### **实施性研究的步骤(踏车模型PEDALs):** 以糖尿病共享门诊为例 Use PEDALs model to pedal for implementation research:

Illustrated by a shared medical appointment implementation study

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PEDALs 踏车模型



内容 Contents 1. Acacia Labs, SIGHT, and ISC

2. Some basic concepts in implementation science

3. Overview of PEDALs

4. Illustration by Shared Medical Appointment Trial

• <u>Problem, EBP, D</u>eterminants, <u>Action, Long-term, and S</u>cale

# 01 Some advertisement...





#### Acacia Labs for Health System Strengthening

Research consortium of 10 university research teams in China

Primary heAlth Care quAlity Cohort In ChinA (ACACIA study)





#### <u>Southern Medical University</u> Institute for <u>G</u>lobal <u>H</u>eal<u>T</u>h

### SIGHT

#### 南方医科大学全球健康中心 (SIGHT)

**Services**: SMU Hospital is the first and largest medical center receiving international patients (primarily from LMICs) in China

Research: Largest total competitive grant size in China in global health

**Education**: One of the 4 and earliest International MPH programs in China (full scholarships for all 25 LMICs students/Year)



- Co-Editors-in-Chief: Anne Sales, Dong (Roman) Xu
- The official companion journal to Implementation Science
- Broad scope and wider range of types of study reports
- Direct transfer route from *Implementation Science*
- Continued focus on rigor and innovation
- Open peer review

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https://implementationsciencecomms.biomedcentral.com/



# 02 实施科学基本概念 Basic concepts in implementation Science

### 实施科学的定义 Defining implementation science

#### **Thomas Odeny and colleagues reviewed**

#### 73 unique definitions!

They propose the definition as " Implementation science is a multidisciplinary specialty that seeks generalisable knowledge about the behaviour of stakeholders, organisations, communities, and individuals in order to understand the scale of, reasons for, and strategies to close the gap between evidence and routine practice for health in real-world contexts. " Definitions of implementation science in HIV/AIDS

Comment

The availability of resources to combat HIV world-Almost all definitions of implementation science wide has motivated a new generation of scientific and research referred explicitly or implicitly to the tions: how can we optimise the implementation oap between knowledge and evidence from research evidence-based interventions in diverse real-world findings (in something theoretical) and use deliver social, cultural, economic, geographical, and health- and application (ie, something that is actually done tems settings? However, little consensus exists For example Gonzalez-Block and colleagues' noted that ut the boundaries of inquiry that qualify as imple-intation science or implementation research "...deals with the knowledge station science or implementation research." At the request of the WHO HIV Department, we did a review of definitions as used in the HIV/AIDS scientific addressing this gap, 14% of definitions invoked studie literature to identify a synthetic working definition. that seek to quantify the scale of the gap betwee he resulting definition helped to facilitate dialogue evidence and practice. Jones and colleagues." for at the Third Strategic Use of Antiretrovirals for example, offer as an example of impl Treatment and Prevention of HIV Infection meeting in research a study showing that full use of existing interventions could cut child deaths worldwide I February, 2014 inched PubMed in April, 2014, more than 60%. Research to identify reasons for th We systematically : to identify articles containing a definition of imple-mentation science in relation to the topical area of HIV and coworkers," who characterised implementation using the terms "delivery science", "implementation science as "...the study of the processes and variab ence", "implementation research", "dissemination which determine/influence the adoption of head escarch", and "dissemination science" with Medical promotion and disease prevention-related knowledge Subject Headings terms "HIV" and "AIDS". We manually Most definitions, nearly 80%, referred to intervention ached references of definitions in identified atticks to close this gap. Eccles and Mittman, in the journ sing a snowball approach until no new references could Implementation Science, defined implementation be found. We extracted key characteristics of definitions science as ", the scientific study of methods to prom e vonte tre extracted we characteristics or demittions some as independent study or metodos of pointing, publication year and whether peer reviewed) and the systematic uptake of research findings and oth evidence-based practices into routine practice.".<sup>10</sup> le constructed a network graph of definitions linked by eir chain of references using the D3 JavaScript library.<sup>1</sup> of findings to address the gap between evidence We used the igraph package in R (v3.0.1)<sup>4</sup> to calculate and practice as a goal of inquiry in implementatio envector centrality, which expresses the extent science. Withough related to operations research which a node (a definition) is connected to other implementation research differs in that it aims to nected nodes in network analyses.<sup>57</sup> produce generalizable knowledge that can be applied We identified 64 references, 48 were excluded and across settings and contexts.", authors from the 53 additional references were added from bibliographic Fogarty Institute remarked in the journal Science.<sup>11</sup> At arching of the remaining 16 articles. These 69 articles ered 73 unique definitions (appendix p 1). Definitions highly prevalent and present in 81% of the definitions offered 73 unique defin were all published between 1996 and 2013, and the "Implementation research does not isolate the effects from number of definitions rose over time, ranging from one in 1996 to a peak of 14 in 2011. Definitions were between the intervention and the context\_", notec losely connect (figure, appendix p.2). In the network UNICEF, the UN Development Programme, the World analysis, maximum cluster size was five; 41% definitions Bank, and the WHO Special Programme for Research were index definitions that cited no other reference; and Training in Tropical Diseases." This balance betwee 67% of these index definitions were not were cited by any other definition. generalisability and context required, in the views of many, an interdisciplinary scientific approach. In JAMA,

