BOGGLE Your Brain: An Online Forum for Obstetrics and Gynaecology Graduate Medical Education in a Tertiary Maternity Hospital [Version 2]

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Author Revision Notes

The abstract has been rewritten in the format of a standard research article. A more tenuous link between face-to-face and online education needed to be made clear – this has been attempted with the addition of selected “BOGGLE” posts, as well as further description of educational methods in the obstetric department in question. These aspects address both post content and also further describe the concept of blended learning within the graduate medical educational programme.

Abstract

Introduction: Social media platforms are increasingly used in Medical Education to facilitate collaboration, interaction and discussion. In the area of graduate medical education (GME), platforms such as Twitter, podcasts, blogs, YouTube, Skype and wikis have been reported. Outcomes relating to knowledge acquisition, professionalism and the effect of social media profiles on recruitment have been reported (Sterling et al., 2017).

Methods: In this paper we describe the use of Yammer (Microsoft) to host an online forum called "BOGGLE" for trainees in Obstetrics and Gynaecology, to facilitate the delivery of their educational program at a tertiary teaching hospital. BOGGLE activity and membership were retrospectively examined over a period of approximately 24 months, using the "group insights" Yammer function.

Results: BOGGLE activity increased significantly over the study period. Members included O&G trainees, but also midwifery and medical staff from adjacent specialties such as anaesthetics, obstetric medicine, and neonatology.
Weekly BOGGLE usage activity trends indicated interaction was highest on weekdays. It was not possible to track trends in individual usage, or to assess volumes of particular "tags".

**Conclusions:** BOGGLE provided a highly engaging platform for education that reached far beyond the original target audience of O&G trainees. Further analysis of post content and individual activity may provide more insight into the utility of Yammer as a platform for education in this context.

**Keywords:** Graduate medical education; GME; Postgraduate education; Continuing Professional Development; CPD; Social Media; Online forum; Online platform; Obstetrics; Gynaecology

**Introduction**

Social Media can be defined as "websites and applications which enable users to create and share content, or to participate in social networking" (OEDOnline, 2018). In recent years, there has been a significant increase in social media usage by medical professionals; for personal use, Graduate Medical Education (GME), patient interaction and education, professional networking, and employment opportunities (Roberts *et al*., 2015). This growth is likely to continue, with concurrent increases in access to smartphones, increasing numbers of "apps" and computer software, and widespread internet availability.

Various social media platforms have been utilised to date in medical education, including Twitter, YouTube, podcasts and Facebook (Pander *et al*., 2014). A key benefit of social media use in GME is the ability to share educational material easily and quickly without geographical or organisational barriers, and to facilitate legitimate peripheral participation (LLP). Social media also provides a useful platform for discussion and debate related to clinical cases, new research and guidelines, in a way which also provides a written archive of discussion allowing users to re-visit at a future date. Use of social media platforms for education can be tailored to align with learning science, as they have the ability to facilitate spaced learning, interleaving, retrieval practice and social learning (Van Hoof and Doyle, 2018). As an example, new Twitter-based journal clubs such as #NephJC are increasing in popularity, and are reaching an ever wider audience over time (Topf *et al*., 2017) (Roberts *et al*., 2015).

The potential risks of using social platforms in medical education have also been described. Unprofessional behaviour, breach of doctor-patient confidentiality, and the sharing of patient-identifying information are areas of significant medico-legal and ethical concern (Gholami-Kordkheili, Wild and Strech, 2013). Accessibility beyond work hours via smartphones introduces the potential for burn out, if these activities are interpreted as "intrusion" into personal time (Abuhadra, Majhail and Nazha, 2017). Research into the use of social media in GME has mainly consisted of qualitative analysis of the inclusion of social media platforms in ongoing graduate medical education, with what appear to be generally positive outcomes and satisfaction amongst users (Curran *et al*., 2017) (Sterling *et al*., 2017) (Cartledge, Miller and Phillips, 2013). However, there continues to be a gap in the literature for quantitative analysis of the impact that social media usage can have.

