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Green, yellow and red hours to go to the beach[☆]



Horas de color verde, amarillo y rojo para ir a la playa

To the Editor:

Exposure to sunlight, whether intentional or for recreational purposes, especially during the holidays, tends to occur at the beach. Simple rules such as spending more time in the shade not spending more time than necessary are useful at

all latitudes and times of year.¹ The Portuguese Skin Cancer Association (<http://www.apcancrocutaneo.pt>) developed a traffic-light system in 2005 to raise awareness in the population about the best times for sunbathing (Fig. 1), with green before 11 AM and after 5 PM, amber between 11 AM and 12 PM and between 4 PM and 5 PM, and red between noon and 4 PM. Since then, copies have been sent every year to many of the country's beaches during the months of July and August.

To access the behavior of the population, a cross-sectional study was carried out between July 18, 2009 (maximum temperature, 32°C; UV index, 10) and July



Figure 1 Sun clock.

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Table 1 Arrivals and Departures in 2009 and 2014.

Arrivals		2009		2014		P	2009		2014		P	
		n	%	n	%		n	%	n	%		
General	8-11 AM	1607	26	1467	30	< .001	8 AM-noon	2448	39	2074	42	< .001
	11 AM-5 PM	3521	56	2719	55		Noon-4 PM	1691	27	1453	29	
	5-8 PM	1153	18	764	15		4-8 PM	2142	34	1423	29	
Total		6281		4950			6281		4950			
< 16 years	8-11 AM	307	23	366	37	< .001	8 AM-noon	540	40	518	52	< .001
	11 AM-5 PM	783	58	458	46		Noon-4 PM	359	27	210	21	
	5-8 PM	258	19	166	17		4-8 PM	449	33	262	26	
16-24 years	8-11 AM	114	10	156	19	< .001	8 AM-noon	214	18	215	26	< .001
	11 AM-5 PM	847	72	594	73		Noon-4 PM	431	37	361	44	
	5-8 PM	209	18	62	8		4-8 PM	525	45	236	29	
25-40 years	8-11 AM	384	27	289	21	.001	8 AM-noon	550	38	413	31	< .001
	11 AM-5 PM	755	53	800	59		Noon-4 PM	383	27	443	33	
	5-8 PM	292	20	262	19		4-8 PM	498	35	495	37	
≥ 41 years	8-11 AM	802	34	656	37	.219	8 AM-noon	1144	49	928	52	.002
	11 AM-5 PM	1136	49	867	48		Noon-4 PM	518	22	439	24	
	5-8 PM	394	17	274	15		4-8 PM	670	29	430	24	
Departures		2009	2014	P		2009	2014	P				
		n	%	n	%			n	%	n	%	
General	8-11 AM	34	1	54	2	< .001	8 AM-noon	256	5	225	6	.013
	11 AM-5 PM	2705	52	1951	54		Noon-4 PM	2262	43	1572	44	
	5-8 PM	2486	48	1599	44		4-8 PM	2707	52	1797	50	
Total		5225		3604			5225		3594			
< 16 years	8-11 AM	8	1	6	1	< .001	8 AM-noon	60	4	66	10	< .001
	11 AM-5 PM	614	44	400	61		Noon-4 PM	528	38	309	47	
	5-8 PM	785	56	247	38		4-8 PM	819	58	278	43	
16-24 years	8-11 AM	1	0	6	1	< .001	8 AM-noon	13	2	26	5	< .001
	11 AM-5 PM	298	55	214	40		Noon-4 PM	252	46	150	28	
	5-8 PM	246	45	319	59		4-8 PM	280	51	363	67	
25-40 years	8-11 AM	10	1	14	2	.159	8 AM-noon	65	6	58	6	.335
	11 AM-5 PM	598	51	488	53		Noon-4 PM	490	42	403	44	
	5-8 PM	565	48	412	45		4-8 PM	618	53	453	50	
≥ 41 years	8-11 AM	15	1	28	2	.007	8 AM-noon	118	6	75	5	.746
	11 AM-5 PM	1195	57	839	56		Noon-4 PM	992	47	710	48	
	5-8 PM	890	42	621	42		4-8 PM	990	47	703	47	

12, 2014 (maximum temperature, 30°C; UV index, 9) at Vilamoura beach, one of the most frequented beaches in Portugal’s Algarve region, with approximately 5000 visitors per day in July and up to 10000 visitors per day in August. Between 90% and 95% of people who visit the beach do so by crossing a particular bridge, which was the ideal place for recording arrivals and departures. At one end of the bridge, a team of 3 pharmacists recorded arrivals each hour, on a computer, between 8 AM and 8 PM, while another team recorded departures. Approximate ages were evaluated and divided into groups of under 16 years of age, between 16 and 24 years of age, between 25 and 40 years of age, and over 40

years of age. Proportions were compared using the χ^2 test of independence.

A team of dermatologists and volunteers worked together to promote rules for safe sunbathing, distribute information leaflets with photographic information on skin cancer and self-examination of the skin.

Table 1 shows the arrivals and departures, by age group, in the 8-11 AM, 11 AM-5 PM, and 5-8 PM time intervals, and in the 8-12 AM, noon-4 PM, and 4-8 PM time intervals, in 2009 and 2014.

In general terms, the number of arrivals between 8 AM and 11 AM improved from 2009 to 2014 (from 26% to 30%, $P < .001$).

Improvement was found in the group of visitors under 16 years of age (from 23% to 37%, $P < .001$) and the group aged between 16 and 24 years (from 10% to 19%, $P < .001$); this was not the case for the group of visitors aged between 25 and 40 years (from 27% to 21%, $p < .001$).

The number of arrivals in the amber and red time intervals was higher in the group aged between 16 and 24 years (72% in 2009 and 73% in 2014), but worsened in the group aged between 25 and 40 years (from 53% to 59%, $p < .001$). Analysis of the hours in red (noon to 4 PM) showed that the group aged between 16 and 24 years was the worst in 2009 (37%) and was even worse 5 years later (44%, $P < .001$). The same occurred in the group aged between 25 and 40 years (from 27% to 33%, $P < .001$).

Despite the limitations of the study (such as the small sample size and the confidence in the method for calculating age), the data reveal important findings. A large percentage of the population arrived at the beach during the amber and red time intervals (between 11 AM and 5 PM) (56% in 2009 and 53% in 2014).

A greater number of arrivals and a smaller number of departures was observed. This may be because of the large number of people who remained on the beach until sunset (approximately 9 PM at that time). All our campaigns are designed to encourage people to enjoy the beach at the end of the day until sunset.

The fact that the vast majority of people entered the beach between noon and 4 PM, with the highest numbers recorded among young people aged between 16 and 24 years, underscores the need to raise awareness regarding the need to wear hats and clothing that protects the torso and upper extremities, sunglasses and, particularly, to shelter under good shade, ideally tents, at times of greatest risk or more than 1 or 2 hours after the last application of sunblock.

Many measures aimed at preventing skin cancer have led to greater knowledge and awareness of exposure to the sun and skin cancer.^{1,2} The change in behavior is, however, slow and insufficient, especially among young adults.²⁻⁷

Prevention strategies must be adapted to each age group.⁸ Lifeguards and celebrities from the world of fashion and sport are good role models for protection against exposure to the sun and can be powerful allies for raising awareness among young adults.^{9,10} The use of the media as a platform for amplifying the message is of inestimable value.

Our intention is to continue to use the sun clock to attract the attention of younger people and to encourage older people to take responsibility when they see this warning on entering and leaving the beach.

Conflicts of Interest

None of the authors have declared a conflict of interest.

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