

Trends in sun exposure awareness and protection practices in Malta: 1999-2004

Susan Aquilina, Lawrence Scerri, Neville Calleja, Andrew Amato-Gauci

Abstract

Rising skin cancer incidence rates have led to sun awareness campaigns in Malta since the early 1990s. The aim of this study is to assess the impact of these campaigns by analysing trends in sun exposure-related knowledge and behaviour amongst the Maltese people. A total of 559 Maltese pedestrians aged 16-50 years were interviewed in 1999. The same questionnaire was used to interview 304 pedestrians in 2004.

More people admitted spending leisure time outdoors during peak sunshine hours in 2004 than in 1999 (85.9% vs 62.4%, $p < 0.001$). There was a drop in people regularly wearing a hat during outdoor leisure activities from 32.4% to 18.4% ($p < 0.001$), and from 37.5% to 9.3% ($p < 0.001$) during outdoor work activities. Rates of regular sunscreen use remained constant at about 50% using it for outdoor leisure activities, but dropped from 25.0% to 9.3% for outdoor work ($p = 0.02$). In 2004, 96.1% of participants having children aged less than 12 years stated that they regularly used sunscreen on their children (87.0% in 1999, $p = 0.01$), while 66.2% said that their children regularly wore a hat (78.4% in 1999, $p = 0.05$). More people were regarding a suntan as unhealthy in 2004 than in 1999 (62.8% versus 37.0%, $p < 0.001$). The mass media remained the most important source of health information.

Key words

Sun, awareness, protection, sunscreens, Malta

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The Maltese people's sun exposure-related knowledge has increased, and attitudes towards safety of tanning have improved, but sun-related behaviour appears to have deteriorated in adolescents and adults. Behavioural-based interventions need to follow on from the knowledge and attitude-based emphasis of past campaigns. Children are much better protected than adolescents/adults.

Introduction

Set in the centre of the Mediterranean Sea (latitude of 36°N), the Maltese Islands are islands 'bathed' in sun. During outdoor leisure as well as work activities, the Maltese people are exposed to intense sunlight particularly in the spring/summer months, with high or very high UV index levels throughout these seasons. Unfortunately, the price paid is a high level of skin cancers as the Maltese people are of skin phototypes II to IV.¹ The age standardized incidence rates for primary invasive cutaneous malignant melanoma in Malta between 1998 and 2002 were 8.0 per 100 000 population per year for males and 5.9 for females. These rose from 3.7 per 100 000 population per year for males and 5.1 for females between 1993-1997.²

As in most other countries with rising skin cancer incidence rates, intensive campaigns are held every spring/summer, using the mass media, billboards, posters, leaflets, stickers, and sun exposure education sessions at school settings. In Malta, these campaigns have been going on since the early 1990s and have, in the year 2000, given way to the EuroMelanoma campaign. This is locally coordinated through the collaboration of the public Dermatology Department, the local Dermatology Association, and the government Health Promotion Department. In order to help guide these annual campaigns, a survey was conducted in 1999 to assess the level of sun exposure awareness of the Maltese people together with their sun exposure behaviours.³ The same survey was repeated in 2004 to assess changes occurring over the five years.

Methods

The 1999 survey had been carried out by two male medical students in the summer months who interviewed Maltese pedestrians walking through the main street of the capital city Valletta on weekday mornings. Maltese pedestrians aged between 16 and 50 years were stopped and asked if they minded being asked a few questions on a health-related topic, and then interviewed according to a set questionnaire (Table 1). The questionnaire was designed after carrying out a literature search for similar surveys conducted in other countries, to allow comparison of results. It was first piloted on ten pedestrians to check the clarity of the questions. In 2004, a repeat survey

was conducted using the same methodology, this time by two female medical students, in the same street and in the same summer months.

Statistical analysis

Data from the 2004 questionnaires was entered into Microsoft Excel and compared with results from the 1999 questionnaires. Differences between the two groups were evaluated using chi-squared tests or the Fisher's exact test (if conditions for use of a parametric test were not met). Probability values were reported as significant at the 0.05 level or lower. Analysis was performed using Microsoft Excel and R version 2.5 statistical software.

