Plastic Surgery Teaching to United Kingdom Undergraduate Medical Students: A Systematic Review

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Abstract

Background There are varying reports about United Kingdom medical students' exposure and teaching methods regarding plastic and reconstructive surgery. To date, no systematic review has been done looking at this topic.

Methods Three databases (PubMed, Embase, and Medline) were searched from January 1, 2011 to July 20, 2023 for studies that assessed United Kingdom medical students' exposure to plastic surgery and suggested recommendations to improve teaching. Three authors performed data extraction and screening, as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Results Fifteen studies were included. Medical students' average current exposure to plastic surgery was 29.44%, but this was highly variable across the studies. The most common method of currently teaching plastic surgery was through lectures (34% of studies), and the most common suggested method of teaching was through courses (40% of studies). Many of the studies (12/15) were deemed as being at high risk of bias.

Conclusion More recent studies need to be performed to assess current levels of teaching of plastic surgery in the United Kingdom medical school curriculum. Greater exposure to plastic surgery through lectures and integrated clinical placements is needed to ensure equitable access for all medical students to plastic surgery as a profession.

Keywords
- plastic and reconstructive surgery
- medical students
- teaching
- medical school
- United Kingdom
- curriculum

Introduction

Despite plastic and reconstructive surgery existing since 600 BC in India, it was only since the work of Sir Harold Gillies in World War I that plastic surgery grew as a specialty in the United Kingdom.[1] Initially, plastic surgery teaching began through case-based teaching, with techniques being passed on from one individual to another, such as from Gillies to Archibald McIndoe. Since World War II, however, there was a greater push for the introduction of plastic surgery into the curriculum, with Gillies stating it should be a "a fully-fledged and desirable

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medical school subject for educating undergraduate students."[2]

However, little has been reported on medical students' exposure and teaching methods regarding plastic surgery. Indeed, plastic surgery teaching has lagged behind other major surgical specialties (such as urology, which is compulsory in 76% of medical schools in Europe[3]), with some medical schools not including any plastic surgery teaching. The hypotheses for this are variable: some state that the medical school curriculum is already too intense to include plastic surgery in the curriculum,[4] while others feel that greater focus is being given toward preparing more general practitioners (GPs). However, GPs also require a good grasp of plastic surgery in managing skin cancers, reassuring parents of those with cleft lip/palate, and ensuring adequate referrals. Furthermore, with adequate plastic surgery teaching, when medical students qualify as future surgeons and GPs, they feel more adequately prepared to deal with cases of hand injuries and burns, have better surgical skills,[5] and are more likely to pursue plastic surgery as a career.[6]

To date, no systematic review has been performed looking at the teaching of plastic surgery to United Kingdom medical students. Thus, this systematic review will aim to assess plastic surgery teaching for United Kingdom medical students, and answer several key questions, namely the following:

- To what extent is plastic surgery taught to medical students?
- By which methods is plastic surgery taught?
- What could be done to improve plastic surgery teaching in the undergraduate curriculum?

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Checklist was used to report the results.

Inclusion Criteria

Studies assessing plastic and reconstructive surgery teaching in the undergraduate medical school curriculum were included. Letters to the editor, original articles, editorials, technical notes, and cross-sectional surveys were all included. Only studies conducted in the United Kingdom and published after 2011 were included. This was because teaching methods may have changed since older studies were published.

Exclusion Criteria

The following exclusion criteria were applied:

- Studies that involved qualified doctors, and not medical students.
- Studies that looked at internships in plastic surgery after qualifying from medical school.
- Studies outside the United Kingdom.
- Studies solely looking at the COVID-19 pandemic.
- Studies that did not focus on plastic surgery training in the undergraduate curriculum.
- Studies published before January 1, 2011.

Search Methods

PubMed, Medline, Embase, and Cochrane were searched from July 19 to 25, 2023. The reference lists of articles were also searched. The search terms included "medical students" AND "plastic and reconstructive surgery" AND "teaching" AND "UK."