m/hiv Vol 2 May 2005



I prefer a shorter definition: IS is a **multidisciplinary specialty** to seek **generalisable knowledge** about the **scale of**, **reasons for**, and **strategies** to close the **evidence-to-practice gap** 

Source: Odeny, T. A., Padian, N., Doherty, M. C., Baral, S., Beyrer, C., Ford, N., & Geng, E. H. (2015). Definitions of implementation science in HIV/AIDS. The Lancet HIV, 2(5), e178–e180. doi:10.1016/s2352-3018(15)00061-2

### 9 关键概念 Key concepts



Everything else beyond the EBP itself (e.g., Organizational support, finan resources, social relations and support, leadership, and organizational culture and climate.

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### 03 实施性研究的基本步骤:PEDALs Critical steps of conducting implementation research: PEDALs

## 11 Motivation for PEDALs

- IS is inundated by theories, models and frameworks (2012 review:>100 frameworks)
- IS frameworks are getting more comprehensive but also cumbersome
- Students have challenges in quickly understand the essence of conducting an IS research
- PEDALs has been developed as a teaching tool to wrap essential steps of conducting IS research in an easy-to-remember acronym with an appropriate metaphor
- Used in teaching already but not published or peer reviewed yet

# 12 PEDALs 踏车模型



Cycling forward with pedals! 踏车前行

- Metaphor: Moving forward with short cycles continued improvement
- 快速小循环前进 持续改善

- P: Problem in clinical work, public health or policies 现实困境
- E: Evidence based practice (EBP) to address that problem 解决困境的EBP
- D: Determinants (barriers and facilitators) of implementing that EBP 实施EBP的决定因素
- A: Actions (implementation strategies) to address those determinants 推动EBP实施的策略
- L: Long-term use (sustained use/normalization of EBP) EBP的持续实施/常态化
- s: Scale (monitoring and evaluation) 监测和评估

# 13 实施性研究基本步骤 PEDALs



## 04 PEDALs illustrated by Shared Medical Appointment for diabetes project

# 15 实施性研究基本步骤 PEDALs



# 16 China facing diabetic epidemic

- 22 m in 2000 to 116 m in 2019
- Prevalence from 2.7% to 9.6%



A health challenge...

# 17 Problems of primary care to address diabetics

- Primary health care for diabetic care
- Overburdened public health and clinical workforce
- Poor quality of care
- Insufficient communication between care providers and patients
- Lack of patient centered care
- Inefficient service model: Seperation of public health vs. curative services



Trying harder to prevent and treat it could save both lives and money

A gap analysis to identify service sector problems to address the health challenge...

• Walk-through of existing procedures, document reviews, focuse groups, interviews, etc...

# 18 实施性研究基本步骤 PEDALs



#### 证据金字塔 Evidence pyramid 19

称作EBP

呢?



20 Sh

# Shared Medical Appointment (SMA/共享门诊) as an EBP to address the service problems for diabetes

SMA is defined by groups of patients meeting over time for comprehensive care for a defining chronic condition or health care state.

SMAs have been studied in an array of primary care settings over decades. They have been researched most in diabetes care, but there has been great variability among these studies.



#### Glucose control

### **Clinical Outcomes**

Meta-analysis revealed that SMAs were associated with a mean decrease in A1c among patients with type 2 diabetes.

Sufficient evidence for the effectiveness of SMA ...

