# Augmented Reality: Bringing Another Dimension to Scientific Publications

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## Abstract

**Objective:** To (1) define the concept of augmented reality (AR), (2) examine potential uses in medical publications, (3) evaluate existing journal/congress guidelines, and (4) propose strategies for future use of AR in medical publications.

**Research design and methods:** AR represents the interface between the digital and physical worlds. Similar to quick response (QR) codes, AR places markers in a print-based environment that link to digital enhancements (video, animations, interactive graphs), which are accessed via tablet or smartphone. AR can increase the educational value of peer-reviewed publications, poster presentations, and supportive educational materials by creating interactivity, which in turn may increase both access and retention of information within a poster or journal article. It can also be used for elaboration of a complex topic or provision of supplementary materials. In order to assess the potential use of AR, guidelines for 18 congresses and 29 journals in major therapy areas were examined.

**Results:** Although 5 of the congresses have guidelines on interactive e-posters, none of the congress guidelines for printed posters discuss AR technology. None of the journals surveyed have guidelines on AR, but 17/29 make some reference to allowing digital media, with a majority providing instructions for uploading interactive files.

**Conclusion:** AR can be valuable for both enhancing publications and extending their life-span. In order to advocate its use, it will be important to partner with journals and scientific associations to determine how best to incorporate this technology, including issues concerning copyright.

## Background

- Augmented reality (AR) allows a mobile technology user to interact with digital information embedded within the physical environment
- AR can increase the educational value of peer-reviewed publications, poster presentations, and supportive educational materials by creating interactivity, which in turn may increase both access to and retention of information within a poster or journal article
  - Interactive posters were perceived to increase audience engagement, provide broader dissemination of data, facilitate metrics tracking, and enhance capacity for multimedia presentation (McGrath and Fisher, ISMPP Conference 2012)
  - AR has also energized the print media world, swiftly adopted by popular magazines, newspapers, and publications to open up a window of interactive, dynamic, and shareable content from what used to be static information

### Potential Benefits of AR in Medical Publications

**Print Journal Benefits**
- Enhances readership experience
- Creates greater opportunity for increased awareness of the print-based publication

**Shared Benefits**
- Augments content
  - Additional study details
  - MOA videos
  - Expert commentary
  - Polling questions
- Alleviates space constraints
- Provides ability to track user metrics
- Offers potential for ongoing communication

**Congress Poster Benefits**
- Draws greater attention to enhanced posters
- Provides access to complex multimedia content, independent of electronic posters
- Adds presenter-independent interactivity

## Methods

- In order to assess the potential use of AR, guidelines for 18 congresses and 29 journals in major therapy areas were examined
- Congresses were surveyed for their guidelines on interactive posters or electronic posters
  - Electronic posters were defined as static posters that can be presented from an electronic panel/poster board
  - Interactive posters were defined as posters that offer interactive elements, such as additional audiovisual capabilities or metric tracking; can be print-based or electronic
- Journals were surveyed for their guidelines on the incorporation of digital multimedia into the publications

## Results

- **Congress Guidelines (Table 1)**
  - Only 5 of the 18 congresses surveyed have guidelines on electronic posters
  - Only 3 congresses have guidelines on interactive posters
  - None of the congresses surveyed have guidelines on the use of AR technology in posters
- **Journal Guidelines (Table 2)**
  - Of the journals surveyed, 21 of 31 make some reference to allowing digital media, with a majority providing instructions for uploading interactive files
  - None of the journals surveyed have guidelines on AR
  - Of the journals that currently feature digital contents, 13 of 21 have applications (apps) that allow subscribers to access journal content via a mobile device

## Discussion

- As AR is delivered in the form of a mobile application, it offers important benefits over QR codes, including the ability to track metrics and facilitate ongoing communication
- None of the congresses or journals surveyed contain guidelines regarding the use of AR technology in published materials
- There is an opportunity to partner with journals and scientific associations to determine how best to incorporate AR technology, benefiting both the medical publication community and the intended audience

### Important Issues That Need Guidelines

**Print Journals**
- Awareness campaigns
- Citation of AR content

**Shared Challenges**
- Copyright ownership
- Longevity of content
- Types of AR content
- Content review and approval process
- Required disclaimers