Data Collection

Initially, the titles of the articles were screened by reviewing the abstracts of the articles. Following this, any duplicates that were present were removed from the search. Then, the full texts of the studies were obtained, and any studies that did not fulfil the inclusion/exclusion criteria were removed. This was performed by two independent researchers (AK1 and SM), and following completion, the results were compared. Any differences that arose between the two researchers were then settled. Where there still existed any disagreement, a third researcher (AK2) decided whether the study should be included. Once the studies were identified, they were screened for the risk of bias. This was done by using the modified tool for screening nonrandomized trials by Viswanathan et al.[7]

Search

Searches of PubMed, Embase, and Medline revealed 121 studies (PubMed = 63; Embase = 32; Medline = 26). No additional studies were identified from the reference lists. Forty-one abstracts were identified; following this, the full texts were screened, after which 15 studies were identified.[8–22] Any studies that did not fulfil the inclusion criteria or fulfilled the exclusion criteria were removed from the search. See ►**Fig. 1** (the PRISMA flowchart) for a complete visual representation of how the 15 studies were identified.

Of the 15 studies that were included in this systematic review, 11 were cross-sectional studies,[8–18] 2 were letters to the editor,[19,20] 1 was a comparative study,[21] and 1 was a pilot study.[22] All the studies were published in English and were published after 2011.

Results

Current Exposure to Plastic Surgery

Across the studies, there were varying reports of medical students' current exposure to plastic and reconstructive surgery (see ►**Fig. 2**), with some studies ($n = 4$) not reporting current exposure to plastic surgery.[9,14,18,20] There was a great deal of variance in exposure between the studies: for example, at the University of Glasgow, Higgins and Thomson asserted that there was no current exposure to plastic and reconstructive surgery,[22] whereas according to Khatib et al, 71% of medical students had received teaching (either formal or informal) in plastic surgery.[11] Medical students' average exposure to plastic surgery was 29.44% across all the studies; however, it has to be noted that there were varying sample sizes between the studies, which may lead to bias.

What was thus needed was a study that aimed to assess all medical students' exposure to plastic surgery, comparing

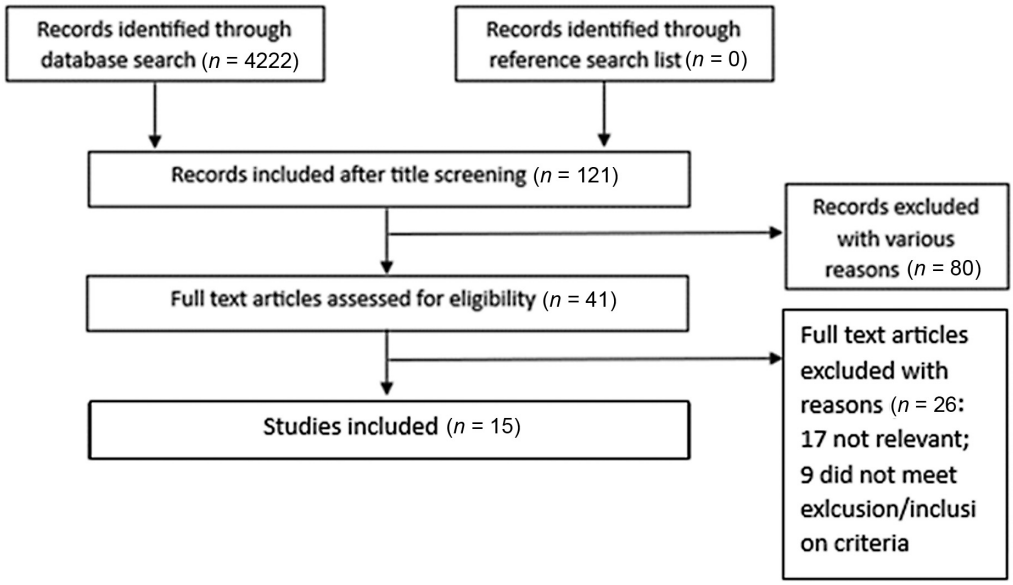

Fig. 1 PRISMA flowchart.

different medical schools. Only the study by Wade et al,[17] which collected its data between October 2010 and May 2011, did so. They reported that only 16.5% of medical students had received formal teaching in plastic surgery, and only 20.4% had clinical attachments to the specialty.

How Is Plastic Surgery Currently Being Taught?

