Overview and Solution in Refractive Error



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Prevalence of myopia (RESC study) 30-50% uncorrected myopia

Children aged 15 years, SE<-0.5D



Challenges & school-based solutions

- School-based screening
 - Identify children with refractive error & eye diseases
- Referral
 - Refraction service
 - Pediatric ophthalmology service
- Annual follow-up
 - Spectacle updating
- Large scale massive screening
 - Real time management system

How to handle data in massive screening - CHEER project *"real-time" cloud data management*

- <u>Children's</u> <u>Healthy</u> <u>Eyes</u> bring <u>E</u>ducational <u>R</u>ewards
- Duration: June 2013 May 2018
- Shanxi, China
- School-based eye disease screening
- Financial support: Standard Chartered Bank, RMB 30M
- Screened: 1.5 million students annually
- Referral: 200,000



Challenges

- Train teacher to perform screening
 - Visual acuity
 - 5 typical pediatric eye diseases
- How?
 - handle massive data
 - Real-time management
 - Link up with the users (parents)



Challenges & solutions

Challenges (pain points)	Solutions?					
 Massive screening task Screen 1.5 million students annually Screening: VA + identification 5 common eye diseases 	Train teacher to perform standardized training procedure					
Massive training task - Teachers from nearly 1000 schools	 On-site training Online training (lecture, video on standard procedure, certification) 					

Online training + certification Teachers perform simple VA testing + identification 5 common diseases



Over 2000 teachers received online training in 3 months, including:

- video (registry/eye examination/screening system)
- slides
- online exam & certification

Challenges & solutions

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System login web-based management

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	項目通知 访问用户中心时请使用谷歌浏览器,请点击此处下载。	2014年01月26日 08:00:00 admin
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	▲ CHEER項目国外机构、国内合作医院及筛查学校 教师帐号都可以通过此页面登录。如果您需要注册 帐号,请点击此处。	电子邮件或手机号码 登录密码
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	如果您使用初始密码登录,登录后请及时修改密 码。如遇到问题请与技术支持人员联系。	

Account authorization

administrator, teacher, eye clinic, parents, project manager

Screening: real-time data entry

欢迎页面	筛查明	细表										
学校筛查	选择班级	: [\$		Screening status	打印	转诊卡	(全校)	打印筛查明细表(全校)
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Real-time data entry at screening

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Challenges & solutions

Challenges (pain points)	Solutions?
 Massive screening task Screen 1.5 million students annually Screening: VA + identification 5 common eye diseases 	Train teacher to perform standardized training procedure
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Program managementProgress reportReal-time management	Web-based systemReal-time statistics

Project manager: Real time progress supervision

欢迎页面		片区学校筛查进度汇总										
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Program managementProgress reportReal-time management	Web-based systemReal-time statistics
User interaction Parents willing to know results Referral to hospitals 	 Automatic SMS reminder GIS data – find the service provider nearby

Real-time SMS to parents

- Impaired VA
 - UCVA < 0.5
 - BCVA < 0.5
- Myopia with rapid progression
 - compare with historic data
 - 2-line drop per year
 - at high risk on percentile plot
- Identified eye diseases
- Send SMS automatically



转诊短信发送成功 (返回码: 01) Message is sent successfully

Locating nearby hospitals

- SMS, with URL link
- Parents click to find
 - Screening report
 - Nearest registered eye clinic & maps for referral



Online management platform www.cheerprogram.org



Self-testing VA by students LED + sensor = estimation on distance





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On-site school screening – sponsored by Mantholantum



Online VA testing at home

- a collaborative project with Mantholatum Rhoto
 Online VA testing + link to health education promotion info



Evidence-based intervention

- Prevention of onset
 - Increased outdoor time
 - Schooling intensity control
- Retardation of progression
 - Spectacle correction
 - Ortho-K
 - Low dose atropine
 - Special design contact lens
 ≻ Peripheral defocus
 > Others
- > Operational research

Outdoor Activity: a Protective Factor?



Sydney Myopia Study

Outdoor Activity: a Protective Factor?



Jones LA, Loraine TS, Mutti DO, et al. Invest Ophthalmol Vis Sci. 2007

<u>Guangzhou</u> Outdoor Activity Longitudinal Study

- Hypothesis
 - Increase of time outdoors reduces 3 year incidence of myopia
- Study Design
 - A 3 year controlled, cluster-randomized clinical trail
 - Intervention
 - ✓ An additional outdoor class of 45 minutes per day
 - \checkmark A parental information campaign

Outdoor Intervention





Recruitment



Results were published in JAMA in September 2015

	Journal of the	e al Association			
Home Current Issue	All Issues	Online First	Collections	CME	Multimedia
September 15, 2015, Vol 314, N	o. 11 >				
< Previous Article Next Article	**				
Original Investigation Septer	mber 15, 2015				
Effect of Time S	spent O	utdoors a	t School	l on t	he
Development of A Randomized Clin	f Myopia nical Tria	a Among	Children	n in C	hina
Mingguang He, MD, PhD ^{1,3} ; Fan J Jian Zhang, MSc ¹ ; Wayne Smith,	Kiang, MD, PhD MD, PhD ^a ; Kath	13; Yangfa Zeng, M Inyn Rose, PhD ^{e,} ; I	D'; Jincheng Mai, an G. Morgan, Phi	BSc*; Qiar	iyun Chen, MSc ¹ ;
[+] Author Affiliations					
JAMA. 2015;314(11):1142-1148.	doi:10.1001/jam	a.2015.10803.		Tex	Size: A A A

ABSTRACT

ABSTRACT | INTRODUCTION | METHODS | RESULTS | DISCUSSION | CONCLUSIONS | ARTICLE INFORMATION | REFERENCES

Article Figures Tables Supplemental Content References CME

Importance Myopia has reached epidemic levels in parts of East and Southeast Asia. However, there is no effective intervention to prevent the development of myopia.

Objective To assess the efficacy of increasing time spent outdoors at school in preventing incident myopia.

Design, Setting, and Participants Cluster randomized trial of children in grade 1 from 12 primary schools in Guangzhou, China, conducted between October 2010 and October 2013.

Interventions For 6 intervention schools (n = 952 students), 1 additional 40-minute class of outdoor activities was added to each school day, and parents were encouraged to engage their children in outdoor

Cumulative Incidence of myopia

Incident Myopia (%)



Refractive and biometric outcomes at 3 follow-up years

	Intervention group	Control group	Difference (95% Cl)	P value
Cumulative incident myopia , N1/N2 (%) ^a	259/853 (30.4%)	287/726 (39.5%)	-9.1% (-14.1, -4.1)	<0.001
Cumulative change in SER	-1.42	- 1.59	0.17	0.037
(D), Mean(95%CI) ^b	(-1.58, -1.27)	(-1.76, -1.43)	(0.01, 0.33)	
Cumulative change in AL	0.95	0.98	-0.03	0.070
(mm), Mean(95%CI) ^b	(0.91, 1.00)	(0.94, 1.03)	(-0.07 <i>,</i> 0.003)	

Outdoor time & prevention of myopia

How Long?

• Additional 45 minutes outdoor activities everyday

How to Achieve?

- Add outdoor activities in the school schedule
- School class recess locking door strategy
- Classroom illumination
- Encourage parents to increase the time for outdoor activities at weekend and holidays.



Acknowledgement

Photos and data provided:

- CHEER Project
- Mantholantum project

Web-based system developer: Guangzhou Healgoo Interactive Medical Technology Co. Ltd. (www.healgoo.com)