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Surveying the knowledge of the World Health Organization physical activity guidelines, exercise habits and beliefs of hospital staff

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INTRODUCTION

Physical Activity (PA) is strongly linked to medical practice, with its prescription recorded as far as two millennia ago.[1] Active individuals have decreased all-cause mortality rates,[2] hypertension,[3] coronary artery disease,[4] stroke,[5] diabetes,[6] osteoarthritis[7] and mental health ailments.[8]

Physical inactivity (PIA), conversely, is the fourth leading cause of death worldwide.[9] PIA is highest in developed countries at 27.8%.[10] Coupled with the fact that PIA is a major risk factor for major non-communicable diseases (NCDs), the situation is worrisome. Furthermore, while PIA has been described as an emergent pandemic, efforts to improve PA levels of populations has lagged behind supporting evidence for its benefits.[9] Indeed, in Asia, populations are rapidly becoming obese, with alarmingly high PIA rates amongst children.[11]

PA counselling and exercise prescription by primary care doctors has had positive effects on sedentary patients; improving blood pressure, BMI, extremity strength and balance.[12] Additionally, PA prescribed by primary care doctors improves physical function, social role functions and mental health, thereby improving quality of life.[13]

In Singapore, a 2010 National Health Survey by the Ministry of Health found 39.1% of Singaporeans did not meet the WHO PA Guidelines.[14] Additionally, obesity and diabetes has been rising since 1992, with 8.7% and 8.6% of the population being obese and diabetic, respectively, in 2017.[15] To tackle the issue of PIA and limit the diabesity epidemic, the Health Promotion Board (HPB) established PA guidelines[16] for adults aged 19-49 years old and adults 50 and over and encouraged regular counselling by hospital staff (HS) about the benefits of PA. Thus, it acknowledged the pivotal role played by HS in advocating PA and motivating change.

This study seeks to build upon a previous study[17] which evaluated medical students'

knowledge of PA, determined if they had any formal PA teaching and ascertained their beliefs about PA. The study found that whilst medical students appreciated PA as a therapeutic modality, there was a worrying lack of PA knowledge amongst medical students. Furthermore, most students had not been taught how to discuss PA with patients.

This study aims to: 1. Survey the knowledge of WHO PA Guidelines amongst Singapore HS; 2. Assess perceptions on PA consultation and education; and 3. Investigate factors influencing HS confidence in their ability to discuss PA.

METHODS

The study was undertaken prospectively over 2 months, from July 2019 to September 2019, to survey HS's knowledge of WHO PA guidelines, counselling habits and personal exercise habits and beliefs. Sampling was undertaken through email, flyer distribution and at departmental meetings with IRB and ethics approval. The survey was hosted on an online anonymized Google Form. It was accessible via QR code or URL. During all communication and sharing, the goals of the survey and anonymity of participants were reiterated and explained. Current staff working at Khoo Teck Puat Hospital (KTPH) in Singapore, regardless of profession and experience, were included in the study.

The survey consisted of 3 different sections. The first acquired the demographics of the subject population. The second section examined personal exercise habits, determining whether subjects exercised, and the type and frequency of PA. The last section sought to understand the subjects' knowledge of the WHO PA guidelines, their views of the importance of PA and their habits and confidence in counselling patients on PA. Their frequency of educating students and their satisfaction of their current knowledge was also assessed.

The questions were in multiple choice question (MCQ) format, open-ended or used a 7-point Likert scale. To assess HS knowledge of PA guidelines, respondents were provided an MCQ with 12 answers to select from. All questions had to be answered to submit the survey. This was partially based on previous studies.[17,18]

Inclusion Criteria were: 1. Respondents were active hospital staff; 2. Respondents were working in KTPH in Singapore; and 3. Respondents understood English. No exclusion criteria was applied as the study was conducted amongst HS. Based on a population of 4618 permanent hospital staff, using an online calculator (Raosoft Inc)[19] a minimum sample size of 355 was required with a 5% margin of error, 95% confidence interval and 50% response distribution.

Statistical analysis was done using IBM SPSS Statistics version 22.0 (IBM Corp, Armonk, NY, USA.). The difference in responses between different subgroups was analysed using a Chi^2 test to determine significant differences. A Chi^2 test was utilized to determine association between identified contributing factors and levels of confidence in all subgroups other than the subgroup "Pharmacists and Psychologists". Fischer's exact test was used instead. The statistical significance for the purpose of this study was set as $p<0.05$.