HbA1c (%)									
		SMA		Us	ual Care			Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% Cl
1.1.1 Diabetes and hy	pertens	ion							
Edelman 2010	-0.9	1.6394	133	-0.57	1.6969	106	6.2%	-0.33 [-0.76, 0.10]	
Jackson 2013	-0.7	1.0607	133	-0.6	1.1448	106	6.7%	-0.10 [-0.38, 0.18]	
Naik 2011	0	0	0	0	0	0		Not estimable	
Subtotal (95% CI)			266			212	12.9%	-0.17 [-0.41, 0.07]	◆
Heterogeneity: Tau <sup>2</sup> =	0.00; Ch	i² = 0.78,	df = 1	(P = 0.38	3); I <sup>2</sup> = 0%	6			
Test for overall effect: 2	Z = 1.42	(P = 0.16)	5)						
1.1.2 Type 1 and 2 dia	abetes								
Sadur 1999	8.18	2.1392	82	9.33	2.1392	74	5.2%	-1.15 [-1.82, -0.48]	
Taveira 2011	-0.9	1.6	44	0	1.8	44	5.0%	-0.90 [-1.61, -0.19]	
Wagner 2001	0.4	2.8879	278	0.5	2.8879	429	6.2%	-0.10 [-0.54, 0.34]	
Subtotal (95% CI)			404			547	16.4%	-0.67 [-1.37, 0.02]	
Heterogeneity: Tau <sup>2</sup> =	0.28; Ch	i <sup>2</sup> = 8.04,	df = 2	(P = 0.02)	2); l <sup>2</sup> = 75	%			
Test for overall effect:	Z = 1.90	(P = 0.06)	5)	N	<i>//</i>				
		•	,						
1.1.3 Type 1 diabetes									
Singer 2018 (1)	0.1	0.8	16	-0.4	0.7	11	5.6%	0.50 [-0.07, 1.07]	
Trento 2005	-0.38	1.2051	30	-0.4	1.1605	28	5.5%	0.02 [-0.59, 0.63]	
Subtotal (95% CI)	0.000	0.000	46	6.00		39	11.1%	0.27 [-0.20, 0.74]	
Heterogeneity: Tau <sup>2</sup> =	0.02: Ch	i² = 1.27.	df = 1	(P = 0.2)	5): l <sup>2</sup> = 21	%		•	
Test for overall effect:	Z = 1.14	(P = 0.26)	5)	(	-,,				
		(· · · · · · ·							
1.1.4 Type 2 diabetes									
Clancy 2003	-1.043	2.33	59	-0.549	2.33	61	4.6%	-0.49 [-1.33, 0.34]	
Clancy 2007	-0.2	2,1947	96	0.1	2,4666	90	5.2%	-0.30 [-0.97, 0.37]	
Cohen 2011	-0.41	1.1612	50	-0.2	1,4274	49	5.9%	-0.21 [-0.72, 0.30]	+-
Gutierrez 2011	-1.19	1.66	50	-0.67	2	53	5.1%	-0.52 [-1.23, 0.19]	
Naik 2011	-0.81	1.3528	44	-0.1	1.3054	41	5.6%	-0.71 [-1.28, -0.14]	
Singer 2018 (2)	-0.09	0.8	16	0.1	0.7	13	5.7%	-0.19[-0.74, 0.36]	
Taveira 2010	-0.9	1.6	58	0	1.5	51	5.6%	-0.90 [-1.48, -0.32]	
Trento 2001	0.1	14	43	0.9	1 6371	47	5.4%	-0.80 [-1.43 -0.17]	
Trento 2010	-0.45	1 3645	315	0.99	1.33	266	6.8%	-1 44 [-1 66 -1 22]	
Vaughan 2017	-0.7	2 4062	25	-0.1	1 9519	25	3.2%	-0.60[-1.81_0.61]	
Wu 2018	-0.27	1 25	90	-0.14	1.0010	110	6.5%	-0.13 [-0.46, 0.20]	-+-
Subtotal (95% CI)	-0.27	1.20	855	-0.14	1.20	815	59.6%	-0.58 [-0.97, -0.19]	◆
Heterogeneity: Tau <sup>2</sup> =	0 33. Ch	i <sup>2</sup> = 61 76	df = 1	0 (P < 0	00001)	12 = 84	%	0.00[0.07, 0.10]	-
Test for overall effect:	7 – 2 05	P = 0.70	), ui – i 131	0 (1 - 0	.00001),	1 - 04	/0		
rest for overall effect.	2 - 2.95	(F = 0.00	5)						
Total (95% CI)			1571			1613	100.0%	-0.46 [-0.750.16]	•
Heterogeneity: Tau <sup>2</sup> =	0.32 <sup>.</sup> Ch	i <sup>2</sup> = 110 5	59. df =	17 (P <	0.00001)	$ ^2 = 8$	5%	-	
Test for overall effect: $7 = 3.02$ (P = 0.003) -2 -1 0 1 2									
Test for subgroup differences: $Chi^2 = 9.39$ , $df = 3$ (P = 0.02), $l^2 = 68.1\%$ Favours [SMA] Favours [Usual Carel]									
i cor loi cuburoub dille	. 511000. (	- 0.0		5.1 = 0		50.170			

#### **Blood pressure control**

### **Clinical Outcomes**

Meta-analysis revealed that SMAs were associated with improved systolic blood pressure control among patients with type 2 diabetes.

