



A Compositional Personalization Approach for Designing Personalized Patient Educational Interventions for Cardiovascular Risk Management

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Patient Education

- ❖ **Disease prevention is commonly addressed through patient education**
 - ❖ Clinical guidelines provide treatment targets
 - ❖ Education can be embedded in behaviour theory-based intervention
- ❖ **Personalized web-mediated educational interventions**
 - ❖ **Personalization** increased attention → greater interest in self-care management
 - ❖ **Web-based** interventions improve behavioural change outcomes



Introducing PULSE

❖ Objective

- ❖ To provide patients with personalized educational messages to help self-management of Cardiovascular Disease (CVD) risk factors
- ❖ Combine behavioural and health determinants to generate personalized educational messages

❖ Solution

- ❖ Personalized patient education – fine-grained patient-specific messages
- ❖ Web-based access

❖ System

- ❖ **PULSE = Personalization Using Linkages of SCORE and behaviour change readiness to web-based Education**

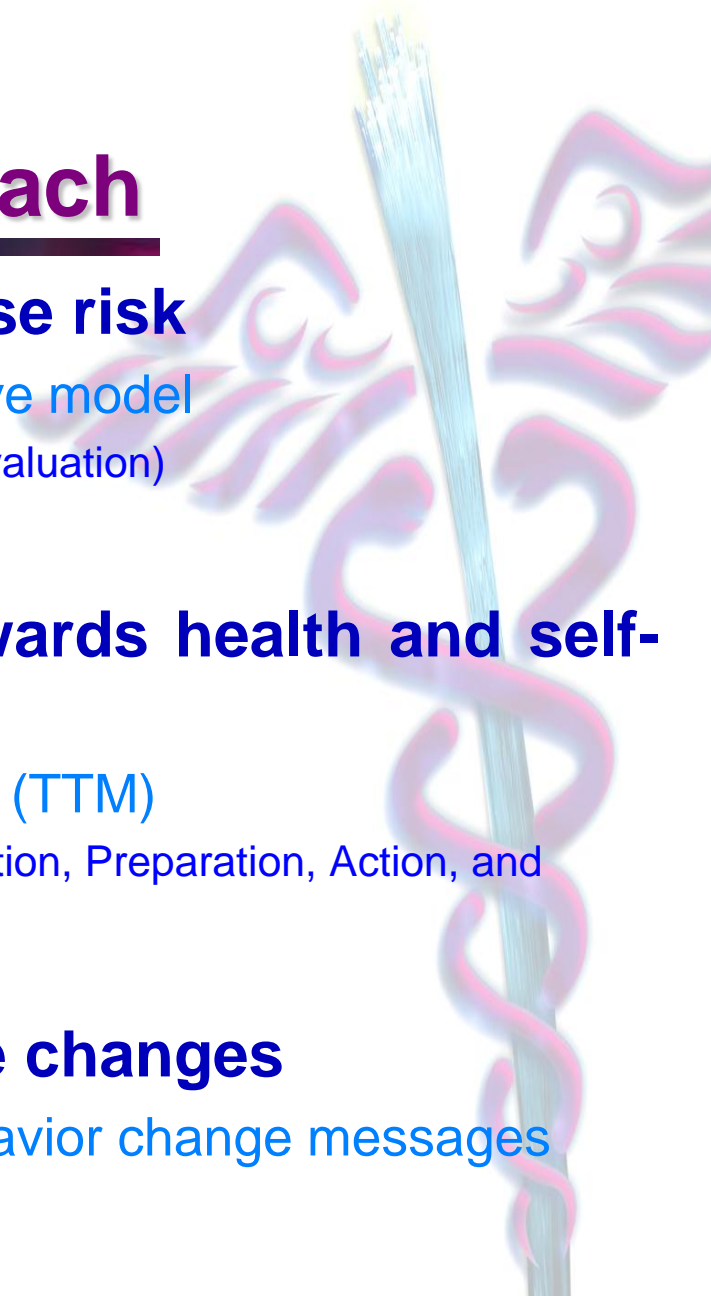
Our Patient Education Approach

- ❖ **Assess patient risk of cardiac disease risk**
 - ❖ Risk Assessment Model - 10 year predictive model
 - ❖ European SCORE (Systematic COronary Risk Evaluation)

- ❖ **Determine the patient's attitude towards health and self-management**
 - ❖ Stages of Change Behavior Change Model (TTM)
 - ❖ Stages of Change: Precontemplation, Contemplation, Preparation, Action, and Maintenance.

