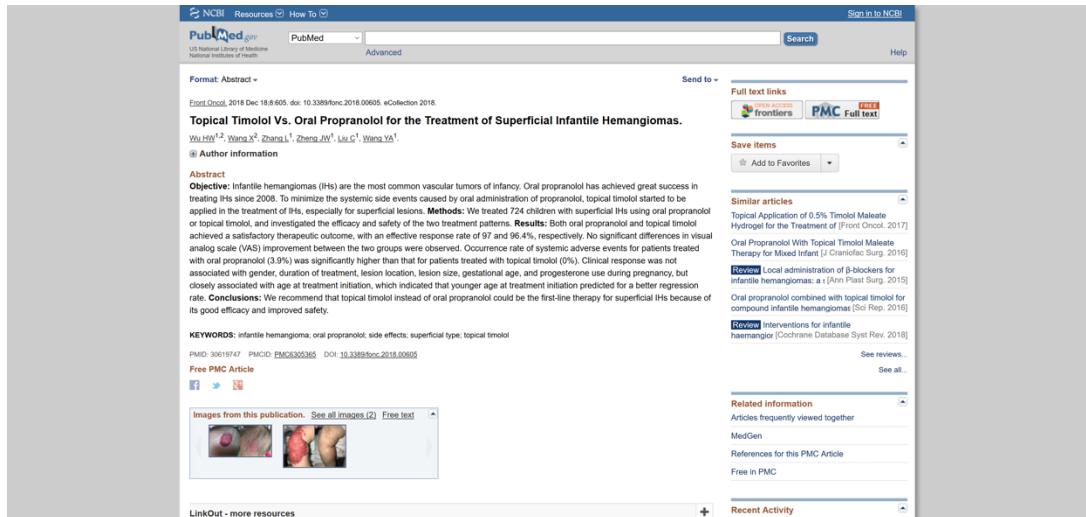- **Best practice** – Accesskey attribute value must be unique.

Additional manual findings using NVDA screen reader

- **SC 1.1.1** – Alternative text for images under "PMC Images search for" must be meaningful.
- **SC 1.1.1** – Informative images under 'Recent Activity' must have alternative text.
- **SC 1.3.1** – The group of checkboxes under "additional filters" must have a group label.
- **SC 1.3.1** – The list of results must be marked up as an ordered list.
- **SC 1.3.1** – Content that is not a list must not be marked up as a list. Each filter group (article type, text available, publication dates, species) must not be contained in a list with a single list item.
- **SC 1.3.1** – The number of results must not be marked up as a heading.
- **SC 2.1.1** – The tooltip for "results by year" must be keyboard accessible.
- **SC 2.4.7** – The "Show" button under "additional filters" must have a visual focus indicator.
- **SC 2.4.7** – The close button under "additional filters" must have a visual focus indicator.
- **SC 3.2.2** – Changing the value of 'format', 'sort by', or 'per page' must not cause the page to refresh.

4. Test individual search result page

Source: https://www.ncbi.nlm.nih.gov/pubmed/30619747

Test case: Quickly test an individual search result page

Automated findings using Axe

- **SC 1.4.2 –** Sources under "Similar articles" and "Recent Activity" must have sufficient color contrast.
- **SC 4.1.2 –** Image link to toggle the "Images from this publication" section must have alternative text.
- **SC 4.1.2 –** Image links for left and right arrows under "Images from this publication" must have alternative text.
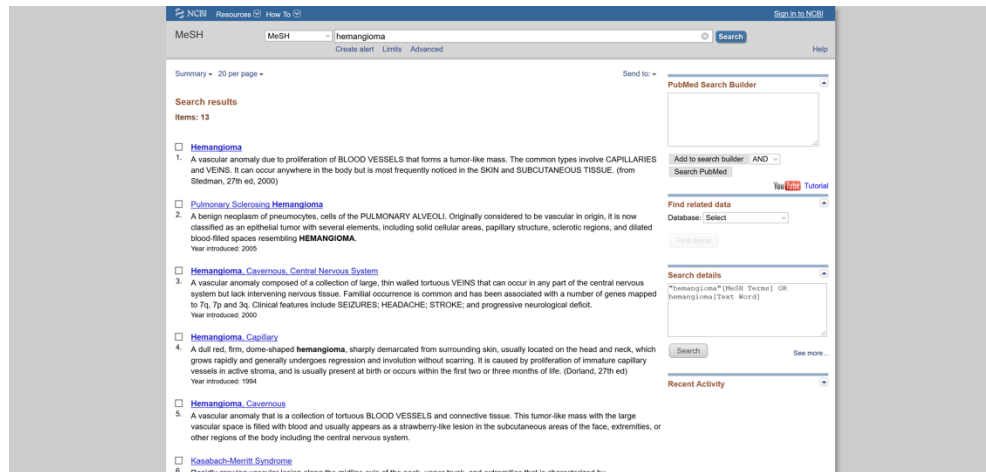
Additional manual findings using NVDA screen reader