Results

A total of 304 completed questionnaires were available for analysis from the 2004 survey. About 1 in 10 of the pedestrians approached refused to participate. Although significantly

less than the 559 completed questionnaires from the 1999 survey (when less than 3% of those approached had refused to participate) the age-sex distribution was broadly similar (Table 2a). The level of education of the 2004 sample was also similar to the previous sample, but a higher proportion had achieved a university level in 2004 ($p < 0.001$) (Table 2b). The self-described skin types in both samples were also remarkably similar and well-correlated (Pearson Correlation: 0.99, significant at the 0.01 level, 2-tailed) (Figure 1).

Comparison of sun exposure practices during outdoor leisure activities between 1999 and 2004

In the 2004 survey, 85.9% ($n=261$) admitted spending at least some of their leisure activities in the sun between 10.00 h and 15.00 h in spring or summer – significantly higher than the 62.4% ($n=349$) admitting this in 1999 ($p < 0.001$). The observed increase in people spending more leisure time in the peak hours of sunshine was spread out almost equally amongst the once weekly (41.0% in 2004 versus 42.4% in 1999), 2-3 days/week (39.8% in 2004, 38.4% in 1999) and more than 3 days/week subgroups (19.2% in 1999 and 2004). As in the 1999 survey, sun exposure during peak sunshine hours on more than 3 days/week in the 2004 survey was significantly associated with the youngest age group (16-25 year-olds), who were twice as likely to spend more time in the sun as the older age groups (95% CI 1.6-2.6). In both the 1999 and the 2004 studies, no association between sun exposure during leisure activities and skin phototype or highest level of education could be found.

There was no significant change in the overall reported use of *sunscreen* during leisure activities between the two surveys (Table 3). Sunscreen was still more popular with females than males (64.2% rate of regular sunscreen use in females in 2004 versus 27.3% rate of regular sunscreen use in males in 2004, $p < 0.001$). Regarding *hat* use, there was an overall significant drop in regular use from 32.4% to 18.4% ($p < 0.001$), disappointingly observed across all subgroups.

Comparison of sun exposure practices during outdoor work activities between 1999 and 2004

In the 2004 survey, 75 participants said that they work in the sun for more than 1 h during their typical working day. Of these, 48 said they work for about 1-3 h a day in the sun and 27 said that they work for more than 3 h/d in the sun. In 1999, 43 had claimed working in the sun for 1-3 h a day, and 45 had claimed working in the sun for more than 3 h/d.

Sun protection during outdoor work activities deteriorated in 2004 (Table 4). Only 9.3% reported using *sunscreen* regularly (compared to 25.0% in 1999, $p=0.02$). Rates of regular *hat* wearing in outdoor workers were similarly disquieting, with a significant drop in the regular use of a hat at work from 37.5% in 1999 to 9.3% in 2004 ($p < 0.001$). The drop in regular hat use at work was consistent across all the subgroups.

Sun protection factor (SPF)

In the 2004 survey, 68.4% ($n=208$) reported ever using sunscreen (up from 45.6% in 1999) ($p < 0.001$). Of these, 52.9% reported using sunscreen with an SPF over 30 (20.0% in 1999), 41.8% said they used an SPF of 15-30 (54.1% in 1999), and 4.8% used an SPF of less than 15 (17.3% in 1999) ($p < 0.001$). There

Table 1: The questionnaire used to assess sun exposure awareness and behaviours

Demographics

- Age
- Sex
- Highest level of education attained
- Self-described Fitzpatrick skin phototype (SPT)

SPT I – fair skin that burns easily and never tans; SPT II – skin that burns easily and tans slowly; SPT III – skin that tans easily and does not burn much; SPT IV – dark skin that tans well and never burns

Leisure activities

- Do you spend any of your leisure time outdoors between 10.00 h and 15.00 h in summer/spring? If the answer is yes, how many times a week?
- During your leisure time spent outdoors in the sun do you use a sunscreen and/or hat regularly, occasionally, or never?

Outdoor work

- How much time do you spend outdoors between 10:00h and 15:00h during a usual working day in summer/spring?
- If you spend more than 1 hour working outdoors in the sun, do you use sunscreen and/or hat regularly, occasionally, or never?

Sun protection factor (SPF)

- What is the SPF of the sunscreen that you usually use? (<15, 15-30, >30, don't know)

Children

- If you have children under 12 years of age, how often do your children make use of a sunscreen and/or hat when they are out in the sun between 10.00 h and 15.00 h? (regularly, occasionally, or never)

Knowledge questions

(answer yes, no, or don't know):

- Can the sun cause skin cancer?
- Can skin cancer be fatal?
- Can the sun cause skin ageing (wrinkles and brown patches)?
- Is a suntan healthy if one avoids getting sunburnt?