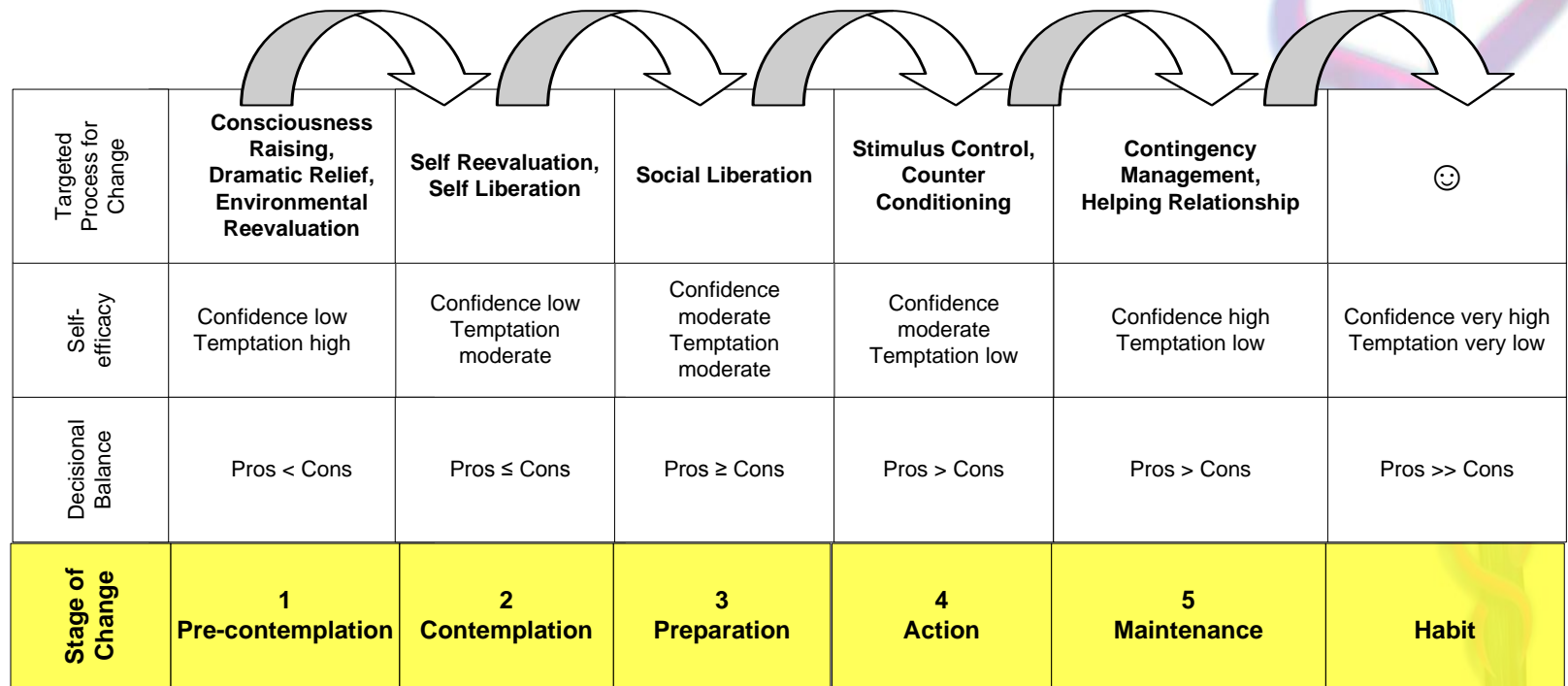
- ❖ **Educate the patient towards lifestyle changes**
 - ❖ Combine evidence based content with behavior change messages

- ❖ **Personalize the educational material**
 - ❖ Target messages to both the patient's behavior and health conditions