RESULTS

850 HS completed the survey, of which there were 58 (6.8%) doctors, 560 (65.8%) nurses, 65 (7.6%) allied health professionals (AHPs), 17 (2.0%) other clinical roles (pharmacists and psychologists) and 150 (17.6%) non-clinical roles. 34 (52.3%) AHPs were physiotherapists.

27 (46.6%) doctors, 158 (28.2%) nurses, 20 (30.8%) AHPs, 7 (41.2%) pharmacists and psychologists and 53 (35.3%) non-clinical staff said they participated in PA. Among these responses, 19 (70.4%) doctors, 92 (58.2%) nurses, 14 (70.0%) AHPs, 3 (42.9%) pharmacists and

psychologists and 34 (64.2%) non-clinical staff had sufficient levels according to the WHO PA Guidelines (Table I). In total, 19.1% had sufficient levels of PA. Responses with inadequate descriptions of the type of PA performed were deemed unclear.

Most HS were unable to provide any correct answer when assessed on knowledge of PA Guidelines (Table II). 226 (26.6%) answered at least one of two questions correctly, and 8 (0.9%) answered both questions correctly. 2 (3.4%) doctors answered all questions correctly, while 26 (44.8%) answered one correctly. No nurse answered both questions correctly, with 113 (20.2%) answering one correctly. 5 (7.7%) AHPs obtained 2 correct answers and 30 (46.2%) had 1 correct. 8 (47.1%) pharmacists and psychologists answered 1 question correctly, with none answering two correctly. 1 (0.7%) non-clinical staff member answered both questions correctly, and 41 (27.3%) answered one correctly. The proportion of HS who incorrectly recalled the WHO PA Guidelines was greater than those who were correct, where being "correct" was defined as selecting at least one answer correctly. A significantly greater proportion of AHPs answered at least one answer correctly ($p < 0.001$) as compared to other subgroups.

On assessing their perception of PA's importance in preventing and treating disease, 90.8% found PA important in prevention, and 78.8% found PA important in treatment. 94.8% and 84.5% of doctors felt PA was important in prevention and treatment respectively. 89.5% and 77.9% of nurses felt PA was important in prevention and treatment respectively. 95.4% and 92.3% of AHPs believed that PA was important in prevention and treatment respectively. 94.1% and 64.7% of pharmacists and psychologists believed PA was important in prevention and treatment respectively. 92.0% and 76.0% of non-clinical staff felt PA was important in prevention and treatment respectively. When comparing between subject populations, there was no noted significant difference in perceptions of PA as a preventative intervention ($p=0.434$). There was a

significant difference (=0.026) in perception of PA's therapeutic value.

Most (86.6%) felt advising patients about PA was important, and 74.4% advised patients about exercise regularly. 26.1% of HS educated students on PA often (Table II). 45.8% felt confident discussing PA with patients and 61.5% felt unsatisfied with their current level of knowledge.

94.8% of doctors, 85.4% of nurses, 95.4% of AHPs, 88.2% of pharmacists and psychologists and 84% of non-clinical staff felt PA advice was important. AHPs reported a significantly higher frequency of advising patients on PA (83.1%;$p<0.001$) than others, with 81% of doctors, 80.5% of nurses, 58.8% of pharmacists and psychologists and 46.7% of non-clinical staff regularly advising patients on PA.

A significantly greater proportion of nurses taught their students about PA (27.7%, p-value= 0.021) than the rest. 19% of doctors, 27.7% of AHPs, 11.8 % of pharmacists and psychologists and 18% of non-clinical staff taught their students about PA. Doctors and AHPs showed significantly higher levels of confidence in PA knowledge, with 69% of doctors and 70.8% of AHPs reporting that they were confident in discussing PA with their patients ($p<0.001$). Conversely, 42.1% of nurses, 23.5% of pharmacists and psychologists and 34% of non-clinical staff were confident. AHPs were significantly more satisfied with their level of PA knowledge (58.5%;$p=0.001$). 51.7% of doctors, 36.4% of nurses, 23.5% of pharmacists and psychologists and 34% of non-clinical staff were satisfied.

Factors influencing confidence levels of respondents were analysed. AHPs' with formal teaching had significantly higher levels of confidence, compared to those with informal or no teaching sessions (91.2% vs 63.3% vs 40.0%;$p<0.001$) (Table III). Additionally, sufficient self-reported PA significantly increased confidence levels among nurses, as compared to nurses with

insufficient PA (60.9% vs 38.5%, p-value <0.001) as well as in non-clinical roles (64.7% vs 25.0%;p<0.001). Education on PA and self-reported PA levels did not significantly affect confidence levels of all other subgroups. Duration of work had no significant effect on confidence levels.