#### Sufficient evidence for the effectiveness of SMA ...

SBP (mmHa)									
(		SMA		Us	sual Care	9		Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
1.2.1 Diabetes and hy	pertens	sion							
Edelman 2010	-14.5	19.094	133	-5.4	18.848	106	11.2%	-9.10 [-13.94, -4.26]	
Jackson 2013	-7.2	9.7263	133	-4.1	9.215	106	19.4%	-3.10 [-5.51, -0.69]	
Subtotal (95% CI)			266			212	30.6%	-5.72 [-11.55, 0.11]	
Heterogeneity: Tau <sup>2</sup> =	14.20; C	Chi² = 4.7	3, df =	1 (P = 0	0.03); l² =	79%			
Test for overall effect: 2	Z = 1.92	! (P = 0.0	5)						
1.2.2 Type 1 and 2 dia	abetes								
Taveira 2011	-7.1	21.5	44	1.8	18.8	44	5.2%	-8.90 [-17.34, -0.46]	
Subtotal (95% CI)			44			44	5.2%	-8.90 [-17.34, -0.46]	
Heterogeneity: Not app	olicable								
Test for overall effect: 2	Z = 2.07	' (P = 0.0	4)						
400T 4 15 1									
1.2.3 Type 1 diabetes									
Singer 2018 (1)	9.2	15.4	14	5.5	15.2	8	2.4%	3.70 [-9.57, 16.97]	
Subtotal (95% CI)	P		14			ð	2.4%	3.70 [-9.57, 10.97]	
Heterogeneity: Not app	Dicable	(D - 0 5	0)						
Test for overall effect.	2 = 0.55	) (P = 0.5	0)						
1.2.4 Type 2 diabetes									
Cohen 2011	-9 19	20 268	50	-0.8	16 746	49	6.5%	-8 39 [-15 71 -1 07]	
Liu 2012	1.48	12.03	98	5.2	12.34	78	14.8%	-3.72 [-7.35, -0.09]	
Singer 2018 (2)	-1.5	12.5	15	10.6	17.3	. 0	2.5%	-12.10 [-25.05, 0.85]	
Taveira 2010	-7.3	20.3	58	-1.7	19.6	51	6.3%	-5.60 [-13.10, 1.90]	
Trento 2010	-5.82	16.531	295	-0.26	17.573	266	17.8%	-5.56 [-8.39, -2.73]	-
Vaughan 2017	-2.9	22.188	25	-3.4	18.943	25	3.1%	0.50 [-10.94, 11.94]	
Wu 2018	-6.9	19.7	99	-8.9	17.4	119	10.8%	2.00 [-2.98, 6.98]	
Subtotal (95% CI)			640			597	61.8%	-4.06 [-6.90, -1.22]	◆
Heterogeneity: Tau <sup>2</sup> =	5.43; Cł	ni² = 10.3	7, df =	6 (P = 0	).11); l² =	42%			
Test for overall effect:	Z = 2.80	(P = 0.0	05)						
			004			004	400.00/	4 50 5 6 66 0 0 0 0	
lotal (95% CI)	474 0	.:2 _ 47 0	964	10 / 5	0.001	001	100.0%	-4.50 [-0.66, -2.34]	<b>▼</b>
Heterogeneity: I au <sup>2</sup> =	4.74; Cr	$11^{\circ} = 17.6$	5, df =	10 (P =	0.06); l²	= 43%			-20 -10 0 10 20
Test for overall effect:	2 = 4.09	P < 0.0	001) 77 af	2 (D	0 40) 12	- 00/			Favours [experimental] Favours [control]
lest for subaroub diffe	rences:	$Cn^{2} = 2.$	//. af =	- 3 (P =	0.43). 12	= 0%			

# 23 SMA also improves many other outcomes

- **Patient behavior**: Self-management: duration of aerobic exercise, increasing over 40 min/week on average
- Process of care: Higher clinician adherence to clinical practice guidelines
- Self-reported outcomes: better health; less days confined to beds
- Less adverse events: More than 50% of patients in the GMC group reported no falls or lightheadedness, compared with 37% in the usual care group
- Economics: SMA patients visited primary care nearly one time more per year, and this difference approached statistical significance. This increase was offset by significant reductions in specialty and emergency room visits. Total health care costs did not differ between the groups; and lower inpatient admissions
- **Patient satisfaction**: no statistical difference, but 91% of the participants wanted to continue SMA at the end of the study, and most (61%) wanted the frequency of the visits to remain at once per month



# 24 实施性研究基本步骤 PEDALs



### 25 关键概念 Key concepts



May need to optimize the health intervention

可能需要优化健康干预本身

culture and climate.

### 26 多阶段优化策略 The multiphase optimization strategy (MOST)



#### The Methodology Center » Research Areas » Optimizing Behavioral and Biobehavioral Interventions

#### OPTIMIZING BEHAVIORAL AND BIOBEHAVIORAL INTERVENTIONS

The content on the Optimization web pages is current. When Linda Collins' new website is launched, the link will be available in this box.