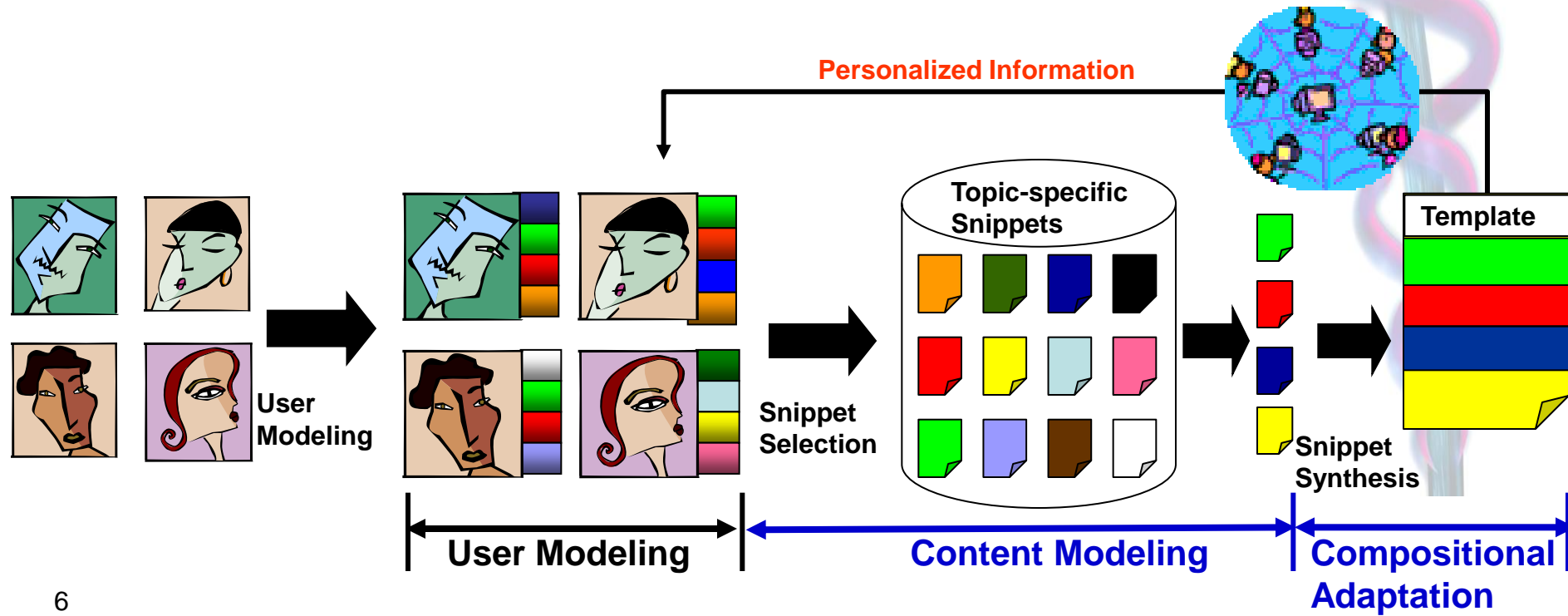
Behavioral Change Model

‘Determine the patient’s behavioral attitude towards cardiac risk management

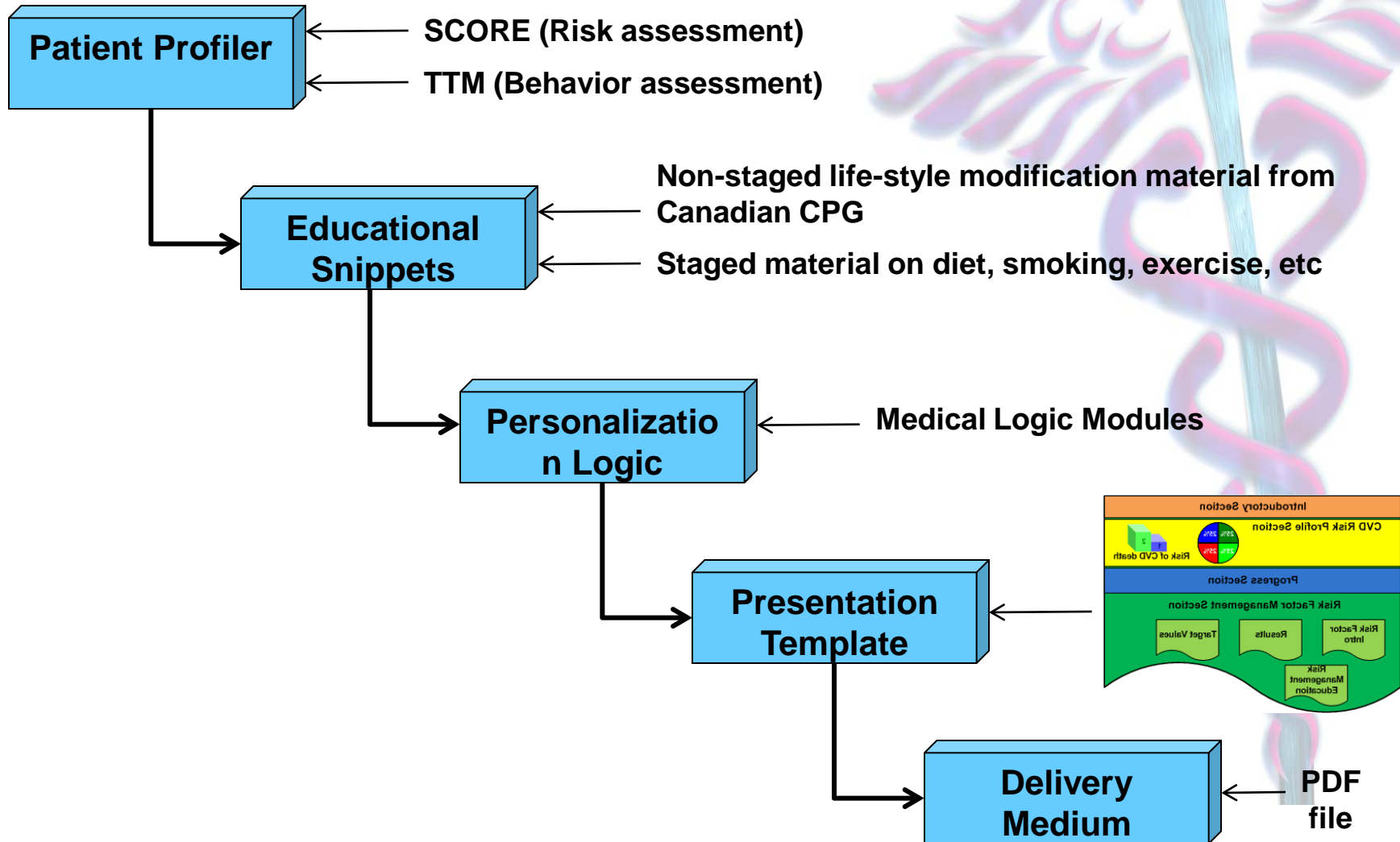


Our Information Personalization Approach

- ❖ **User Modeling**
 - ❖ Patient's profile based on health risk and behavioral attributes
- ❖ **Content Modeling**
 - ❖ Snippets – Short topic-specific educational messages
- ❖ **Compositional Adaptation**
 - ❖ Select and synthesize patient-specific snippets



PULSE Components



Personalizing Patient Information

- ❖ **Personalization is achieved by:**
 - ❖ Diversity of snippets selected for different patients
 - ❖ Diversity of the number of messages received by different patients
