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Letter to the Editor

**Title:**

Publication output target for ophthalmology subspecialty fellows in Australia

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Clinical fellowship is an opportunity for advanced surgical and research training in ophthalmic subspecialties. Whilst the minimum requirement for the number of surgical procedures and fellows' surgical outcomes has received much attention,<sup>1-4</sup> there are no data on the outcomes of research training during ophthalmic subspecialty fellowship. The goal of this study was to evaluate the publication track record of fellows in Western Australia (WA) over a period of 28 years as a metric of clinical research training<sup>5</sup> during ophthalmic subspecialty training and to establish a reasonable target number of research publications that can be expected from fellows during and after their fellowship training. A secondary objective was to examine whether publication track record prior to commencing fellowship has an impact on future bibliometric.

Ethics approval to obtain the names of subspecialty fellows in WA and Victoria was obtained from the ethics committee of the Royal Victorian Eye and Ear Hospital (RVEEH). We compiled a list of the fellows who had completed 1-2 years of subspecialty fellowship in WA from 1985 to 2012 inclusive. For comparison of bibliometric track record with an Eastern state cohort, a list of the Fellows who had completed subspecialty fellowship at the RVEEH between 2001 and 2012 was also compiled. The number of PubMed indexed articles from each fellow was counted (by co-author H.A.S. and verified independently by F.K.C.) regardless of the position of authorship (<http://www.ncbi.nlm.nih.gov/pubmed> [accessed Jan 2017]). For the subspecialty fellows in WA, their gender, country in which primary ophthalmic training was completed; subspecialty and hospital were also recorded. Mann-Whitney U test was used for comparison and a p value of < 0.05 was considered statistically significant.

We identified 76 and 92 subspecialty fellows from WA and the RVEEH, respectively. Amongst the WA fellows, 7 (9%) were female, 36 (47%) received primary ophthalmic training in the United Kingdom (UK) and 9 (12%) stayed for two years. There were 12 (16%) fellows with Australian primary ophthalmic training and the remaining 64 (84%) were overseas trained doctors from Asia, America, New Zealand, Ireland, Israel and South Africa. Two types of fellowship subspecialties are offered in WA: posterior or anterior segment at 1:1 ratio. Amongst all WA fellows, 39 completed a 1 year vitreoretinal retinal fellowship, 33 completed a 1 year "anterior segment" fellowship which included cornea, glaucoma, oculoplastics, uveitis and genetic eye disease, and 4 completed a combined anterior and posterior segment fellowships of 2 year duration.

WA fellows had a median (mean, range) of 1 (4.0, 0-92) publication prior to commencement of fellowship. The mean numbers of publications during and through each of the 4 subsequent years after fellowship were 1.5, 1.0, 1.2, 1.0 and 1.1, respectively; similar to the control RVEEH cohort (**Tab. 1**). The distribution of the number of publications during and after fellowship are similar between anterior and poster segment fellows in WA and the RVEEH cohort (**Fig. 1**). We compared the output of those who had never published (63, 38%) to those who had (105, 62%) prior to fellowship. There was a statistically significant difference in publication numbers between the two groups during the fellowship and throughout each of the four years thereafter (**Tab. 2**). Amongst those with no prior publications, 38-39% still did not publish during or throughout the 4 years after fellowship (**Fig. 2**). In contrast, only 11-13% of those who published prior to fellowship failed to publish anything during or throughout the 4 years after the fellowship (**Fig. 2**). The proportion of

fellows with no publications dropped from 35-41% prior to fellowship to 13-16% at 4 years after fellowship (**Fig. 3**). Conversely, the proportion of fellowship with more than 10 papers increased from 7-9% to 24% (**Fig. 3**).

There is a large variation in publication output numbers prior to, during and after subspecialty training in WA. This could be generalised across Australia given the similarity in bibliometric data from fellows at RVEEH in Victoria. Subspecialty fellows had 1-2 publications during the period of their 1-2 years of fellowship. Australian ophthalmic subspecialty fellowship programs differ significantly in their emphasis on clinical training, scholarly activities, teaching duties and community service. Because there is no equivalent body to the Association of University Professors of Ophthalmology Fellowship Compliance Committee in the United States,<sup>1</sup> each program director determines the emphasis of the individual training program. Even in the same centre, each fellow may come with a different set of learning objectives depending on his/her background and motivation. Some may already be surgically competent and therefore have more time to devote to teaching and research whilst others may have already done a postgraduate degree either before or after primary ophthalmic training and prefer to develop clinical and surgical skills. Those fellows who have already completed a prior subspecialty fellowship elsewhere may have already started a research project with publication prior to and during the period of their fellowship in WA. To examine the potential confounder of prior research experience, we compared the publication outputs from those with and without prior publication before the commencement of their fellowships.