Behavioral and biobehavioral interventions appear throughout society. They are important in many

areas of public health, such as substance misuse, HIV/AIDS, Hepatitis C, smoking cessation, cancer

treatment, weight management, treatment of depression and other mental health problems, and prevention of child maltreatment. They are also important in enhancement of educational

achievement and promotion of human well-being.



Video: Brief overview of MOST

Among the challenges faced by scientists is how to use interventions to achieve the greatest societal benefits. Societal benefit is a function of not only the effectiveness of an intervention, but also its reach. Thus to achieve the greatest societal benefits, it is necessary that interventions be not only effective, but also readily implementable, in other words, scalable. If an intervention is highly effective but too costly or complicated to be implemented widely, it can offer only limited societal benefits. By contrast, scalable interventions, that is, interventions that can be implemented widely and with fidelity without exceeding available resources, have the potential to reach many participants and thereby offer substantial societal benefits. Here the term resources is broadly defined to include, for example, the amount a payer (e.g. insurance company or school district) is willing to pay to implement the intervention; the amount of staff or classroom time that can be spared; and the amount of time participants are willing to devote to completing the intervention.

#### Statistics for Social and Behavioral Sciences

Linda M. Collins

### Optimization of Behavioral, Biobehavioral, and Biomedical Interventions

The Multiphase Optimization Strategy (MOST)





Note: The numbers on the arrows indicate relevant mechanisms as listed in the right side box.

Partially based on: Kirsh, Susan R., et al. "A realist review of shared medical appointments: How, for whom, and under what circumstances do they work?." BMC health services research 17.1 (2017): 1 13.

### 28

### **Optimize SMA components under selected resource constraints**

We are conducting an optimization trial based on factorial design

- highly efficient
- test interactions

Initial selection of candidates component and optimizing criteria of SMA based on literature and expert consensus

			≤ 8	优化标准 Opt 限制条件 3 hours/month	imizing Crit 效果越大起 Health eff	eria 越好 ect
干预 包序 列号 Com binat ion #	成分1: 病情类似患 者共同就医 Compone nt 1: Patients seek care in groups	成分2: 多学科医 疗团队 Compon ent 2: Multi disciplina ry care group	成分3: 线上健康 教育 Compone nt 3: Online diabetic educatio n	额为所需 医务团队 时间 Extra time on providers	患者自我 管理预测 fatient self manage ment	
1	No	No	No	0	35	
2	No	No	Yes	-2	30	
3	No	Yes	No	5	45	
4	No	Yes	Yes	3	40	
5	Yes	No	No	4	55	
6	Yes	No	Yes	2	58	
7	Yes	Yes	No	9	67	
8	Yes	Yes	Yes	7	65	

#### 29 关键概念 Key concepts



Everything else beyond the EBP itself (e.g., Organizational support, financial resources, social relations and support, leadership, and organizational culture and climate.

#### 需要寻找促进EBP实施的环境因素

Need to identify the contextual determinants to the implementation of the EBP

# 30 框架式思维 Framework-based thinking

- 实施科学研究的各个环节都大量使用框架 Implementation scienc uses frameworks across all processes of the implementation
- 建立框架式思维 Criticial to establish a way of framework-driven thinking
  - 站在巨人的肩膀上 Standing on the shoulders of many giants
  - 框架让思维全面、有条理 Frameworks make your thinking more comprehensive and logical
  - 理论型的框架提供因果的关系 Theories and models provide insight for the program theory
- 2012年系统评价找到100多实施科学框架,目前框架仍在增加 Many frameworks and the numbers are still on the rise
- 框架 "出生不平等" (以下为基于所有框架的"荟萃"框架) Not all frameworks are equal; some frameworks are synthesized ones
  - Consolidated Framework for Implementation Research (CFIR) 实施性研究荟萃框架
  - Theoretical Domains Framework (TDF)
  - Tailored Implementation for Chronic Diseases (TICD)



without frameworks



#### With frameworks





### 33 Consolidated Framework for Implementation Research (CFIR)



- CFIR developed in 2009
- Started on Greenhalgh (2004) et al.'s synthesis of nearly 500 published sources across 13 fields
- Include Grenhalgh plus
   18 other sources such as PARiHS, PRISM
- Provide a taxonomy of 39 constructs across 5 domains: a menu of constructs; a metatheoretical framework

Source: Damschroder L J, Aron D C, Keith R E, et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science[J]. Implementation science, 2009, 4(1): 1 15.