Studies listed a variety of ways in which plastic surgery was being taught (see ►**Fig. 3**), and some studies mentioned more than one way in which plastic surgery was being taught (when this was the case, equal weightage was given to each suggestion, e.g., if three methods of teaching were recommended in one study, each one was given one-third weightage). The most common method of teaching plastic surgery was through lectures (34%), followed by integrated clinical placements (19%). The lecture-based format of teaching plastic surgery was largely in the earlier years of medical school (years 1 and 2), whereas clinical placements

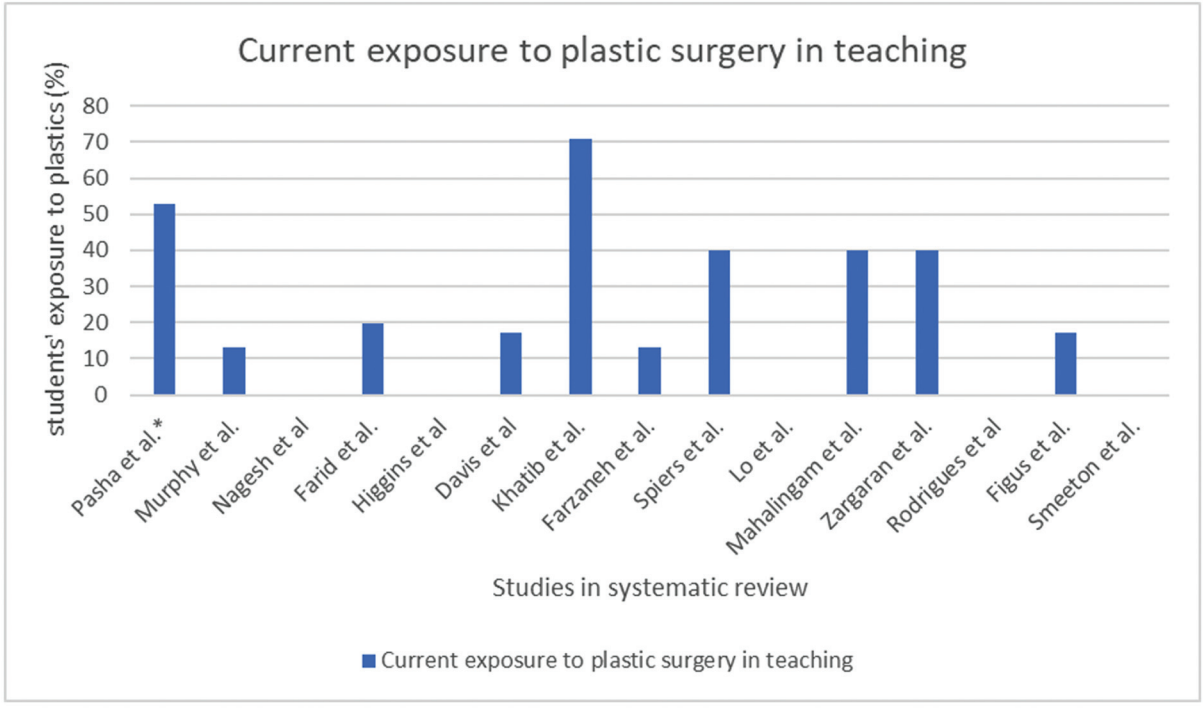

Fig. 2 Bar chart showing current exposure to plastic surgery teaching.