We showed that a track record of any publication prior to fellowship is associated with a greater number of publications during the fellowship and at years 1 and 4 after completion of the fellowship. The lower rate of publication in those without prior track record may be due to the following reasons. These fellows may not have the opportunity to participate in research during their primary ophthalmic training and therefore they may not have research writing skills. Some of these fellows are from regions where English is not spoken. Nevertheless, over 60% of these fellows do eventually publish during or within the 4 years after their fellowships. Furthermore, we noted almost a quarter of the WA and RVEEH cohort had more than 10 publications by 4 years after fellowship with the highest being over 220 publications. On completion of fellowship training programs, some of these fellows may go on to do another clinical fellowship elsewhere, begin private clinical practice or establish a clinician-academic career. The latter would require continuous publication output to maintain viability of their research career because bibliometric is one of the most important measures of research track record.

Our study is only a snap shot of the WA and RVEEH fellow publication history with 4 years of follow-up. Some papers may be missed due to variations in spelling or initials of names. The 9% female cohort may have published under both maiden and married names, which are unknown to us. We did not differentiate publications arising from fellows' affiliation with other subspecialty or general ophthalmic training programs elsewhere. Authorship order, citation number and journal impact factors were not examined. However, with the relatively low number of articles overall and the fact that publication number is only one measure of research experience and training during a clinical fellowship, we consider these other metrics less important in this initial exploratory analysis. Given the recent positive

association found between publication track record and clinical skills assessment scores amongst residents in training, further work is needed to examine the relationship between surgical outcomes, clinical competency and research output amongst subspecialty fellows.<sup>6</sup> In conclusion, we demonstrated evidence of clinical research training in our fellowship program and recommend setting 1-2 publications during or soon after subspecialty training as a reasonable target for ophthalmic fellows in Australia.

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**Table 1. Comparison between WA and RVEEH fellow publication output**

| Median (mean, range) of number of publications | WA (N=76)     | RVEEH (N=92)  | p value† |
|--|---------------|---------------|----------|
| Prior to fellowship                            | 1 (4.0, 0-92) | 1 (4.4, 0-78) | 0.86     |
| During fellowship*                             | 0 (1.5, 0-22) | 0 (0.9, 0-17) | 0.17     |
| First year after fellowship completion         | 0 (1.0, 0-21) | 0 (0.9, 0-11) | 0.50     |
| Second year after fellowship completion        | 0 (1.2, 0-23) | 0 (1.0, 0-7)  | 0.85     |
| Third year after fellowship completion         | 1 (1.0, 0-29) | 0 (1.0, 0-13) | 0.47     |
| Fourth year after fellowship completion        | 0 (1.1, 0-37) | 0 (0.8, 0-22) | 0.36     |

WA; Western Australia, RVEEH; Royal Victorian Eye and Ear Hospital

\*9 of 76 (12%) fellows from WA and 7 of 92 (8%) fellows from RVEEH had completed a 2 year fellowship and the remaining completed a 1 year fellowship.

† Mann-Whitney U test

**Table 2. Comparison between those without and those with prior publications from WA and RVEEH cohorts**

| Median number of publications (mean, range) | No prior publication (N = 63) | With prior publication (N = 105) | p value† |
|---|-------------------------------|----------------------------------|----------|
| Prior to fellowship                         | 0 (0.00, 0-0)                 | 3 (6.80, 1-92)                   | < 0.001  |
| During fellowship                           | 0 (0.25, 0-4)                 | 0 (1.70, 0-22)                   | < 0.001  |
| First year after fellowship completion      | 0 (0.25, 0-2)                 | 1 (1.40, 0-21)                   | < 0.001  |
| Second year after fellowship completion     | 0 (0.62, 0-5)                 | 1 (1.38, 0-23)                   | 0.006    |
| Third year after fellowship completion      | 1 (0.54, 0-7)                 | 0 (1.27, 0-29)                   | 0.043    |
| Fourth year after fellowship completion     | 0 (0.21, 0-3)                 | 0 (1.43, 0-37)                   | < 0.001  |

WA; Western Australia, RVEEH; Royal Victorian Eye and Ear Hospital

† Mann-Whitney U test

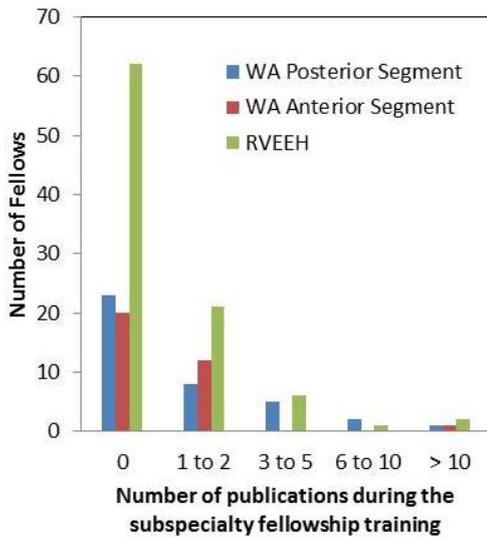
## Figure Legend

**Fig. 1.** A histogram showing the distribution of the number of publications during (A) and after subspecialty fellowship training. Blue bars denote posterior segment fellows in Western Australia (WA), red bars denote anterior segment fellows in WA and green bars denote Victorian fellows at Royal Victorian Eye and Ear Hospital (RVEEH).