Adapted / Source: http://www.normalizationprocess.org/

#### 常态化理论

Normalization process theory (NPT)

# 在框架指引下探究实施的障碍和促因 Use frameworks to guide the exploration of barriers and facilitators to the implementation of an EBP

- 利益相关方分析 Stakeholder analysis
  - Community engagement & involvement (CEI)
- 用"determinant"决定因素框架来探究实施的障碍和促因 (也就是determinants) Use determinant frameworks to guide the process
- 在框架指引下采用定性和定量的方法 Mixed quantitative and qualitative methods under the guide of the frameworks (Framework-driven mixed methods). e.g.,
  - 用框架指引调查表的设计 Design of survey forms
  - 用框架指引深度访谈的提纲 Design of the interview guide
  - 用框架来分析数据 Use the framework to analyze the data



# Barriers to implementation of SMA from available studies



#### **Poor attendance**

- Lack of interest
- Content of SMA not meet patient needs
- Significant time and effort required
- Challenges of scheduling
- Frail patients



# Group dynamic incompatibilities

- Some patients are uncomfortable with group interaction
- Some patients desire for more privacy
- Some physicians are uncomfortable leading group discussions



Staff / facilities inadequacies

- Additional training required of study clinicians
- Required monitoring to maintain patient interaction
- Many physicians feel the traditional individual appt model they're trained for is the best form of care
- Support of community committee is needed



Cost-benefit concerns

- Economic advantages depend on group size
- Benefits are invisible to clinic staff, making ongoing support difficult

# 37 实施性研究基本步骤 PEDALs



## 38 确定实施策略Identify implementation strategies

- Match implementation techniques to each barriers 为每一个实施障碍找 到一个针对性的解决手段
- Combine the implementation techniques to form the complete implementation package (ie, implementation strategy) 将各个针 对性的解决手段有机的组合在一起,形 成完整的实施策略



ERIC implementation strategy taxonomies

Expert Recommendations for Implementing Change (ERIC) project

### 39 Methods to match and tailor strategies to barriers

- Under-researched area in IS
- Powell suggests four methods
  - **Concept mapping** (visual mapping using mixed methods): A mixed methods approach that involves generating, structuring, and analyzing ideas to create a visual map of concepts that are rated on specified dimensions (e.g., importance and feasibility)
  - Group model building (causal loop diagrams of complex problems): A system dynamicsbased method that involves engaging stakeholders in the collaborative development of causal loop diagrams that model complex problems to identify opportunities and strategies for improvement
  - Conjoint analysis: A quantitative method that requires participants to select different "product" profiles, which allows for the determination of how they value different attributes of products, services, interventions, implementation strategies, etc.
  - Intervention mapping (systematic multi-step development of interventions): A systematic, multi-step method for developing interventions (or implementation strategies) that is inherently ecological and incorporates theory, evidence, and stakeholder perspectives
- All those methods extensively used in other fields but not as much in IS





Source: Green, A. E., Fettes, D. L., & Aarons, G. A. (2012). A concept mapping approach to guide and understand dissemination and implementation. The journal of behavioral health services & research, 39(4), 362-373. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC38411 08/

# Discrete choice experiment (DCE) to tailor implementation strategies for SMA

DEC widely used in health economics but not as much in IS

- DCE belongs to methods in conjoint analysis
- DCE extensively used in health economics in understanding preferences for health products and programs
- Ramzi reviews (2017) identified 22 DCE studis comparing implementation strategies

Use of DCE in our SMA study

- Choice sets (or "products") of implementation strategies to be developed through initial review of literature and expert mapping of ERIC technique (via Delphi method) to barriers identified in implementing SMA (Using Audit and Feedback as an example of implementation strategy)
- · Attributes and their levels determined for Audit and Feedback
- · Stakeholders select from choice sets side-by-side
- Statistical analysis can determine how preferences are influenced by each attribute, as well as their relative importance
- Attributes can be quantitatively valued in terms of stakeholders' "willingness to pay"

Attributes of Au	Choice 1	Choice 2			
Format of	Verbal	X			
feedback	Written		Х		
Recipients of feedback	Individual	Х	X		
	Group				
Source of	Influential sources	Х			
feedback	Other sources		X		
Delivery of	By email/post	Х	Х		
feedback	In person				
Frequency of	Monthly	х			
feedback	Every 4 months		X		
Instructions for	Explicit, measurable target, but no action plan	х			
improvement	Action plan, but no explicit target		X		
Complementary strategies to	1000 RMB for participation in SMA	x			
A&F (Incentives)	500 RMB	х			
Which set would you prefer as our approach to improve SMA in your organization?					