The aim of this paper is to describe the implementation and membership of a social media based educational group for GME using Yammer (Microsoft) in a tertiary maternity hospital, and to quantify usage since inception. This social media platform was utilised to aid in the O&G GME programme in the hospital, which already consisted of a fortnightly face-to-face registrar education session along with regular day-to-day clinical supervision and teaching.
Methods

Setting
The Mater Mothers’ Hospital is a tertiary level combined public, private maternity hospital in Brisbane, Australia, delivering approximately 10,000 babies a year. The hospital employs 12 resident medical officers (RMO’s) (8 rotational junior house officers, 4 senior house officers) and the registrar workforce consists of 19 full-time equivalents across a spectrum of training levels from principal house officers to senior registrars. Prior to the introduction of social media for education, educational announcements and materials were hosted on a hospital intranet page accessible only from hospital computers.

Development and use of Yammer Group - BOGGLE
The Yammer group was named "BOGGLE": "Bridge to Obstetrics and Gynaecology Group Learning Environment". Yammer was preferred over other platforms as it afforded a level of control and privacy compared to Facebook or the "Twittersphere", which was appropriate to a clinical department. This platform allowed for discussion within our team and more broadly within the hospital without the risks of comment or criticism from external parties, or inappropriate posts ‘going viral’ should the rules of use not be followed.

All Obstetrics and Gynaecology trainees and consultant staff in the department of Obstetrics and Gynaecology were enrolled as members in May 2016. The group was "OPEN" meaning that anyone within the organisation was able to contribute/view posts. BOGGLE could be accessed from hospital, home computers via the web and on mobile devices (tablets and smartphones) via the Yammer app.

Rules were established outlining the requirements of BOGGLE engagement: It was to facilitate educational content only (i.e. not a platform for operational matters) and it was made clear that no patient details or identifying information were to be posted.

Posts could be anything educational but generally came under three broad categories: advertising educational events, sharing of educational materials (e.g. slides or summaries from educational sessions, links to interesting papers or podcasts) and asking and answering clinical questions. During day-to-day clinical activities, it was encouraged that clinical encounters without clear answers would produce a "clinical question" to be answered by the trainee involved. This was made possible by the availability of the smartphone app. The addition of a "#" (or "tag") grouped topics to make them easily searchable. For example, when clinical questions were posed, "#cq2016" was applied so that at fortnightly education forums, answers could be reviewed and shared. The "topic" would then be converted to "#cqa2016" with an additional tag applied to denote the subject matter (e.g. #endometriosis) so that topics of interest could be retrieved and reviewed for use when required. The O&G department holds fortnightly face-to-face trainee education sessions. During each session, BOGGLE "clinical questions" which had received answers would be reviewed by the group and discussed in further detail. These sessions were also used as an opportunity to nominate and "tag" trainees to choose further clinical questions for research prior to the next face-to-face session. Additionally, BOGGLE was frequently used to share journal articles planned for discussion at an upcoming face-to-face education session.

Three O&G consultant staff and two senior registrars served as administrators and informal moderators. BOGGLE clinical questions/answers and general posts were reviewed at O&G education sessions, generally on a fortnightly basis. The ‘rules of engagement’ were revisited periodically, and the group encouraged to call out any posts or information that were thought to breach the rules. A process of peer mediation occurred, and an administrator would edit or remove any content if deemed to be inappropriate.
In February 2017, the group was migrated from an "internal" group to an "external" group to enable engagement with approved Visiting Medical Officers who could otherwise not join due to lack of a hospital email address.

**Analysis of engagement**
The "group insights" function of Yammer was used to download group engagement data. During the one-month period of phasing out BOGGLE 2016 and introducing the BOGGLE external group, the sum of engagement in both groups was calculated.

BOGGLE administrators were asked about any inappropriate or unprofessional posts that required editing or intervention over the study period.

**Results/Analysis**

The period of analysis was approximately 24 months between 16<sup>th</sup> May 2016 and 19<sup>th</sup> June 2018.

**Activity**

During the study period there were 1641 messages posted, 3624 "likes" and 21568 messages were read. These results will be discussed further in the context of legitimate peripheral participation.

BOGGLE activity increased significantly over the studied period. Mean daily active people increased from 14.25 in May 2016 to 49.79 in June 2018 (p= 0.002) and mean daily "likes" also rose significantly from 0.25 to 10.63 (p=0.031). Mean daily posts increased non-significantly from 0.56- 2.05 (p=0.191).