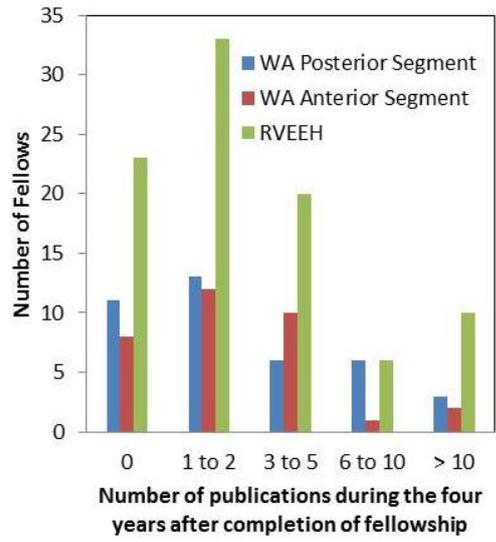
**Fig. 2.** Flow charts showing proportion of fellows with or without prior publication track records going on to publish during fellowship or the 4-year period after fellowship in Western Australia (A) and Victoria (B).

**Fig. 3.** A histogram showing the distribution of the cumulative number of publications before the start of the fellowship (blue bar), at the end of the fellowship (red bar) and at the end of 4 years after completion of the fellowship (green bar) for Western Australian fellows without prior publications (A), with prior publications (B), Victorian fellows without prior publications (C) and with prior publications (D).