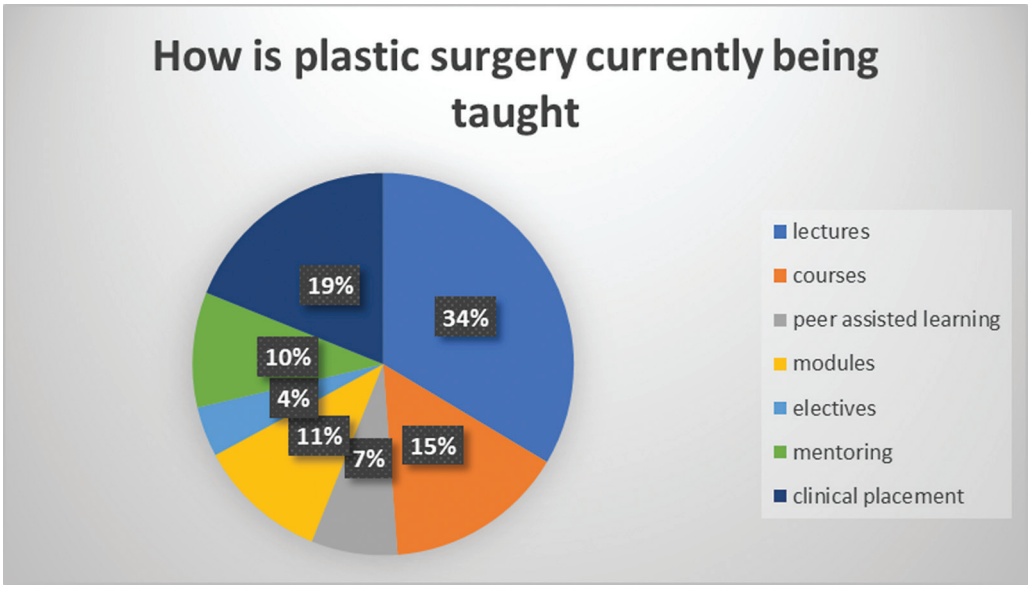

Fig. 3 Pie chart showing current methods of plastic surgery.

predominated years 3, 4, and 5. Other methods of teaching were courses (15%), which were run by medical school surgical societies and the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS): these were often over 1 day and had lectures by plastic surgeons and then some workshops to practice practical skills. Some courses were free to attend, whereas others had a cost associated with them. Other reported methods included the following: peer-assisted learning (7%), where students were taught by fellow students; modules (11%), which were delivered online and had information relating to plastic surgery; electives (4%), which were self-organized; and national mentoring schemes (10%), where students collaborated with plastic surgeons.

How Do Authors Recommend Plastic Surgery Be Taught?

There were varying suggestions as to how plastic surgery be taught, with some new, innovative ideas. It is important to note that not all studies made recommendations on how plastic surgery be taught, and some suggested that plastic surgery be taught through all of the methods described in ►**Fig. 4** (when this was the case, such studies had their results evenly distributed).

Interestingly, the most common way of teaching plastic surgery was through voluntary courses (40%), most of which had the format described in the previous section. However, some courses incorporated newer techniques, such as a three-dimensional (3D) virtual flap course. Lectures were

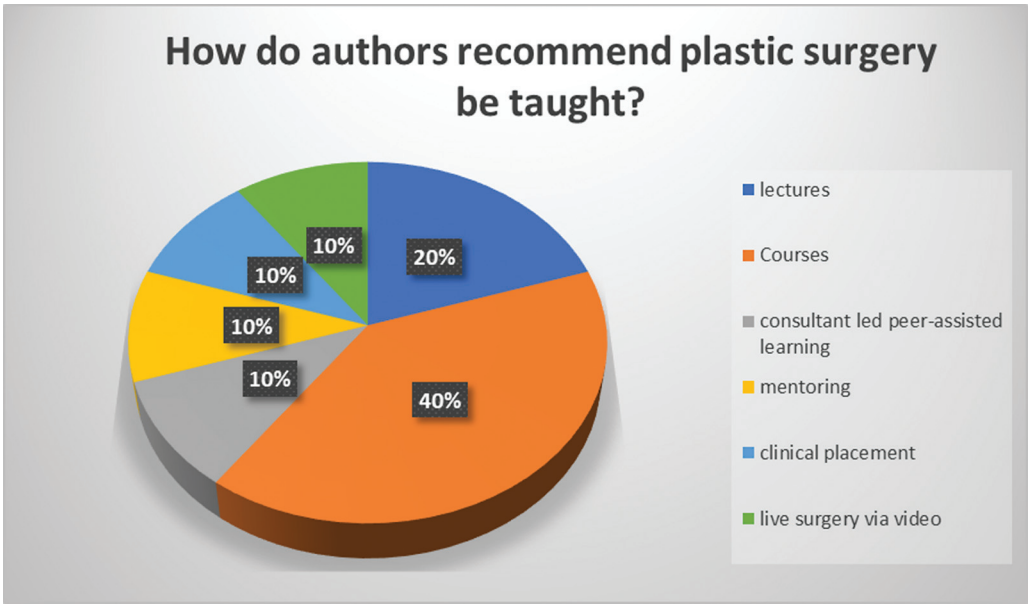

Fig. 4 Pie chart showing how authors recommend plastic surgery to be taught.