The number of respondents who received education on PA was assessed. 13 (22.4%) doctors, 39 (7.0%) nurses, 34 (52.3%) AHPs, 4 (23.5%) pharmacists and psychologists and 20 (13.3%) staff in non-clinical roles received formal teaching sessions on PA. In total, 110 (12.9%) received formal PA education.

DISCUSSION

Exercise plays a pivotal role in managing cancer,[20] diabetes,[21] hypertension,[22] stroke[23] and ischaemic heart disease.[24] With one of the lowest fertility rates in the world, and consequently a rapidly ageing population, chronic diseases will take greater precedence in Singapore.[25] Thus, PA's importance will become increasingly relevant.

To our knowledge, this study is the first in Singapore assessing PA knowledge, habits and beliefs of HS. 850 responses were obtained, representing all roles in healthcare. The decision to include non-clinical roles in our study was made as we believe non-clinical roles help in the overall management of patients. Heenan et al[26] found that increases in clinical knowledge in non-clinical staff allowed for greater understanding of the rapidly evolving clinical landscape, allowing them to improve quality.

Overall, HS across all subgroups recognized the PA's importance as a therapeutic modality. 90.8% believe it is important in prevention, but fewer (78.8%) believed its importance in treatment. This result is consistent with the commonly held perception that exercise is for the

healthy and fit, rather than for the chronically ill.

More importantly, only 74.4% frequently advised their patients on PA. In other studies, common reasons for decreased rates include the "lack of training, distrust and organizational issues"[27] and "scarcity of time and not having adequate access to reference materials."[28] Similarly, this study has shown that many HS (87.1%) have never received formal training on PA. Furthermore, amongst AHPs, a significantly greater proportion of the untrained group felt unconfident discussing PA (60% vs 40%), likely contributing to decreased counselling. Additionally, despite understanding the importance of PA, more than 70% of HS failed to accurately state the WHO PA Guidelines. Low levels of formal training are a likely contributing factor, indicating any training previously received was more likely to be non-standardized and ineffective.

The issue becomes more pertinent when we consider the fact that 74.4% of respondents regularly educated their patients on PA, despite low levels of PA. More than 80% of HS had insufficient levels of PA. Coupled with their poor understanding of the WHO PA Guidelines, it becomes difficult to conduct effective counselling. Furthermore, nurses who had reported insufficient levels of PA were more likely to be unconfident in conducting PA consultations with their patients (61.5% vs 38.5%). Similarly, Morishita et al[29] discovered a physician's own exercise habits would influence how exercise consults were conducted. To the public, HS are role models. Hence, if HS continually counsel on PA whilst maintaining subpar levels of PA, there is a risk that the public will become disinclined to listening to HS advice.

Hence, there is a need to develop standardized and formal PA education processes for HS, to improve confidence and knowledge levels. This is likely to be well-received as more than half of the respondents acknowledged they were unsatisfied with their current knowledge. The need

for an improvement in the ability of HS to effectively discuss PA is emergent. With the continual rise of chronic illnesses, as well as a greater focus on preventing and treating chronic diseases in Singapore, HS must be confident in dispensing adequate PA advice.

It should be noted that in this study, the frequency that HS educate students about PA is low. Only 26.1% of them educate their students on PA frequently. This can result in a negative feedback loop where poorly educated students become HS unconfident in teaching their students. Previous research has shown that medical students do not have sufficient knowledge in PA.[17] As such, all HS must consider PA a vital aspect of medical education, rather than an afterthought.

This study was not without limitations. Although this is the first study in Singapore of its kind, we note some limitations. Firstly, while a substantial number of responses was received, this remains a single-centre study. This may limit how representative our study is of Singapore's HS. We will seek to further include HS from other institutions in future to improve generalizability.

Second, there may have been self-selection bias amongst respondents, with higher participation rates among the more physically active or confident. Furthermore, while doctors represent 9.1% of KTPH's workforce, only 6.8% of responses came from doctors. Physiotherapists also occupied more than half of the number of AHP responses, which may have swayed the results of other AHPs such as occupational therapists and speech therapists. Thus, this may not reflect the whole spectrum of opinions. Although anonymity was emphasized when disseminating the survey, increased email reminders or an increased hospital presence may have increased staff participation and decreased bias.