Influential sources of information

regarding the effects of the sun on the skin (mass media, school, doctor, family/friends, other)

Table 2a: Age-sex distribution of the two sample populations (1999 and 2004)

| Age (years) | 16-25 | 26-40 | 41-50 |
|----------------|-------|-------|-------|
| Males | | | |
| 1999 (n=195) | 51.3% | 30.2% | 18.5% |
| 2004 (n=114) | 44.7% | 34.2% | 21.1% |
| Females | | | |
| 1999 (n=364) | 52.5% | 31.9% | 15.7% |
| 2004 (n=190) | 37.4% | 33.7% | 28.9% |
| Total | | | |
| 1999 (N=559) | 52.1% | 31.3% | 16.7% |
| 2004 (N=304) | 40.1% | 33.9% | 26.0% |

Table 2b: Level of education of the participants of the two surveys (1999 and 2004)

| | 1999 (N=559) | 2004 (N=304) |
|-----------------------------------|--------------|--------------|
| Highest level of education | | |
| Primary | 6.1% | 5.9% |
| Secondary | 53.0% | 44.1% |
| Post-secondary | 27.0% | 25.0% |
| University | 14.0% | 24.0% |

Table 3: Self-reported rates of sunscreen and hat use between 10.00 h and 15.00 h during leisure activities; results of the 1999 and the 2004 surveys compared (n=349 in the 1999 survey and 261 in 2004)

| | Participants using sunscreen (%) | | | Participants using hat (%) | | |
|------------------------------|----------------------------------|--------------|-----------|----------------------------|--------------|-----------|
| | Never | Occasionally | Regularly | Never | Occasionally | Regularly |
| Overall | | | | | | |
| 1999 (n=349) | 29.50% | 19.50% | 51.00% | 54.20% | 13.50% | 32.40% |
| 2004 (n=261) | 23.80% | 26.10% | 50.20% | 54.8%*** | 26.8%*** | 18.4%*** |
| Age | | | | | | |
| 16-25 years | | | | | | |
| 1999 (n=215) | 29.80% | 21.90% | 48.40% | 60.90% | 14.40% | 24.70% |
| 2004 (n=114) | 21.90% | 33.30% | 44.70% | 63.2%* | 22.8%* | 14.0%* |
| 26-40 years | | | | | | |
| 1999 (n=95) | 29.50% | 15.80% | 54.70% | 42.10% | 11.60% | 46.30% |
| 2004 (n=87) | 21.80% | 20.70% | 57.50% | 54.0%*** | 29.9%*** | 16.1%*** |
| 41-50 years | | | | | | |
| 1999 (n=39) | 28.20% | 15.40% | 56.40% | 46.20% | 12.80% | 41.00% |
| 2004 (n=60) | 30.00% | 20.00% | 50.00% | 40.00% | 30.00% | 30.00% |
| Gender | | | | | | |
| Male | | | | | | |
| 1999 (n=120) | 49.20% | 17.50% | 33.30% | 58.30% | 14.20% | 27.50% |
| 2004 (n=99) | 39.4%* | 33.3%* | 27.3%* | 58.6%* | 25.3%* | 16.2%* |
| Female | | | | | | |
| 1999 (n=229) | 19.20% | 20.50% | 60.30% | 52.00% | 13.10% | 34.90% |
| 2004 (n=162) | 14.20% | 21.60% | 64.20% | 52.5%*** | 27.8%*** | 19.8%*** |
| Skin types I and II | | | | | | |
| 1999 (n=170) | 25.90% | 18.20% | 55.90% | 52.90% | 15.30% | 31.80% |
| 2004 (n=119) | 14.3%* | 27.7%* | 58.0%* | 53.8%** | 28.6%** | 17.6%** |
| Skin types III and IV | | | | | | |
| 1999 (n=179) | 33.00% | 20.70% | 46.40% | 55.30% | 11.70% | 33.00% |
| 2004 (n=142) | 31.70% | 24.60% | 43.70% | 55.6%*** | 25.3%*** | 19.0%*** |

*p<0.05, **p<0.01, ***p<0.001

was no difference between males and females in their reported choice of SPF.