**Congress Posters**
- Standardized AR app/platform
- Length of content
- Use of audio in poster hall

## Guidelines

### Table 1. Congress Guidelines for Digital Enhancements in Posters

| Congress Name | Electronic Posters | Interactive Posters | AR Technology |
|---|---|---|---|
| American Academy of Allergy, Asthma & Immunology | NO | NO | NO |
| Academy of Managed Care Pharmacy | NO | NO | NO |
| American Academy of Dermatology | YES | YES; e-poster guidelines allow interactive elements | NO |
| American Academy of Orthopaedic Surgeons | NO | NO; but do have multimedia presentations | NO |
| American Academy of Pediatrics National Conference & Exhibition | NO | NO | NO |
| American College of Cardiology | YES | YES; e-poster guidelines allow interactive elements | NO |
| American Congress of Obstetricians and Gynecologists | NO | NO | NO |
| American College of Rheumatology | NO | NO | NO |
| American Diabetes Association | YES | NO | NO |
| American Geriatrics Society | NO | NO | NO |
| American Neurological Association | NO | NO | NO |
| American Psychiatric Association | NO | NO | NO |
| American Society of Clinical Oncology | NO | NO | NO |
| American Society of Hematology | NO | NO | NO |
| American Thoracic Society International Conference | NO | NO | NO |
| Digestive Disease Week | YES | NO; but have videos based on abstracts | NO |
| European Society of Ophthalmology | YES; SOE 2013 will use only e-posters; hyperlinks cannot be included, but videos permitted | YES; e-poster guidelines allow interactive elements | NO |
| IDWeek | NO | NO | NO |

### Table 2. Journal Guidelines for Digital Enhancements in Print Publications

| Journal | Digital Features Included | Mobile Platform | AR Use in Print | Commentary |
|---|---|---|---|---|
| American Journal of Hematology | NO | None | None | None in current articles and no available upload guidelines |
| American Journal of Infection Control | NO | None | None | |
| American Journal of Kidney Diseases | YES | None | None | Journal posts podcast/video weekly |
| American Journal of Psychiatry | YES | None | None | Audio only |
| Annals of Internal Medicine | YES | iPad | None | Current articles include video of author insights and audio podcast |
| Arthritis & Rheumatism | NO | None | None | None in current articles and no available upload guidelines |
| Blood | YES | iPad/Android | None | |
| British Medical Journal | YES | iPad | None | Current articles include video of author insights and audio podcast |
| Cardiology | NO | None | None | |
| Chest Journal | YES | iPad | None | Home page features MP3 and video |
| Circulation | YES | iPad | None | Website encourages video uploads |
| Clinical Pharmacology & Therapeutics | YES | None | None | Author instructions include uploading photos, audio, and videos; videos included in articles |
| Diabetes Care | YES | iPad/Android | None | Mobile view available |
| European Journal of Pediatrics | YES | None | None | Author instructions include uploading photos, audio, and videos |
| Internal Medicine Journal | NO | None | None | |
| International Journal of Infectious Diseases | YES | None | None | Movies, animations, high-resolution images, background datasets, sound clips, etc |
| Journal of the American Board of Family Medicine | NO | None | None | |
| Journal of the American College of Cardiology | YES | iPad | None | Can use AR technology, but did not have specific information regarding guidelines |
| Journal of the American Medical Association | YES | None | None | Author instructions include uploading photos, audio, and videos |
| Journal of Asthma | NO | None | None | Only upgraded option is PDF Plus with reference linking |
| Journal of Clinical Oncology | YES | iPad | None | Very little experience with AR, but would be open to using it in the future |
| Journal of Immunology | YES | None | None | Videos included in articles; author instructions include uploading photos, audio, and videos |
| Journal of Stroke & Cerebrovascular Diseases | NO | None | None | None in current articles and no available upload guidelines |
| Leukemia & Lymphoma | NO | None | None | Only upgraded option is PDF Plus with reference linking |
| Mayo Clinic Proceedings | YES | iPad | None | Author instructions include uploading photos, audio, and videos |
| New England Journal of Medicine | YES | iPad | None | Author instructions include uploading photos, audio, and videos |
| Obstetrics & Gynecology | YES | iPad | None | Journal posts podcast/video weekly |
| Pain | YES | None | None | Author instructions include uploading photos, audio, and videos |
| Pain Research & Management | NO | None | None | |
| Spine | YES | iPad | None | Digital artwork allowed; mobile view and tablet apps available |
| The Lancet | YES | iPad | None | Author instructions include uploading photos, audio, and videos |

This poster has **augmented reality** content. Please go to *RADARmAPP.com/download* or **scan the QR code to the right**.

Once the app is installed, point the camera of your mobile device to specific sections of this poster, indicated by **the icon to the left**, and enjoy the augmented reality content.

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