Medical Dosimetrist Scholarly Publications in a Competitive Environment – How a Progressive Publishing Model May Support the Worldwide Growth of the Medical Dosimetry Profession
» Please take out a pencil and paper
» Relax and clear your mind of worrisome thoughts
» Maybe draw a little doodle while we are talking
» Write down your thoughts and questions as they come
» Choices and the future of medical dosimetry?

» The world is **CHANGING**!
» Where did we come from?
» Are we where we want to be?
» Where are we going?
» What choices do we have?
» What are the right choices?
» And what choices must we take care to avoid?

*How do scholarly publications help us plan for what is to come?*
Today’s talk deals with the AAMD community, the importance of your journal, *Medical Dosimetry*, and the worldwide reach of the medical dosimetry profession.

The AAMD is a professional and scholarly community bound together by its communication organs.

The AAMD community must demonstrate the profession has a cost effective solution to offer the world respecting the quality treatment of radiation oncology cancer patients.

What are the outreach goals of the AAMD?
» The American Association of Medical Dosimetrists is an international society established to promote and support the Medical Dosimetry profession.

» We provide opportunities for education, a forum for professional interaction and a representative voice in the healthcare community.

» The Society seeks to promote an ideal of professional conduct to which its members should aspire and endorses the highest standards of patient care.

AAMD Mission Statement
What types of work do medical dosimetrists do?

» Clinical Service and Consultation

» Research

» Teaching in a Clinical and/or Academic Environment

» Locum Tenens

» Vendor Applications/Technical Support/ Sales Specialist

» Administration
AAMD Professional Society
» Scope of Practice
» Certified Education Pathways
» Certified Clinical Training
» MDCB Board Certification
» Practice Standards

Definition of Qualified Medical Dosimetrist
» Regional and National Meetings
» Continuing Education Requirements
» Educational Foundation
» Medical Dosimetry Journal
» The clinical knowledge base to support the practice of medical dosimetry worldwide exists only in the AAMD

» The infrastructure to support the professional interests of medical dosimetrists exists only in the AAMD

» There are no counterpart organizations to the AAMD in Europe or Asia

» The AAMD needs only to any barriers that would inhibit the worldwide dosimetry community from forming naturally

**Important observations!**
» The AAMD has over 3,000 members
» Over 90% of these members reside in the United States
» The Medical Dosimetry profession largely does not exist outside the US

Medical dosimetry within the US and outside the US
Radiation therapists in certificate programs train for a few months in medical dosimetry
Degree not required
Clinical dosimetry training not required
Board Certification not required

IAEA Standards for clinically qualified medical physicist:
BS degree (graduate degree not required)
No residency requirement
No Board Certification Requirement

International Standards – Medical Dosimetry & Physics
» Primary Question:
» Is medical dosimetry a cost-effective professional model for providing radiation planning services to cancer patients worldwide and therefore one that should be exported to the world?

» Secondary Questions:
» Is the training model of a bachelor’s degree and certificate training in medical dosimetry optimal?
» What is the projected supply of and demand for medical dosimetrists given this training model?
Supply and demand of medical dosimetrists
Some radiation therapists and medical physicists perform radiotherapy planning (Standard outside US)

All medical dosimetrists perform radiotherapy planning full time (Standard within US)

The question is: what model is better?

Should clinics employ full-time planners/dosimetrists?

Should therapists and medical physicists be employed to perform planning and eliminate the employment of full-time planners/dosimetrists?

Two Models of Radiotherapy Planning
Dosimetrist model:

- In the US, planning duties for routine cases, 3D-CRT and class solution IMRT cases are planned by dosimetrists.
- ~25% of patients are planned by physicists.
- ~75% of patients are planned by dosimetrists.
- Therapists do not plan.

Therapist/Physicist model:

- In other countries, planning duties are shared between physicists and therapists; dedicated planners do not exist.
- ~25% of patients are planned only by physicists.
- ~75% of patients are planned approximately in equal numbers by physicists and therapists.

What model is better?
Dosimetrist Model and Therapist/Physicist Model:

Assume the same time is required to complete the service regardless of the profession of the planner.

Dosimetrist Model: Assume the overlapping work duties of the dosimetrist and medical physicist are interchangeable.

Therapist/Physicist Model:

Assume the work of the therapist and medical physicist is interchangeable except for the work only the medical physicist can perform.

Assumptions
» Medical dosimetrists and medical physicists are staffed in almost exactly a 1 : 1 ratio.

» Medical dosimetrists and medical physicists report almost identical median numbers of CPT code charges across the range of CPT codes.