the second most common way (20%) of plastic surgery being taught; these were suggested in various guises, with some suggesting a 90-minute introductory plastic surgery lecture, whereas others mentioned that plastic surgeons should educate and examine medical students. Yoong et al suggested teaching through consultant led peer-assisted learning[9] (10%): this would involve students learning surgical skills through a video developed by a plastic surgeon, and then practicing this in person. Rodrigues et al suggested a mentoring scheme[20] (10%): they emphasized that particular focus be given to having local mentors with whom students can collaborate in multiple domains, such as teaching, attending theater, and research. Finally, Smeeton et al made the innovative suggestion that plastic surgery be taught through live surgery[18]: this would involve a surgeon doing a procedure that is being live-streamed to a lecture hall of medical students and a prerecorded transcript being played. Students would also have the opportunity to ask questions as the surgery proceeded. Further, 7 of the 15 studies recommended a voluntary form of teaching[9,11–14,16]2-, 5 recommended compulsory teaching,[10,15,17,18,22] and 3 suggested both.[8,19,21]

Risk of Bias

A drawback of this systematic review is that 12/15 of the studies[8–16,18–20] were deemed to have a high risk of bias. This is because two were letters to the editor,[19,20] with no cross-sectional study performed and were thus viewed as being highly opinionated. Most of the cross-sectional studies,[8–16,18] apart from the study by Wade et al,[17] were also deemed as being at high risk of bias: this is because they all had small sample sizes and the data analysis was done with no blinding or control; for example, the organizers of the intervention (such as a plastic surgery teaching course) did the data analysis. The cross-sectional study by Wade et al[17] was deemed as being at low risk of bias as it was a nationwide study with a large sample size. The study by Farid et al[21] was also rated as low bias. This was because it had a large sample size of 243 and a control group. The study by Higgins and Thomson[22] was rated as medium bias. This was because despite a sample size of 160, there was no blinding or control.

Discussion

Currently, plastic and reconstructive surgery is greatly under-represented in the medical school curriculum, with 85% of medical students being unable to name five conditions treated by a plastic surgeon.[23] Even if one does not want to pursue plastic surgery as a specialty, a thorough understanding of plastic surgery is vital, in ensuring adequate referrals to plastic surgeons,[24] to ensure patients get the care that they need. Despite the comments of Walsh,[4] who suggested that the medical school curriculum is already too dense to facilitate the learning of yet more information, teaching plastic surgery would have first-rate dividends. Not only would it inspire the future generation of plastic surgeons,[7] but it would also ensure better patient care.[25]

It is interesting to note that there was a great degree of variance in the reported exposure to plastic surgery, with estimates varying from 0 to 71%. One possible reason for this may be varying definitions of plastic surgery. While some authors may have defined plastic surgery teaching solely as teaching delivered by a plastic surgeon, others may have had a looser definition, including preclinical teaching on the physiology of burns and general surgery teaching on ulcer management.

Another possible reason for this may be local variance in teaching exposure due to the setup of hospitals, as not all studies analyzed nationwide data. Generally, three possibilities exist regarding plastic surgery setups at different hospitals:

1. Hospitals have a plastic surgery department.
2. Hospitals have a qualified plastic surgeon as a part of general surgery/trauma team.
3. Hospitals do not have a plastic surgery department.

As one progresses from option 1 to 3, plastic surgery teaching to medical students is likely to decline considerably.

It is important that students who are placed at hospitals that have no plastic surgery department receive some form of exposure to plastic surgery. One possible way of doing this is to train a general surgeon, who has an interest in teaching and plastic surgery, to a basic level in plastic surgery content and methods through a BAPRAS course. The general surgeon can then deliver compulsory teaching to medical students who can then be assessed to judge how much they have learnt. The general surgeon is an apt individual to do so, since general surgery is the mother of all surgical specialties, thus being an amalgamation of surgical specialties and super-specialties. Therefore, the general surgery curriculum contains all the necessary parts of the surgical super-specialties required to be an apt clinician and GP. Since GPs are increasingly coming into contact with patients who have varicose ulcers, skin cancers, and cleft lip/palate, a thorough understanding of plastic/general surgery is imperative to ensure that patients receive optimal care from the GPs and clinicians of the future. This must be done through appropriate methods, such as teaching by a plastic or general surgeon, such that biased sources can be avoided.