Figure 1 demonstrates activity by weekday. Highest activity occurred on Thursdays and lowest on Sundays, however, weekend activity rates were just over half of the activity that occurred on weekdays.

**Figure 1: Weekly Patterns of Boggle Usage**

Who was using BOGGLE

There were 184 members in June 2018, however, individual membership numbers could not be tracked over time to
understand growth.

Activity of 'member' vs "non-member" groups could only be analysed from January 2017. This indicated that the vast majority of activity, posts and likes were all carried out by BOGGLE members. A small number of "reads" (median 9 reads per day) were by non-members.

Professional role of members is outlined in Table 1. Non-O&G medical staff members were from related clinical departments including Neonatology, ICU, ED, Anaesthetics and Obstetric Medicine. A considerable number of midwifery staff were also noted to have joined the BOGGLE group.

Table 1: Professional Role of BOGGLE Members

| Medical Staff          | O&G  | Non- O&G |
|------------------------|------|----------|
| RMO                    | 14   | 1        |
| Registrar / PHO        | 41   | 10       |
| Consultant / VMO      | 31   | 14       |
| General Practitioner   | 2    | 1        |
| **Midwifery Staff**    |      |          |
| Midwifery clinical     | 28   |          |
| Midwifery management/education | 9   |          |
| **Other Staff**        |      |          |
| Administrative         | 6    |          |
| Other                  | 19   |          |
| Unknown                | 8    |          |

Administrators reported that on two occasions, posts or comments were edited due to information that had the potential to identify a patient; however, no specific patient names or identifying data were posted. No professionally inappropriate posts were observed.

At this stage, Yammer analytics did not allow us to assess volumes of particular tags, or to identify patterns of individual usage. However, examples of some posts selected at random are provided below. Figures 2, 3 and 4 all demonstrate a "clinical question" asked by a member of consultant staff, tagging a trainee who subsequently devised an answer to the question. Figure 5 is an example of a clinical question asked by a trainee, who tagged a senior consultant in the department as a learning opportunity for the BOGGLE community at large.

Figure 2: BOGGLE Post
I wasn’t able to find any studies of aspirin’s effect independent of a population diagnosed (or previously diagnosed) with pre-eclampsia. However, a recent metaanalysis by Roberge et al (2017) demonstrated that aspirin is certainly safe in women with a history of abruption.

Over 15 reported studies, commencement of >100mg aspirin at <K16 of gestation demonstrated a trend towards risk reduction for abruption, though this did not reach statistical significance (RR, 0.62; 95% CI, 0.31–1.26).

The thinking is that placental abruption may relate to abnormal placentation, and given that we know that low dose aspirin may improve this, it may have a role. However, data in this context is lacking - and did not reach statistical significance in the context of women with pre-eclampsia.

Reassuringly though, it is certainly not contra-indicated (if being used to reduce risk of FGR or PET) in women who have had a prior abruption. The aforementioned meta-analysis demonstrated a trend, when aspirin was commenced >K16, towards increased incidence of abruption though perhaps reassuringly, this was also not statistically significant.

Take home message: prior abruption is not a contraindication to low dose aspirin use, but nor does the prescription of aspirin in this setting significantly reduce abruption incidence.

Roberge et al. (2017) Meta-analysis on the effect of aspirin use for the prevention of pre-eclampsia on abruption and antenatal haemorrhage. AJOG 2018 (1) 1–7

(Roberge, Bujold and Nicolaides, 2017)
Neostigmine is an acetylcholinesterase inhibitor. The negative side effects of neostigmine included abdominal pain, excess salivation and vomiting. Symptomatic bradycardia can also develop -- obviously the most concerning side effect -- and this is treated with atropine. Given the risk of this, patients with underlying bradyarrhythmias or those receiving β-adrenergic antagonists may be more susceptible to neostigmine-induced bradycardia. Neostigmine also increases airway secretions and bronchial reactivity, which may exacerbate any active bronchospasm.
Although, lateral episiotomy in the literature references a different episiotomy technique than I would have thought. Crucially though, although appropriately cut episiotomies can reduce OASI, an inappropriately angled episiotomy can actually increase this risk. So it’s not just a matter of cutting an epis when it’s indicated - but also cutting it correctly!