» This supports the 1 : 1 staffing ratio in the community and also supports the assumption that the work of both professionals is utilized to complete the patient planning process.
Dosimetrist Model
Dosimetrist salary: $100,000 plus benefits = $130,000 or $65.00/hour

Medical Physicist
salary: $168,500 plus benefits = $220,000 or $110.00/hour

Therapist/Physicist Model
Therapist salary: $74,000 plus benefits = $96,000 or $48.00/hour
Medical Physicist
salary: $168,500 plus benefits = $220,000 or $110.00/hour
US salaries reflect hourly wages (including benefits) of $110, $65, and $48 for medical physicists, dosimetrists and therapists, respectively.

This is a ratio of about 1 : 1.35 : 2.3, reflecting a much wider gap between medical physicists and dosimetrists than between dosimetrists and therapists.

If these ratios hold in other nations, these ratios should allow the determination of a breakeven point to determine if medical dosimetry is a cost effective solution for radiation oncology planning.

Salary Ratios
As long as the salary ratios are similar in other countries, a cost breakeven analysis performed on US salaries will apply to other nations as well.

If planning work performed by a dosimetrist is shared equally between medical physicists and therapists, the Dosimetrist model demonstrates a clear cost advantage: a cost savings of about 12%.

Critical Assumptions
A critical question: What fraction of dosimetrist work must a therapist assume for the Therapist/Physicist model to break even with the Dosimetrist model?

Breakeven Analysis:
An analysis demonstrates that in order to break even, a therapist would need to perform about 75% of the work of a full-time dosimetrist, while a physicist would perform 25%
If it is unreasonable to expect a therapist to perform any more than the simple routine planning work component, a therapist cannot be expected to perform ½ the work of a dosimetrist, much less ¾ of that work.

A therapist working ¾ time planning would likely lose valuable therapist skills.

If a physicist plans significantly more than the breakeven ¼ work fraction, the substantial extra cost of medical physicist labor eliminates any cost savings gained by utilizing therapists to plan.

Failure of the Therapist Physicist Model
Medical physicist salaries would need to be 25% less (or therapist salaries 25% more) for the breakeven fraction to approach 50%.

If the medical physicist makes only 1.73 times the salary of a therapist, the financial justification for a medical dosimetry profession is not realized.

What if the salary ratio is varied?
Employing a full time dosimetrist is more cost-effective than employing more therapists and medical physicists to perform the same work; the savings is likely between 10 and 15 percent.

Irrespective of venue, employing dosimetrists is more cost effective than employing therapists and medical physicists to perform the work typically performed by dosimetrists.
The business model for medical dosimetry is that CMDs will provide infrastructure for a safe service at high quality and lower cost than can be provided by any other professional. They will do this by being more cost-efficient than these professionals when compared to best practices and peer review. Radiation oncology planning is performed everywhere on the planet; this business model should hold everywhere because CMDs lower the transaction costs of providing plans of high quality and safety.
The medical dosimetry model must be exported to the world because it offers higher quality patient care at a lower price than the alternative.

How is this accomplished?

Academic and training programs are key, but they are only the beginning.

Lifelong professional and scholarly progress must be communicated through the medium of a peer-reviewed journal.
» Budapest Open-Access Initiative – 2/14/2002
» Bethesda Statement on Open Access Publishing – 6/20/2003
» Berlin Declaration on Open Access to Knowledge in the Sciences & Humanities – 10/22/2003

What are the three “B”s of Open Access Publishing?
Budapest Open Access Initiative

The Budapest Open Access Initiative arises from a small but lively meeting convened in Budapest by the Open Society Institute (OSI) on December 1-2, 2001. The purpose of the meeting was to accelerate progress in the international effort to make research articles in all academic fields freely available on the internet. The participants represented many points of view, many academic disciplines, and many nations, and had experience with many of the ongoing initiatives that make up the open access movement. In Budapest they explored how the separate initiatives could work together to achieve broader, deeper, and faster success. They explored the most effective and affordable strategies for serving the interests of research, researchers, and the institutions and societies that support research. Finally, they explored how OSI and other foundations could use their resources most productively to aid the transition to open access and to make open-access publishing economically self-sustaining. The result is the Budapest Open Access Initiative. It is at once a statement of principle, a statement of strategy, and a statement of commitment.

The initiative has been signed by the Budapest participants and a growing number of individuals and organizations from around the world who represent researchers, universities, laboratories, libraries, foundations, journals, publishers, learned societies, and kindred open-access initiatives. We invite the signatures, support, and participation of the entire world scientific and scholarly community.