Lastly, since the survey was disseminated online, respondents were unsupervised. There may have been response bias as respondents could check the guidelines while completing the survey. Additionally, participants may have done the survey in groups and discussed answers,

introducing further bias. To prevent this, respondents must be reminded that results are anonymized. Additionally, respondents could be encouraged to do the survey individually, without referencing other sources. Opportunities for HS to fill up hard-copy versions of the survey, rather than doing it online may have helped.

In conclusion, this study suggests a worrying trend despite the Ministry of Health's increased focus on PA. These findings show the need for standardized formal teaching about PA, as well as a re-emphasis about the importance of PA counselling. Without a change in the education of HS, the current gap in knowledge will continue to persist. Increasing evidence shows the effectiveness of PA as a therapeutic modality, so HS of today must be equipped with the knowledge on how to utilize PA effectively if their patients are to reap any of its benefits.

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Table I. Self-reported PA levels amongst healthcare professionals in KTPH Singapore.

Survey Responses	Number (%)									
	Doctors (n=58)		Nurses (n=560)		AHPs (n=65)		Pharmacists and Psychologists (n=17)		Non-clinical Roles (n=150)	
I take part in PA (sports/exercise)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	27 (46.6)	31 (53.4)	158 (28.2)	402 (71.8)	20 (30.8)	45 (69.2)	7 (41.2)	10 (58.8)	53 (35.3)	97 (64.7)
Sufficient	19 (32.8)	-	92 (16.4)	-	14 (21.5)	-	3 (17.6)	-	34 (22.7)	-
Insufficient	2 (3.4)	-	28 (5.0)	-	0 (0.0)	-	0 (0.0)	-	7 (4.7)	-
Unclear response	6 (10.3)	-	38 (6.8)	-	6 (9.2)	-	4 (23.5)	-	12 (8.0)	-

AHP: allied health professionals; PA: physical activity

Table II. Knowledge of WHO PA Guidelines and understanding of the importance of PA amongst healthcare professionals in KTPH Singapore.

Survey Responses	Number (%)					
	Doctors	**Nurses**	**AHPs**	**Pharmacists and Psychologists**	**Non-Clinical Roles**	**p-value[Ω]**
Knowledge of WHO PA Guidelines[*]						<0.001
At Least 1 Correct Answer (n=234)	28 (48.3)	113 (20.2)	35 (53.8)	8 (47.1)	42 (28.0)	
No Correct Answers (n=616)	30 (51.7)	447 (79.8)	30 (46.2)	9 (52.9)	108 (72.0)	
Importance of PA in Prevention of Disease[#]						0.434
Important (n=772)	55 (94.8)	501 (89.5)	62 (95.4)	16 (94.1)	138 (92.0)	
Not Important (n=78)	3 (5.2)	59 (10.5)	3 (4.6)	1 (5.9)	12 (8.0)	
Importance of PA in Treatment of Disease[#]						0.026
Important (n=670)	49 (84.5)	436 (77.9)	60 (92.3)	11 (64.7)	114 (76.0)	
Not Important (n=180)	9 (15.5)	124 (22.1)	5 (7.7)	6 (35.3)	36 (24.0)	
How important is advising patients about PA?[&]						0.038
Important (n=736)	55 (94.8)	478 (85.4)	62 (95.4)	15 (88.2)	126 (84.0)	
Not Important (n=114)	3 (5.2)	82 (14.6)	3 (4.6)	2 (11.8)	24 (16.0)	
How often do you advise patients on PA?[^]						<0.001
Often (n=632)	47 (81.0)	451 (80.5)	54 (83.1)	10 (58.8)	70 (46.7)	
Not Often (n=218)	11 (19.0)	109 (19.5)	11 (16.9)	7 (41.2)	80 (53.3)	
How often do you teach students about PA?[+]						0.021
Often (n=222)	11 (19.0)	164 (29.3)	18 (27.7)	2 (11.8)	27 (18.0)	
Not Often (n=628)	47 (81.0)	396 (70.7)	47 (72.3)	15 (88.2)	123 (82.0)	
How confident are you in discussing PA with patients?[§]						<0.001
Confident (n=377)	40 (69.0)	236 (42.1)	46 (70.8)	4 (23.5)	51 (34.0)	
Not Confident (n=473)	18 (31.0)	324 (57.9)	19 (29.2)	13 (76.5)	99 (66.0)	
How satisfied are you with your current knowledge of PA?[ǂ]						0.001
Satisfied (n=327)	30 (51.7)	204 (36.4)	38 (58.5)	4 (23.5)	51 (34.0)	
Not Satisfied (n=523)	28 (48.3)	356 (63.6)	27 (41.5)	13 (76.5)	99 (66.0)	