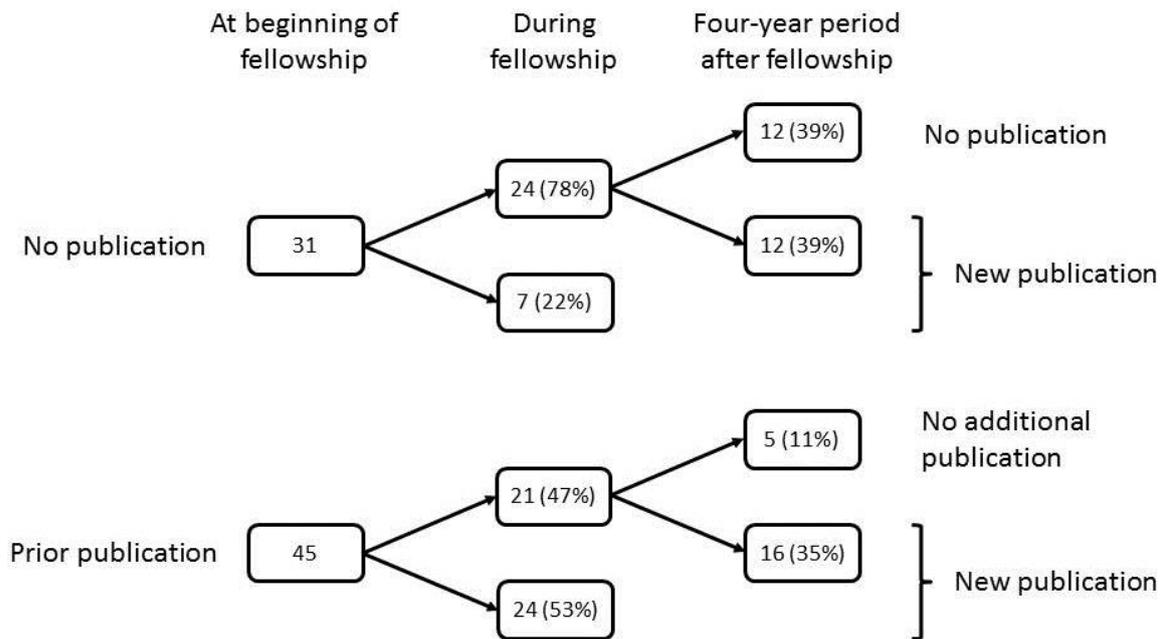
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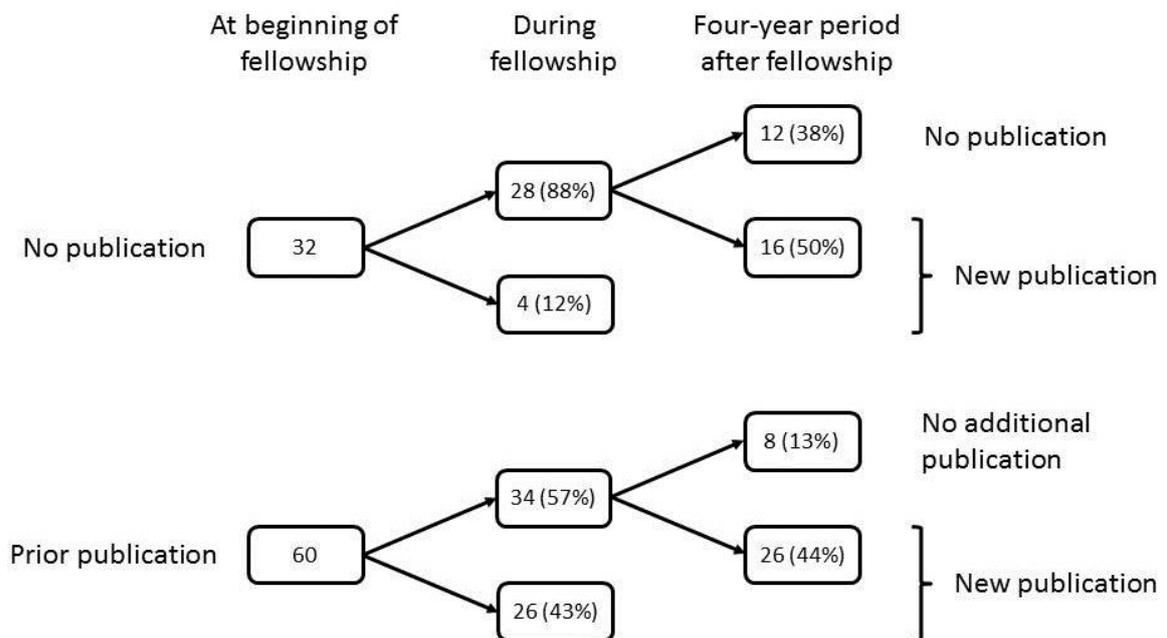
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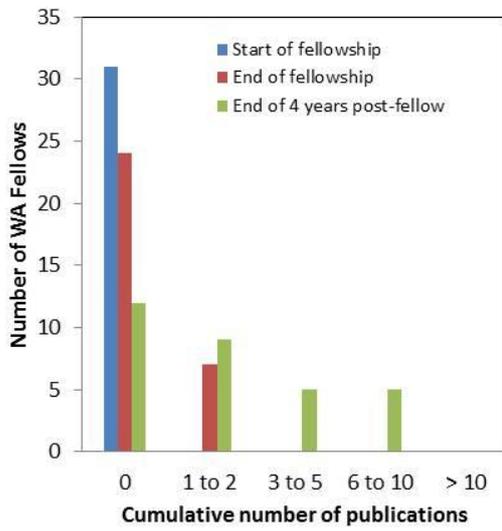
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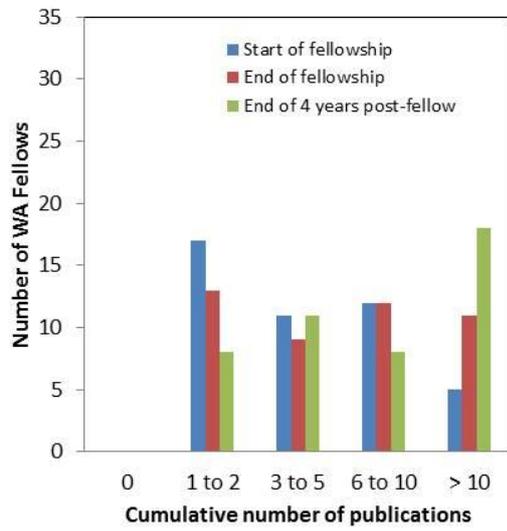
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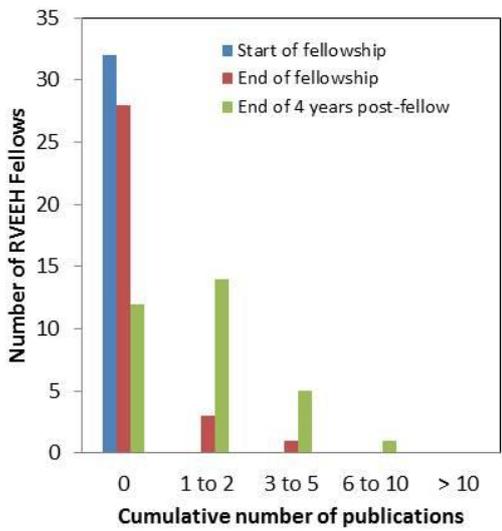
A



B



C



D