E-mail: openaccess@soros.org
Bethesda Statement on Open Access Publishing

Released June 20, 2003

Contents

- Summary of the April 11 meeting
- Definition of open access publication
- Statement of the Institutions and Funding Agencies working group
- Statement of the Libraries & Publishers working group
- Statement of Scientists and Scientific Societies working group
- List of participants

Summary of the April 11, 2003, Meeting on Open Access Publishing

The following statements of principle were drafted during a one-day meeting held on April 11, 2003 at the headquarters of the Howard Hughes Medical Institute in Chevy Chase, Maryland. The purpose of this document is to stimulate discussion within the biomedical research community on how to proceed, as rapidly as possible, to the widely held goal of providing open access to the primary scientific literature. Our goal was to agree on significant, concrete steps that all relevant parties—the organizations that foster and support scientific research, the scientists that generate the research results, the publishers who facilitate the peer-review and distribution of results of the research, and the scientists, librarians and other who depend on access to this knowledge—can take to promote the rapid and efficient transition to open access publishing.

A list of the attendees is given following the statements of principle; they participated as individuals and not necessarily as representatives of their institutions. Thus, this statement, while reflecting the group consensus, should not be interpreted as carrying the unqualified endorsement of each participant or any position by their institutions.
Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities

Preface

The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage. For the first time ever, the Internet now offers the chance to constitute a global and interactive representation of human knowledge, including cultural heritage and the guarantee of worldwide access.

We, the undersigned, feel obliged to address the challenges of the Internet as an emerging functional medium for distributing knowledge. Obviously, these developments will be able to significantly modify the nature of scientific publishing as well as the existing system of quality assurance.

In accordance with the spirit of the Declaration of the Budapest Open Access Initiative, the ECHO Charter and the Bethesda Statement on Open Access Publishing, we have drafted the Berlin Declaration to promote the Internet as a functional instrument for a global scientific knowledge base and human reflection and to specify measures which research policy makers, research institutions, funding agencies, libraries, archives and museums need to consider.

Goals

Our mission of disseminating knowledge is only half complete if the information...
The author grants to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use distribute, and display the work publicly.

A complete version of the work is deposited upon initial publication in an online repository that is supported by an academic institution, scholarly society, or other organization that seeks to enable open access, unrestricted distribution, and long-term archiving.

How does a journal qualify as “Open Access”? 
» If access is without cost to the user, the business model may be unsustainable

» Open Access journals may garner more citations simply because the articles are more widely available

» As a consequence, traditional journal impact factors may suffer with respect to open access journal factors

What are the Criticisms of the Open Access Journal Movement
When an author publishes an article in a tradition journal, the copyright is assigned (given) to the owner of the journal. The journal then charges a fee for access to the article and reproduction of the article. Therefore the article has a value as a commodity.

When an author publishes an article in an open access journal, the author retains the copyright (including the right to approve of republication as well as other ownership rights). The nature of the article changes from a commodity to a gift. There is no cost to access the article and it has no commodity value.

Authors give away something whenever they publish.
When a scientist publishes (gives away) an article, it is with the intention someone will read it.

The reader “gives back” to the author:
- By citing the work in another article
- By mentioning the work in public forums

A connection therefore exists between the author and the reader.

The “giving” is at once self-interested and altruistic; it is also community-building.

Some Observations on “Giving” an Article Away in any Journal
In traditional journals, the article (gift from the author) is a commodity, and it has value. This value is not easily traded, sold or recovered. This is because the primary value is in the relationship between author and reader.

In traditional journals, the work has fiscal value and demands a price to read or copy it.

In open access journals, the work changes from commodity to gift (from the author to the reader).

Paradoxically, the more the article is accessed (given), the more the article is “worth”.

“Giving” Articles in Traditional versus Open Access Journals
» When a library subscribes to an electronic version of a journal, the library does not own the archive

» The publisher decides who may view, copy and distribute the contents of the journal

» Access to content is restricted to library users who are authorized by the publisher

» When scholars sign away copyright, they inhibit dissemination of their work, and readers may be prevented from accessing that work through high cost or lack of authorization

What is a business model for a traditional journal with online access?
Traditional print
Access is limited to subscribers and libraries
The article is a commodity with high cost relative to value
The author loses ownership, copyright and other property rights over the information

Open access
Potentially 3 billion people have access
The article is a gift that returns value to the author
The author retains copyright and may share the article freely with anyone

Which model best builds a community?
» Medical Dosimetry Journal:
  » 4 issues per year; 15 articles / issue: 60 articles per year
  » About 5,000 users; Print subscription; Free to publish

» Journal of Applied Clinical Medical Physics:
  » 6 issues / year; 45 articles / issue; 270 articles / year
  » About 50,000 users; Open access; $500 APC

» Journal of Medical Physics
  » 12 issues / year/ 50 articles / issue; 600 articles / year
  » About 25,000 users; Print subscription; Free to publish
The JACMP is AAPM’s clinical medical physics academic journal

JACMP was the first open-access academic medical specialty journal – first published in February of 2000

The first open-access medical journal: Journal of Medical Internet Research (August, 1999)

Author retains the copyright

Over 1500 articles have been published
THE COST OF PUBLISHING

JOURNAL PRICES VARY WITH INFLUENCE AND BUSINESS MODEL.