Furthermore, it is imperative that the current exposure of medical students to plastic surgery is studied once again, since the latest nationwide survey was conducted between October 2010 and May 2011 by Wade et al,[17] which was over 12 years ago. Much can change in the span of 10 years in teaching, and thus it is imperative that another study be conducted, reviewing the current exposure of medical students to plastic surgery and teaching methods. We suggest that a nationwide analysis be conducted every decade, surveying medical students, lecturers, and consultants. This is to assess how exposure and teaching methods are evolving over time, allowing for any trends to be tracked.

For those currently exposed to plastic surgery, the main method of teaching is through lectures and clinical placements, accounting for 53% of current teaching methods. However, there is little literature on what students are being taught in their lectures and placements. It is highly

important that this is also investigated every 10 years through a nationwide analysis, such that the learning outcomes can be streamlined across medical schools, to ensure standardization of curricula.

For those not exposed to plastic surgery, there are many ways to improve the exposure of undergraduates to plastic surgery. Despite the most common suggestion being courses for medical students (40%), care must be taken before these are prescribed as the main method of teaching medical students. This is because running a compulsory course for an entire year group of medical students (which can be in excess of 400) requires lots of venue space and equipment, which is not always possible. Furthermore, external courses, such as those run by the Association of Surgeons in Training (ASiT) and BAPRAS, can be very expensive, especially when one accounts for registration fees, travel costs, and accommodation costs. This may serve to further the notion that plastic and reconstructive surgery is a specialty merely for the elite and rich,[26] thus barricading those from poorer backgrounds.

It is important that the method of teaching plastic surgery to undergraduates is one that appeals to those without a prior interest in it and is also accessible to all. This is such that plastic surgeons are recruited from all backgrounds and ethnicities. The only successful way of doing so is through lectures and integrated clinical placements. Once this foundation is achieved, voluntary forms of teaching, like mentorship schemes, can be added for those in whom an interest has been sparked.

It is also interesting to compare these results on a broader international scale. Studies show that lack of plastic surgery teaching to medical students is a global phenomenon, with a similar dearth in teaching to medial students also being reported in India,[27] Canada,[28] the United States,[29] and Saudi Arabia.[30] In India, as a result, the majority of plastic surgery teaching is delivered through general surgery teaching. Due to the difficulty in incorporating surgical super-specialties into the standard medical curriculum, more novel ways of teaching plastic surgery have been developed. For example, where plastic surgery departments are not available to medical students, online classes have been run by plastic surgeons from different hospitals. These provide medical students with a vital insight into what plastic surgery entails, and thus hope to spark a future interest in the specialty. Moreover, with the recent change to the competency-based curriculum in 2020,[31] advances have been made in plastic surgery teaching. For example, as per the National Medical Commission guidance, there are now voluntary electives at the end of the third year of medical school, and students may choose to do this in plastic surgery (if there is a local plastic surgery department). This aims to increase medical students' interest in plastic surgery and to develop research opportunities. However, much like the United Kingdom, this is optional and thus inevitably favors those with a prior interest in plastic surgery. Therefore, it is important that there is a push globally toward incorporating plastic surgery into the mandatory curriculum to ensure a baseline level of competency and equitable access for all.

Conclusion

The BAPRAS logo incorporates a salamander, as it is able to marvelously adapt and regenerate lost limbs, thus restoring form and function. Plastic surgery, in the past 100 years, has been metaphorically analogous to a salamander. It has marvelously adapted to new innovations and methods. However, the proper teaching of plastic surgery to medical students has been like a crocodile: prehistoric and slow to incorporate students. This limited exposure to plastic surgery has meant that many incoming junior doctors feel that they are unable to deal with plastic surgery emergencies, and has perhaps meant many medical students have written off plastic surgery as a career due to inadequate exposure.

It is now time for the teaching of plastic surgery to medical students to evolve and change from a crocodile to a salamander for the better.

Conflict of Interest
None declared.

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