Children

In the 2004 survey, 77 participants (25.3%) stated that they had children under 12 years of age. Of these, 96.1% (significantly more than the 87.0% in 1999, $p=0.01$) claimed that when their children were out in the sun between 10.00 h and 15.00 h they regularly applied sunscreen, and 66.2% (significantly less than the 78.4% in 1999, $p=0.05$) claimed that their children regularly wore a hat when out in the sun.

Knowledge about the effects of the sun on the skin and influential sources of information

Knowledge about sun effects on the skin kept improving: 98.7% made the link between the sun and skin cancer in 2004. (Table 5). In addition, more people were appreciating that having a suntan is not good for your health even if one avoids getting sunburnt – 62.8% in 2004 versus 37.0% in 1999 ($p<0.001$). The mass media remained the most important source of health information by far (85.5% in 2004, 88.0% in 1999) (Table 6).

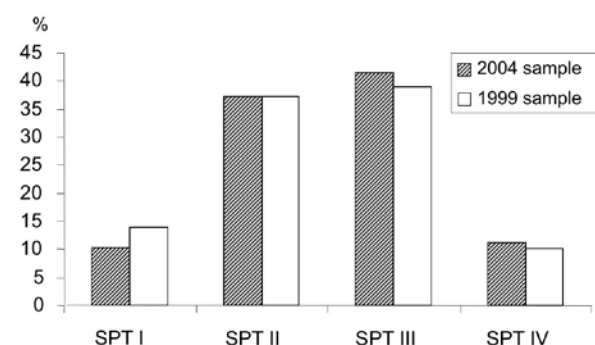
Discussion

A comparison of the results of the two surveys, spaced only 5 years apart, brings out an obvious point. The Maltese people's level of sun-related knowledge has increased, but sun exposure-related behavioural practices seem to have deteriorated in

adults and adolescents. Practically all those interviewed knew that the sun can cause skin cancer and photoageing, and a high percentage knew that skin cancer can be fatal. The proportion that consider a suntan as a sign of health is also decreasing, so sun-related attitudes are also improving. However, despite all this knowledge, the percentage of respondents admitting spending leisure time in the sun during peak hours of sunshine increased instead of decreasing. This was especially true for the younger people. In addition, there was a drop in people regularly wearing a hat during outdoor leisure activities while the rate of regular sunscreen use remained constant. Why is the knowledge not being converted into behavioural change? Is it that people feel that they are somehow personally immune to the sun's harmful rays or that campaigns are exaggerating the damage? For some it could be that looking tanned is worthwhile whatever the price paid in the future, or perhaps some people just love relaxing in the sun so much that they would rather risk skin cancer and photoaging than give it up? Assessing the personal perceived risk to skin cancer and photoaging of the various sectors of the Maltese population, and their concern with these issues, would make an interesting future study. Campaigns could then try to modify behaviours by targeting the particular concerns of each subgroup.

As with leisure, the level of reported sun protection during outdoor work activities in 2004 was disappointing, even more so than the already poor 1999 results. This is despite government measures to provide free sunscreen to various occupational

Figure 1: Comparison of self-described skin phototypes (SPT) in the two sample populations (1999 and 2004)



SPT I – fair skin that burns easily and never tans; SPT II – skin that burns easily and tans slowly; SPT III – skin that tans easily and does not burn much; SPT IV – dark skin that tans well and never burns

sectors involving outdoor activity, including postal workers, members of the police force, and hospital security personnel to name but a few that made it to the press. People occupationally exposed to the sun are at an especially high risk for squamous cell carcinoma (which is linked to cumulative sun exposure). If this group of people is to be helped in preventing these

Table 4: Self-reported rates of sunscreen and hat use in survey participants working in the sun for at least 1 hour between 10.00 h and 15.00 h on a typical working day; results of the 1999 and the 2004 surveys compared (n= 92 in the 1999 survey and 75 in 2004)