# 41 实施性研究基本步骤 PEDALs



# 42 混合设计 hybrid designs: SMA to use type II

**EBP Trial** + Observe & collect implementation data 检验EBP的效果&观察和收集实施 信息

Type I Hybrid 一型混合设计

#### EBP + Implement-ation Trial

Test effects of EBP and delivery system (implementation strategies) of EBP

同时检验EBP本身的效果&实施EBP的 措施的效果

Type II Hybrid 二型混合设计 ImplementationTrial + Observe & collect health information 检验实施EBP措施的效果&观察和收 集健康信息

Type III Hybrid 三型混合设计

#### SMA study to use hybrid II design

- Optimized SMA still need to be validated in China for its effectiveness in clinical/health outcomes
- Implementation strategies (tailored audit & feedback) also need to be tested for its effectiveness in implementation outcomes



### **Stepped Wedge**

#### **Design considerations**

- Allow gradual implementation SMA (important considering our limited implementation capacity)
- All sites eventually receive SMA (Ethically sound)
- Same sample size, much higher statistical power

#### **Complications:**

- Analysis more complicated, particularly considering that we have embedded an implementation trial of A& F with the effectiveness trial of SMA
- Project longer than traditional RCTs

	Counties		Tir	ne			
0 ers)		Month 1-3	Month 4-6	Month 7-9	Month 10-12	Month 13-15	Month 16-18
nd 1 Clust	1	0	1	1	1	1	1
ies a ers (C	2	0	0	1	1	1	1
ount Cente	3	0	0	0	1	1	1
5 C HC (	4	0	0	0	0	1	1
P	5	0	0	0	0	0	1

#### **Effectiveness trial**

- 1: Implement Shared Medical Appointment (SMA)
- 0: Not implementing SMA (Control)

#### Implementation trial

For each county, one PHC center randomized into Audit & Feedback and the other into another usual implementation approach

### 44 确定实施结局和评估 Determine implementation outcomes

服务结局 患者结局 实施结局 Service Outcomes **Implementation Outcomes Individual Outcomes** 效率 efficiency 接受度 acceptability 发病率 incidence 安全性 safety 采用率 adoption 死亡率 mortality 有效性 effectiveness 费用 cost 健康情况 health status 公平性 equity 可行性 feasibility 生活质量 quality of life 患者为中心 保真性 fidelity patient centered 渗透率 penetration 及时性 timely 可持续性 sustainability

Equity/Distribution

Absolute obtainment

# 45 实施科学常用的评估框架 RE-AIM

- **Reach (**人群覆盖) the target population
- **Effectiveness** (干预效果) of the intervention
- Adoption (机构采用) by target staff, settings, or institutions
- **Implementation** (干预实施) consistency, fidelity, costs, and adaptions made during delivery
- Maintenance (效果维持)of intervention effects in individuals and settings over time



# 46 Measurement tools for fidelity of implementation

Will unannouced standardized patients play a role?

- Control for case mix (patients fixed)
- No Hawthorne effect
- Direct measurement
- Qickly enable A&F

BMJ Open Using smartphone-based virtual patients to assess the quality of primary healthcare in rural China: protocol for a prospective multicentre study

Jing Liao,<sup>1</sup> Yaolong Chen,<sup>2</sup> Yiyuan Cai,<sup>3</sup> Nan Zhan,<sup>4</sup> Sean Sylvia,<sup>6</sup> Kara Hanson,<sup>6</sup> Hong Wang,<sup>7</sup> Judith N Wasserheit,<sup>6</sup> Wenjie Gong,<sup>9</sup> Zhongliang Zhou,<sup>10</sup> Jay Pan,<sup>11</sup> Xiaohui Wang,<sup>12</sup> Chengxiang Tang,<sup>13</sup> Wei Zhou,<sup>14</sup> Dong Xu<sup>1</sup>