The ideal episiotomy - with regard to reducing OASI - is one that originates 1cm from the midline fourchette, at an angle of 60 degrees, and at least 3cm long.

A Norwegian study by Stedenfeldt et al (n=74) demonstrated quite elegantly that ideal episiotomies reduced OASI incidence by 70% ([OR 0.30; 95% CI 0.14–0.66) for each 5.5-mm increase in episiotomy depth, decreased by 56% (OR 0.44; 95% CI 0.23–0.86) for each 4.5-mm increase in the distance from the midline to the incision point of the episiotomy, and decreased by 75% (OR 0.25; 95% CI 0.10–0.61) for each 5.5-mm increase in episiotomy length.

However, OASI risk increased by a factor of 9 when the episiotomy angle was <15° or >60°

Stedenfeldt, M., Pirhonen, J., Blix, E., Wilsaard, T., Vonen, B. and Øian, P. (2012), Episiotomy characteristics and risks for obstetric anal sphincter injuries: a case-control study. BJOG: An International Journal of Obstetrics & Gynaecology, 119: 724–730
Figure 5: BOGGLE Post

Discussion

The Yammer group BOGGLE provided a highly engaging platform for education and sharing that reached beyond the initial intended target of O&G trainees, with over 20 000 posts read over a 2-year period.

Activity

For each post there were, on average, 2 likes and 13 reads, indicating a number of users are passively engaged only. These data suggest an element of legitimate peripheral participation (LPP) occurring within the organisation. LPP was originally proposed as a concept by Lave and Wenger in 1991, and is an important aspect of learning for inexperienced or novice members of a "community of practice" (Lave and Wenger, 1991). Its use both in online learning environments, and within medical education has previously been documented in the literature (Burgess and Nestel, 2014) (Zagal and Bruckman, 2010) (Yong Park, 2015).

Typically, it describes how inexperienced community members initially commence with straightforward, non-integral group tasks or activities, through which they gain knowledge and expertise, often overseen or guided by more expert group members. The reading of group messages and "liking" of posts can therefore be interpreted as non-critical actions within the BOGGLE community, through which junior members may experience educational benefit and value.

Daily activity was highest on weekdays, with most activity on Thursdays and Fridays. This temporal relationship of BOGGLE activity to face-to-face departmental Friday education suggests that BOGGLE appears to add an extra dimension to already-existing teaching sessions, rather than as a purely separate educational resource. This is likely due to the use of the "clinical question" tags on BOGGLE (as previously described), and their further discussion during face-to-face teaching sessions. The tags allow trainees or consultant staff to identify a clinical situation in which they have limited knowledge or experience and research this independently. It is then often discussed further online via BOGGLE and face-to-face at teaching sessions, with some didactic teaching often provided by senior colleagues. Once questions and answers are discussed and debated at face-to-face teaching, they are re-tagged as "#cqa"-answered clinical questions. Such "combined" learning is often referred to as "blended" learning - referring to a combination of two or more separate teaching methods (e.g. online learning and didactic teaching or simulation training). Blended learning has been demonstrated as beneficial due to increased learner satisfaction and engagement with the educational topics involved, flexible access to educational material, and in increasing the self-confidence of learners in applying evidence-based-medicine to clinical scenarios (Dragan et al., 2013; Stockwell et al., 2015; Stetson, Saxena and Harleman, 2017).
High weekday activity is in contrast to other studies documenting social media activity trends, although these studies describe social media platforms not specifically related to education or employment (Rizwan et al., 2018) (Guo et al., 2009). However, it is in line with a study conducted by Seidel et al. in 2017, which assessed trends in the use of a Facebook Group for "Breast Imaging Radiologists" – a special interest social media group with a significant emphasis on clinical practice and education, but also including "socially-oriented" topics relating to networking, and personal posts (Seidel et al., 2018). While it was not possible to determine if BOGGLE activity was occurring by staff on shift, it seems more likely that weekend activity was happening in non-rostered time as clinical loads on weekends are unlikely to allow for educational activities. The spontaneous occurrence of the tag "#fridaynightBOGGLE" suggests some members were pleased to announce activity after work hours completion. Given concerns raised in previous studies regarding the risk of burnout associated with "intrusion" into personal time and work-life balance when social media is utilised in GME, (Shanafelt, Boone and Tan, 2012; Schrijver, 2016; Abuhadra, Majhail and Nazha, 2017) further analysis may be required to ensure that BOGGLE is not contributing to such burnout.