| | Participants using sunscreen (%) | | | Participants using hat (%) | | |
|------------------------------|----------------------------------|--------------|-----------|----------------------------|--------------|-----------|
| | Never | Occasionally | Regularly | Never | Occasionally | Regularly |
| Overall | | | | | | |
| 1999 (n=88) | 67.00% | 8.00% | 25.00% | 54.50% | 8.00% | 37.50% |
| 2004 (n=75) | 76.0%* | 14.7%* | 9.3%* | 69.3%*** | 21.3%*** | 9.3%*** |
| Age | | | | | | |
| 16-25 years | | | | | | |
| 1999 (n=44) | 66.00% | 9.10% | 25.00% | 63.60% | 6.80% | 29.50% |
| 2004 (n=33) | 81.90% | 12.10% | 6.10% | 78.80% | 12.10% | 9.10% |
| 26-40 years | | | | | | |
| 1999 (n=29) | 69.00% | 0% | 31.00% | 41.40% | 6.90% | 51.70% |
| 2004 (n=23) | 65.2%** | 26.1%** | 8.7%** | 73.9%** | 13.0%** | 13.0%** |
| 41-50 years | | | | | | |
| 1999 (n=15) | 66.70% | 20.00% | 13.30% | 53.30% | 13.30% | 33.30% |
| 2004 (n=19) | 78.90% | 5.30% | 15.80% | 47.3%* | 47.3%* | 5.3%* |
| Gender | | | | | | |
| Male | | | | | | |
| 1999 (n=51) | 86.20% | 5.90% | 7.80% | 56.90% | 9.80% | 33.30% |
| 2004 (n=39) | 87.10% | 10.20% | 2.60% | 61.5%* | 25.6%* | 12.8%* |
| Female | | | | | | |
| 1999 (n=37) | 40.50% | 10.80% | 48.60% | 51.40% | 5.40% | 43.20% |
| 2004 (n=36) | 63.9%* | 19.4%* | 16.7%* | 77.8%*** | 16.7%*** | 5.6%*** |
| Skin types I and II | | | | | | |
| 1999 (n=40) | 80.00% | 5.00% | 15.00% | 70.00% | 10.00% | 20.00% |
| 2004 (n=33) | 60.6%* | 27.3%* | 12.1%* | 75.80% | 18.20% | 6.10% |
| Skin types III and IV | | | | | | |
| 1999 (n=48) | 56.30% | 10.40% | 33.30% | 41.70% | 6.25% | 52.10% |
| 2004 (n=42) | 88.1%* | 4.8%* | 7.1%* | 64.3%*** | 23.8%*** | 11.9%*** |

*p<0.05, **p<0.01, ***p<0.001

skin cancers, they need be specifically targeted in campaigns. Outdoor workers should be advised to plan outdoor work to avoid peak hours of sunshine and to work in the shade as far as possible; to wear appropriate lightly-coloured clothing that absorbs sweat; and to apply sunscreen of a suitable SPF and texture (for example, sunscreen sprays that are non-greasy) to protect areas that remain uncovered. Applying sunscreen at home will allow absorption by the time they are at their place of work. People with skin types I/II should also be made aware that they are at greater risk.

At least the situation in children appears to be very different. Sunscreen use seems to have become the rule (96.1% in 2004, 87.0% in 1999), although rates of regular hat use dropped from 78.4% to 66.2%. In a multicentre study in Belgium, Germany, France and Italy carried out in 1995-1997, only 25% of children always used sunscreen.⁴ And in a recent study in Italy, 80% of children aged 6-14 years used sunscreen, but only 38% used it on a regular basis.⁵ The annual campaigns in Malta have always emphasised sun protection in children because the incidence of cutaneous malignant melanoma is mostly related to intermittent burning sun exposure in childhood and adolescence. In a small population like the Maltese one, social pressures can be very high, and could be exerting a strong influence on parents to keep their children safe. It is a pity, however, that the high level of sun protection apparently enjoyed by children seems not to be maintained when the children become adolescents, as sun exposure during leisure activities and sun protection rates remain the worst amongst the 16-25 year olds. The positive influence of parents seems to be replaced by negative peer pressure.⁶ It has been shown that college students are more likely to change their behaviour when the *immediate risks to appearance* are emphasized rather than cancer risks, which are psychologically remote.⁷ In several studies, the viewing of UV-filtered photographs that show an individual's early skin changes from photodamage, along with written or video educational information about photoageing, have resulted consistently in changes in planned and reported sun protection motivation and behaviours.⁸ With the older people, skin cancer-related concerns may be more relevant.