[*]Respondents were provided with 12 answers to select from. [#]Respondents were provided with a 7-point Likert scale, with 1= not important at all and 7= extremely important. Respondents who selected '5', '6' and '7' were deemed to have considered PA important. [Ω]A Chi-square test was utilized to compare the groups. [&] Important = '7', '6' or '5', not important= '4', '3', '2' or '1'. [^]Often = 'Multiple times a day', 'Once a day' or 'Weekly', not often = 'Monthly', Quarterly' or 'Never'. [+]Often = 'Once a day' or 'Weekly', not often = 'Monthly', Quarterly' or 'Never'. [§]Confident = '7', '6' or '5', not confident= '4', '3', '2' or '1'. [ǂ] Satisfied = '7', '6' or '5', not satisfied= '4', '3', '2' or '1'. [Ω]A Chi-square test was utilized to compare the groups. AHP: allied health professionals; PA: physical activity; WHO: World Health Organization

Table III. Factors influencing confidence levels in discussing PA amongst healthcare professionals in KTPH Singapore

Survey Response	Doctors				Nurses				AHP				Pharmacists and Psychologists				Non-clinical roles			
Confidence Levels	**Low**	**High**	**Total**	**p-value**	**Low**	**High**	**Total**	**p-value**	**Low**	**High**	**Total**	**p-value**	**Low**	**High**	**Total**	**p-value**	**Low**	**High**	**Total**	**p-value**
Educated on PA				0.404				0.088				0.000				0.328				0.279
Formal	4 (30.8)	9 (69.2)	13 (100)		16 (41.0)	23 (58.9)	39 (100)		3 (8.8)	31 (91.2)	34 (100)		3 (75.0)	1 (25.0)	4 (100)		10 (50.0)	10 (50.0)	20 (100)	
Informal	7 (43.8)	9 (56.2)	16 (100)		71 (58.2)	51 (42.8)	122 (100)		4 (36.4)	7 (63.3)	11 (100)		2 (50.0)	2 (50.0)	4 (100)		26 (66.7)	13 (33.3)	39 (100)	
None	7 (24.1)	22 (75.9)	29 (100)		237 (59.4)	162 (40.6)	399 (100)		12 (60.0)	8 (40.0)	20 (100)		8 (88.9)	1 (11.1)	9 (100)		63 (69.2)	28 (30.8)	91 (100)	
Self-reported PA				0.588				<0.001				0.05				0.541				<0 .001
Sufficient	5 (26.3)	14 (73.7)	19 (100)		36 (39.1)	56 (60.9)	92 (100)		1 (7.1)	13 (92.9)	14 (100)		3 (100)	0 (0.0)	3 (100)		12 (35.3)	22 (64.7)	34 (100)	
Insufficient	13 (33.3)	26 (66.7)	39 (100)		288 (61.5)	180 (38.5)	468 (100)		18 (35.3)	33 (64.7)	51 (100)		10 (71.4)	4 (28.6)	14 (100)		87 (75.0)	29 (25.0)	116 (100)	
Duration of Work				0.137				0.568				0.09				0.219				0.73
<5 years	2 (20.0)	8 (80.0)	10 (100)		135 (58.2)	97 (41.8)	232 (100)		7 (22.6)	24 (77.4)	31 (100)		11 (84.6)	2 (15.4)	13 (100)		52 (63.4)	30 (36.6)	82 (100)	
5-10 years	9 (50.0)	9 (50.0)	18 (100)		113 (60.1)	75 (39.9)	188 (100)		4 (21.1)	15 (78.9)	19 (100)		2 (66.7)	1 (33.3)	3 (100)		33 (70.2)	14 (29.8)	47 (100)	
>10 years	7 (23.3)	23 (76.7)	30 (100)		76 (54.3)	64 (45.7)	140 (100)		8 (53.3)	7 (46.7)	15 (100)		0 (0.0)	1 (100)	1 (100)		14 (66.7)	7 (33.3)	21 (100)	

AHP: allied health professionals; PA: physical activity