Users
There is little analysis of speciality and professional role in the literature relating to social media platforms or groups for GME. However, there is some evidence that specialty-specific educational materials are accessed by physicians and other health care workers whose primary interest may not be in the specialty on which the social media platform is based (Desai et al., 2013; Oliphant et al., 2015). In this study, BOGGLE membership indicated a reach far beyond the original target audience of O&G consultants and trainees. The number of departments involved suggested that BOGGLE was of interest and benefit to a much wider section of the healthcare community than initially considered, including our clinical midwifery colleagues. The social media platform may be well placed to provide educational opportunities for interested healthcare providers outside the specialty of O&G, who may be unable to attend regular face-to-face O&G departmental teaching due to work scheduling conflicts. The array of departments and professions involved in the BOGGLE group also gives potential for "multidisciplinary" discussions and educational opportunities by enabling a connection between consultants and trainees in different fields, who may otherwise rarely interact.

The relatively low number of RMO members was noted compared to the large numbers rotating through the department on a regular basis (up to 40 each year). RMOs were not actively recruited to the BOGGLE group during the initial 12-18 months but are now encouraged to join if interested in Obstetrics and Gynaecology. Further investigation behind the reasons for the lower level of engagement within this group may lead to strategies to improve junior doctor participation in departmental education.

Risks
With only two episodes of inappropriate posting amongst over 1600 posts this represents an extremely high level of professionalism within the BOGGLE group. Previous studies on use of social media by clinicians have demonstrated rates of "unprofessional posts" of 3% on platforms such as Twitter, with up to 0.7% of posts potentially causing a risk to patient confidentiality (Chretien, Azar and Kind, 2011; VonMuhlen and Ohno-Machado, 2012). While humour was noted to be used on occasion, it was encouraging to note that there were no instances of bullying, harassment or trolling as is sometimes known to occur in other social media groups and on other platforms.

Limitations
Potential areas of weakness in this study include the inability to examine individual members’ activity with the Yammer analytics available or assess volumes of particular tags. Therefore, at this stage we are unable to identify popular topics or any "superusers" and inactive members. Additionally, BOGGLE does not update profiles to indicate that an employee has changed role or is no longer employed in the institution. Due to the high turnover of
training registrars (>80%) it is estimated that several members are no longer active, despite the ability to continue to be engaged in BOGGLE via their membership. While separate analysis of this group was not possible administrators note that many ex-employees have indicated that they continue to view BOGGLE posts, but were noted to rarely post messages or "like". Non-members who used BOGGLE were not able to be identified at the analytics level.

**Conclusion**

BOGGLE provided a highly engaging platform for education that reached far beyond the original target audience. Further analysis of post content and individual activity may provide more insight into the utility of Yammer as a platform for education in this context.

**Take Home Messages**

- This online forum provided a highly engaging platform for continuing medical education amongst members
- The forum was unexpectedly popular amongst non-O&G specialists
- It has been possible to maintain an extremely high level of professionalism on the forum, with regard to patient confidentiality and interaction with other colleagues
- Weekly trends in use of this social media platform correlate with fortnightly face-to-face departmental teaching, and could demonstrate "blended learning" within the O&G department in question
- Use of this and similar online forums need to be investigated further in order to assess their contribution to burnout amongst members

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**Appendices**

None.

**Declarations**

_The author has declared that there are no conflicts of interest._

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**Ethics Statement**

Mater Misericordiae Ltd Human Research Ethics Committee (EC00332) issued an exemption for this project (Project ID 49367) after receipt of ethics application, stating "this project does not meet the NHMRC National Statement on Ethical Conduct in Human Research 2007 (updated 2018) definition of research and is compliant with the NHMRC guidance Ethical Considerations in Quality Assurance and Evaluation Activities 2014. As such... HREC review is not required".

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