- **SC 1.1.1 –** Alternative text for images under "Images from this publication" must be meaningful.
- **SC 3.2.2 –** Changing the value of 'format' must not cause the page to refresh.
- **SC 4.1.1 –** IDs of active elements must be unique.

5. MeSH search

Source: https://www.ncbi.nlm.nih.gov/mesh/?term=hemangioma

Test case: can you select the first checkbox and send to search builder on right and then "search pubmed" with keyboard only? Is this page also accessible/readable to a screen reader?

Automated findings using Axe

- **SC 1.4.2** – Inactive pagination links must have sufficient color contrast.
- **SC 1.4.2** – Source text under "Recent Activity" must have sufficient color contrast.
- **SC 3.3.2** – Checkboxes for results elements must have programmatic labels.
- **SC 3.3.2** – 'Search details' textbox must have a programmatic label.
- **SC 3.3.2** – 'PubMed Search Builder" textbox must have a programmatic label.
- **SC 3.3.2** – 'and/or/not' select must have a programmatic label.
- **SC 3.3.2** – 'and/or/not' select must have a visual label.
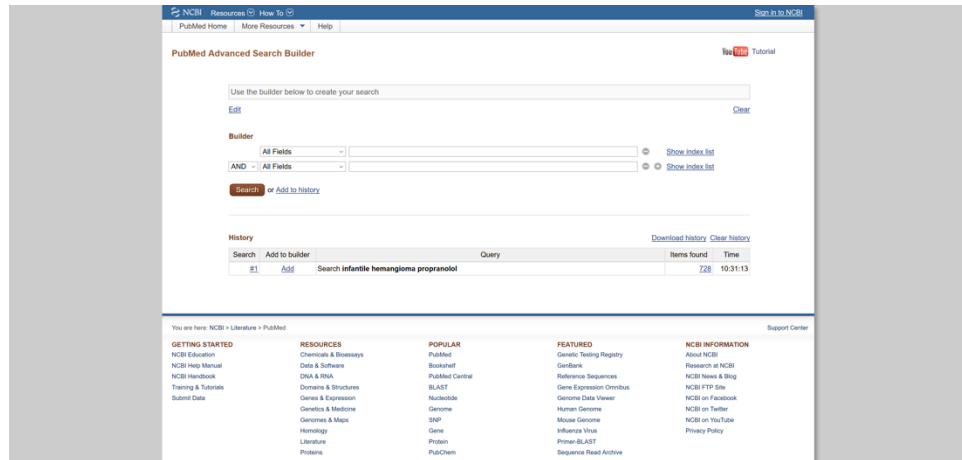- **SC 4.1.1** – IDs of active elements must be unique.

Additional manual findings using NVDA screen reader

- **SC 1.1.1** – YouTube image must have alternative text.
- **SC 1.1.1** – Informative images under 'Recent Activity' must have alternative text.
- **SC 1.3.1** – The number of results must not be marked up as a heading.
- **SC 1.3.1** – The list of results must be marked up as an ordered list.
- **SC 2.4.7** – The "search" button must have a visual focus indicator.
- **SC 3.2.2** – Changing the value of 'summary', or 'per page' must not cause the page to refresh.

6. Advanced search

Source: https://www.ncbi.nlm.nih.gov/pubmed/advanced

Test case: Quickly test the advanced search page.

Automated findings using Axe

- **SC 1.3.1** – Company Search textbox must have a programmatic label.

Additional manual findings using NVDA screen reader

- **SC 1.1.1** – YouTube image must have alternative text.
- **SC 1.3.1** – The textbox that appears after clicking 'edit' must have a programmatic label.
- **SC 2.4.7** – The "PubMed Home" button must have a visual focus indicator.
- **SC 2.4.7** – The "Search" button must have a visual focus indicator.
- **SC 3.3.2** – The select list to filter the search must have a visible label or title attribute.
- **SC 3.3.2** – The form must indicate which fields are required or provide a meaningful error.
- **SC 3.3.2** – The textbox that appears after clicking 'edit' must have a visible label.