 - ❖ Relevance of the messages to the patient
 - ❖ Connectness of the messages



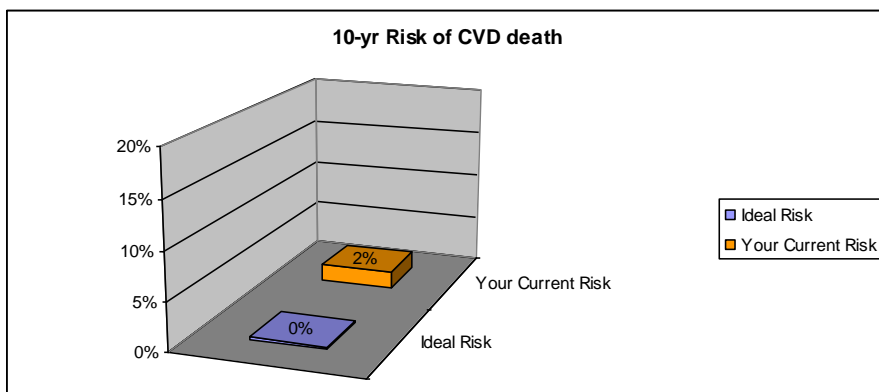
Personalized Information in PULSE

| CVD Risk Factor | Patient #1 Data | No. of Messages |
|-----------------|-----------------|-----------------|
|-----------------|-----------------|-----------------|

| | | |
|-------------------------|----------------------------------|---|
| | 48 yr old diabetic female | 2 |
| Smoking | non-smoker | 0 |
| Blood Pressure | 135/88 | 0 |
| Lipid Profile | TC:HDL cholesterol = 6.2 | 4 |
| Glycemic Control | FPG = 6.3 mmol/L | 2 |
| Depression | No | 0 |
| Exercise | 1x/ week, Stage 2 | 6 |