Price of prestige

Open-access prices correlate weakly with the average influence of a journal’s articles.

Publication fee (US$ thousands)

Influence of journal’s articles

Hybrid*
Open access

PLoS ONE
Neuron

Cost of publication?
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<td>Commercial or Society Interests</td>
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**Model for open access publishing**
JACMP Editors:
» 1 Editor-in-Chief
» 2 Deputy Editors-in-Chief
» 80 Associate Editors in Radiation Oncology Physics
» 20 Associate Editors in Imaging Physics
» 2 Associate Editors in Radiation Protection
» 2 Associate Editors in Management, Administration & Professional Topics
» 1 Associate Editor in Radiation Measurements
» 1 Associate Editor in Non-Ionizing Topics
» 1 Associate Editor in Education

JACMP Operational Model
JACMP has over 7000 registered users and we recorded over 300,000 visits from over 150,000 unique IP addresses in 2015. We estimate the JACMP has about 20,000 regular users.

JACMP Peer Review is Double-Blind

There is an average 78 days from submission until final disposition of the manuscript.

Submissions are about 25% from the United States, 15% from Canada and 60% from the rest of the world.

JACMP is published on the Public Knowledge Project Open Journal Systems platform.

The JACMP utilizes Canadian copyeditors, layout editors and proofreaders.

JACMP has an acceptance rate of 50%.
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**Average annual growth over fifteen years**

19 21
Where can an open access journal get revenue to support its operations?

1. Banner ads
2. Wrapper ads
3. Article publication Fee
4. Society Support

Show me the money!
The report of Task Group 100 of the AAPM: Application of risk analysis methods to radiation therapy quality management


Citation: Medical Physics 43, 4209 (2016); doi: 10.1118/1.4947547
View online: http://dx.doi.org/10.1118/1.4947547
View Table of Contents: http://scitation.aip.org/content/aapm/journal/medphys/43/7?ver=pdfcov
Published by the American Association of Physicists in Medicine

Articles you may be interested in
- Stereotactic body radiation therapy: The report of AAPM Task Group 101
  Med. Phys. 37, 4078 (2010); 10.1118/1.3438001
- The management of respiratory motion in radiation oncology report of AAPM Task Group 76a
  Med. Phys. 33, 3674 (2006); 10.1118/1.2346990
- A 2-D diode array analysis software for verification of intensity-modulated radiation therapy delivery
  Med. Phys. 30, 870 (2003); 10.1118/1.1557631
- A quality management program in intravascular brachytherapy
  Med. Phys. 29, 2650 (2002); 10.1118/1.1524167
- Quality management of medical physics issues at the German heavy ion therapy project
  Med. Phys. 27, 725 (2000); 10.1118/1.880635
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How does the $500 APC compare?
» Open access journal publishes 100 articles/year
» Banner ad revenue: $30 K / year from 6 ads
» Wrapper ad revenue: $30 K / year from 50 weeks at $600 / week
» Article publication fee revenue (free for AAMD members): $20 K per year from $400 APC for 50 of 100 articles.
» Total revenue: $80 K / year.
» Cost is approximately $700 / article or $70 K
» Editor-in-Chief honorarium can be $10 K and the journal will break even.
» You could offer as an incentive a one year AAMD membership to any first author non-AAMD member.

So how can we make an open access journal business model work?
What I am suggesting:
AAMD should look at all publishing models to determine which one best builds its worldwide community. Possibilities include:

- Staying with print / publication
- Changing to open-access
- Publishing a hybrid journal (print but with low cost to open access)
- Starting a free online newsletter with some open-access articles
- Charging non-members $400 to publish while members publish free – thus publishing an article costs the same as publishing it for $200 and a one year AAMD membership

Am I suggesting AAMD convert Medical Dosimetry to an open access journal – Yes/No!
Key and Critical Questions for the AAMD to consider:

> Is the AAMD primarily about medical dosimetrists (community) or about medical dosimetry (science and professional practice)?

> Under what set of circumstances can dosimetrists share their scholarly achievements in the US? In other countries?

> What model of medical dosimetry scholarly communication best serves the interests of the community and the patient?

> What is the wise path as we ponder our possible future?
Medical dosimetry is a living jewel, if you hold it to the light and turn it this way or that, new colors, insights, properties are revealed.

Medical dosimetry is like a bureaucracy, subject to problems common to all bureaucracies: overspecialization, rigidity and inertia of procedures, group thinking (as opposed to critical thinking), disregard for dissenting opinions, and legalism at the expense of common sense.

Conclusion
Medical dosimetry is like a healthy organism, balanced, dancing, creative, respectful, efficient, and able to withstand assaults from the environment.

Medical dosimetry is an information stream, continually maturing, simplifying, and continually developing more insights, colors, flavors and jewels.

Conclusion