et al. Using smartphone-	Introduction Valid and low-cost quality assessment	Strengths and limitations of this study
sed virtual petients to ones the quality of primary indificants in numl China obcol for a prospective whitemets estays, BMJ Open 119.Bis/Q20143. doi:10.1136/ mjopen-2017-020043 - Propublication history and difficient instantial for this open are anallable colline. To one them Files, pleasa visit is journed colline (http://dx.doi. vm10.1136/brunner-2017-	tools summing care quality are not smally wavablek. The unarrecords chardeniced patient (GS), the gold statication for associating quality, in costly to implement while the laser charding-to Competition of the single-the topological topological topological technological technological technological technological sector hapd charding and interactive simulations of doctor- selecting and unalised in crash scale and any interactive simulations and analysis. The staty will be implemented technological and analysis. The staty will be implemented topicars handle correst splical technological sectors and smean technological and analysis. The staty will be implemented topicars handle correst splical technological sectors and smean technological sectors splical technological sectors and smean technological sectors and sectors and smean	<ul> <li>Denskrige and validity prastphore-based du- hala paterk VII on a outph assessment tool for research and nutrits use in rular prinary halfbare centre.</li> <li>Foldwing all evidence-based approach is divelop W cases and consequentiation.</li> <li>a conse-safetical institution to the output of the same state of the same state proceeding and which the VP assessment but its P the exected to which the VP assessment to the same state of the same state of the same state prototomers' real clinical practice media to be writind.</li> </ul>
Sources, and the source of the sources of the sourc	Observe provides, and rejuscians protocoling at broading which souths and which devises all is a cert with re- presentation of the south of the south of the south of the south of the south of the south of the south south of the south protocol of the south of the south of the south of the south of the south of the south of the south of the south of the south protocol of the 10 for south of the south of the south of the south of the south of the south of the south of the south of the south of the south of the 2017-2017. South of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017. South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017. South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the south of the 2017-2017, South of the south of the south of the south of the	quality of care is poor. Despite efforts devote to improve the devote of the quality or lock of strending events, where it is that of strending events and the quality or particularly of lowincomes and middlesine more commits (LMCs). <sup>24</sup> The theory of evolves and or balle, here can decay to improve the strength of the devote and care to improve the strength of the devote strength of energy (see the strength of the strength of energy (see interaction), and the strength of the strength of the strength of energy (see the interaction) of the strength of energy (see the strength of energy (see the interaction) and public metanose (see the strength of energy (see the interaction) and public metanose (see the strength of energy (see the interaction) and public metanose (see the strength of energy (see the interaction) and public metanose (see the strength of energy (see the interaction) and strength metanose (see the strength of energy (see the interaction) and strength metanose (see the strength of energy (see the interaction) and strength metanose (see the strength of energy (see the interaction) and strength metanose (see the strength of energy (see the interaction) and strength metanose (see the strength of energy (see
Check for updates		measures are being used, because of their advantance in terms of frequent and timely
3 Author(s) (or their mployed)(2018, Re-use emittad ualder CO BrVAE. No commercial ne-use. See rights nd permissions, Published by MJ. isr numbered attiliations see red of article. Cerrespondence to tr Osna Xu:	INTRODUCTION Universal health coverage (UHG) is a para- mount goal of health system development for countries at all income levels. <sup>1</sup> The achieve- ment of UHC is not possible without primary healthcare services, <sup>1</sup> which ensure integrated care close to the population they serve and link to the health-related sustinable devel- opment goals. <sup>2</sup> However, service coverage	evaluation and the usefulness in improving practice? <sup>18</sup> The 'gold standard' of assessing process is the unannounced standardised patient (USP), namely a trained actor whs simulates the symptoms, signs and emotions of a real patient in a standardised fashion and presents himself or herself unannounced to dinks to assess care quality. <sup>11</sup> USP can reduce recall bias better than patient exit
xudong5@mail.sytu.edu.cn	alone cannot improve health outcomes if the	interviews, minimise the Hawthorne effect
BMI	Lian J, et al. BMJ Open 2018;8x6020043. doi:10.1136/br	njopen-2017-020943

BMJ Global Health	Using unannounced standardised patients to obtain data on quality of care
	in low-income and middle-income
	countries: key challenges
	and opportunities

Viprint Wiseman,<sup>912</sup> Mykere Lagarde,<sup>8</sup> Rosanne Kovece,<sup>2</sup> Luh Pott Lia Wulandan,<sup>1</sup> Timothy Powell-Jackson,<sup>1</sup> Sestica King,<sup>2</sup> Catherine Goodman,<sup>8</sup> Kare Hanson,<sup>9</sup> Rosalind Miller,<sup>2</sup> Dong Xu,<sup>4</sup> Marco Liverai,<sup>62</sup> Shurmay Yuang<sup>1</sup> Dunisiani Hoomahe,<sup>4</sup> Mishal Kham,<sup>2</sup> Ronale Burger,<sup>1</sup> Carmon S Christian,<sup>9</sup> Dunan Blazuw,<sup>9</sup> On behalf of Members of the Standardised Patients Working Group

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Primary heAlth Care quAlity Cohort In ChinA (ACACIA study)





# We are recruiting post doctoral fellows in implementation science, health systems, health

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# Back up slides

### 实施性研究的研究设计Research designs in implementation studies



与健康干预类似,实施科学需要开展高质量研究,以提供实施策略是否有效的高等级证据 Implementation science need high-quality studies to provide evidence for the effectiveness of implementation strategies 但实施性研究需在真实世界开展的属性,决定 其研究设计在广泛吸收其他领域已有研究设计 的基础上具有一些独特性 But as implementation research need to be conducted in real world settings, its

research designs have some unique

characteristics, while harnessing the

fields

benefits of existing designs used in other

### 准试验 Quasi experiment

### 实施研究常常无法开展RCT

### RCT not possible for all

### implementation research

### 准试验

- 近似于随机分组 "as if randomized"
- 干预的分组与结局指标无关Group assignment exogenous

### 准试验Big Five

- Instrumental variable
- Regression discontinuity
- Interrupted time series
- Difference-in-differences
- Fixed effects design