One should note the increasing influence of family and friends, who relay health messages from the media to their loved ones. Unfortunately, however, the contribution from 'doctor' dropped from 22.0% in 1999 to 11.2% in 2004. An American doctor explains that he decided to stop counselling patients

about sun protection as he feels that the public is already fully informed and that physicians' advice meets with little success.⁹ One wonders if this is also the attitude taken up by Maltese doctors. In response to this article, it has been shown that patients counselled by doctors about sun safety were the most likely to have the strongest sun safety practices.¹⁰

When comparing the results of the two surveys, one should note the possible effects of interviewer (including selection) bias as the interviewing students were different in the two surveys (two male medical students in 1999 and two female medical students in 2004). Generalization of the study samples to the whole population should also be done with caution. Social desirability is another possible bias in both surveys, especially in the case of children. It would be most useful if future Maltese studies could establish the validity and reliability of verbal reports in such surveys with objective measures including direct observations, skin reflectance, personal dosimetry, and skin swabbing for sunscreen.¹¹ Another limitation of the study is that sunscreen and hat were the only sun protection measures assessed. It is not known if the people who reported not wearing sunscreen or a hat were staying in the shade. However, a canopy or umbrella on reflective surfaces like sand, water or concrete will decrease ultraviolet radiation by only about 50%, so sunscreen use would still be advisable, especially if the person is occasionally leaving the shade to go for a swim. The use of long-sleeved shirts and trousers was also not assessed, but a hat and/or sunscreen would still be needed to protect the face and hands. In addition, in the case of sunscreen, detailed questioning on its proper use was not carried out, for example whether it is applied before sun exposure, an hour later, or after the first swim; if it is applied to all exposed skin; if it is applied in the correct amount; and if it is reapplied frequently. Asking about the use of sunscreen alone will miss these important issues.

Conclusions

Periods of regression are expected in campaigns and should not be disheartening. It may now be appropriate to shift some of the focus of Maltese campaigns from children (who are apparently being adequately sun-protected by their parents) onto adolescents and outdoor workers. For a specific subgroup, targeted campaigns can be expected to be more successful than one blanket approach for all, so more studies are needed to better qualify the particular attitudes and concerns of each subgroup. It is important for campaigns to provide messages that are clear, informative and consistent so that the public can know their options and make an informed choice. To facilitate the transition from knowledge to a change in attitude and then on to a change in behaviour, behaviourally-based intervention strategies

Table 5: Questions about the harmful effects of the sun on the skin

| | Correct answer | % answering correctly | |
|---|----------------|-----------------------|--------------|
| | | 1999 (N=559) | 2004 (N=304) |
| Can the sun cause skin cancer? | Y | 96.2% | 98.7%* |
| Can skin cancer be fatal? | Y | 76.2% | 83.6%* |
| Can the sun cause skin ageing (wrinkles and brown patches)? | Y | 91.6% | 95.4%* |
| Is a suntan healthy if one avoids getting sunburnt? | N | 37.0% | 62.8%** |

* $p < 0.01$, ** $p < 0.001$

Table 6: Influential sources of information regarding the effects of the sun on the skin

| | 1999 (N=559) | 2004 (N=304) |
|--|--------------|--------------|
| Mass media: TV, radio, newspapers, magazines | 88.0% | 85.5% |
| School | 24.0% | 25.0% |
| Doctor | 22.0% | 11.2%* |
| Family/friends | 20.0% | 31.9%* |
| Other | 13.1% | 4.6%** |

* $p < 0.001$

are needed. While continuing to promote sun protection as a means of primary prevention of skin cancer, campaigns should also continue emphasizing regular examination of the skin and early referral for changing or new pigmented lesions. The battle to lower the rate and morbidity and mortality of skin cancer is still on.

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Special Examiners' Prize



Nicholas Borg was awarded a special Examiners' Prize following the June 2008 Final Examination session held by the Department of Medicine of the University of Malta. His performance in the clinical examination and in the subsequent viva-voce examination was judged to be outstanding. The monetary prize and certificate of award were presented to Nicholas by Professor Joseph Cacciottolo, Head of the Board of Examiners, and the two External Examiners of the Department: Professor Parveen Kumar, Professor of Clinical and Medical Education at the University of London and Gareth Williams, Professor of Medicine and Dean of the Faculty of Medicine and Dentistry at the University of Bristol. Dr Borg is currently a Foundation Year 1 houseman at Addenbrooke's Hospital of the Cambridge University Hospitals NHS Foundation Trust.

Professor Joseph Cacciottolo