Total Messages 14

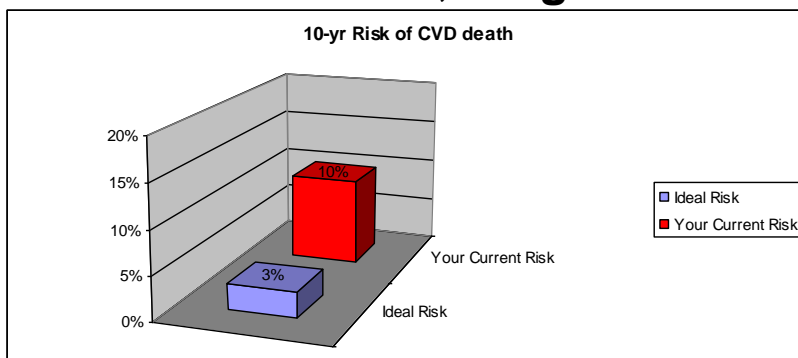
CVD Risk = 2% (Moderate)



Personalized Information in PULSE

| CVD Risk Factor | Patient #2 Data | No. of Messages |
|-------------------------|--|-----------------|
| | 60 yr old hypertensive male family history = heart disease | 4 |
| Smoking | currently smoking, Stage 2 | 4 |
| Blood Pressure | 145/98 | 3 |
| Lipid Profile | TC:HDL cholesterol = 4.3 | 4 |
| Glycemic Control | FPG = 5.8 mmol/L | 0 |
| Depression | Yes, Stage 2 | 2 |
| Exercise | 0x/ week, Stage 1 | 4 |
| Total Messages | | 21 |

CVD Risk = 10% (High)



Personalized Patient Education Document



Molly Adams' Personalized Education for the Management of Cardiovascular Disease Risk

Examination date: 2010-09-13

Healthcare Practitioner: Guest Account

Personalized Patient Education Document

PULSE Document for Molly Adams

Table of Contents

| | |
|--------------------------------------|---|
| CVD Risk Profile | 1 |
| Progress Charts | 2 |
| Clinical Data | 3 |
| Managing Blood Pressure..... | 3 |
| Lipid Profile | 3 |
| Weight Management..... | 3 |
| Glycemic Control..... | 4 |
| Lifestyle | 5 |
| Smoking Cessation | 5 |
| Managing Stress | 5 |
| Exercise | 5 |
| Healthy Eating..... | 5 |
| General risk conditions | 7 |
| Age..... | 7 |
| Gender | 7 |
| Personal Health History | 7 |
| Family Health History | 7 |
| Physician Comments | 7 |
| External links | 8 |

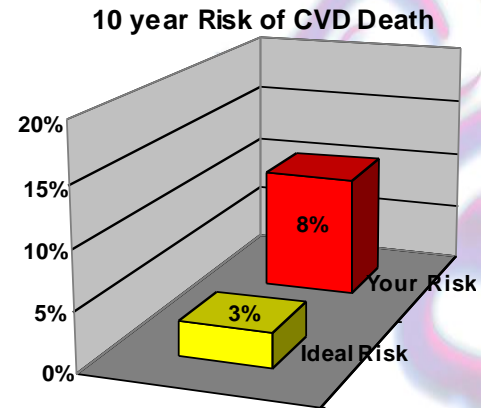
PULSE Output

❖ Patient receives:

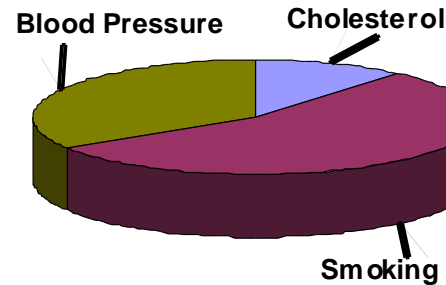
1. Risk Profile including:

❖ graph of 10 yr risk of CVD event; and

❖ risk factor contribution chart



Contribution of Risk Factors to Total CVD Risk



2. Patient also receives personalized educational messages to manage risk

Patient Evaluation Study

❖ Survey-based pilot study

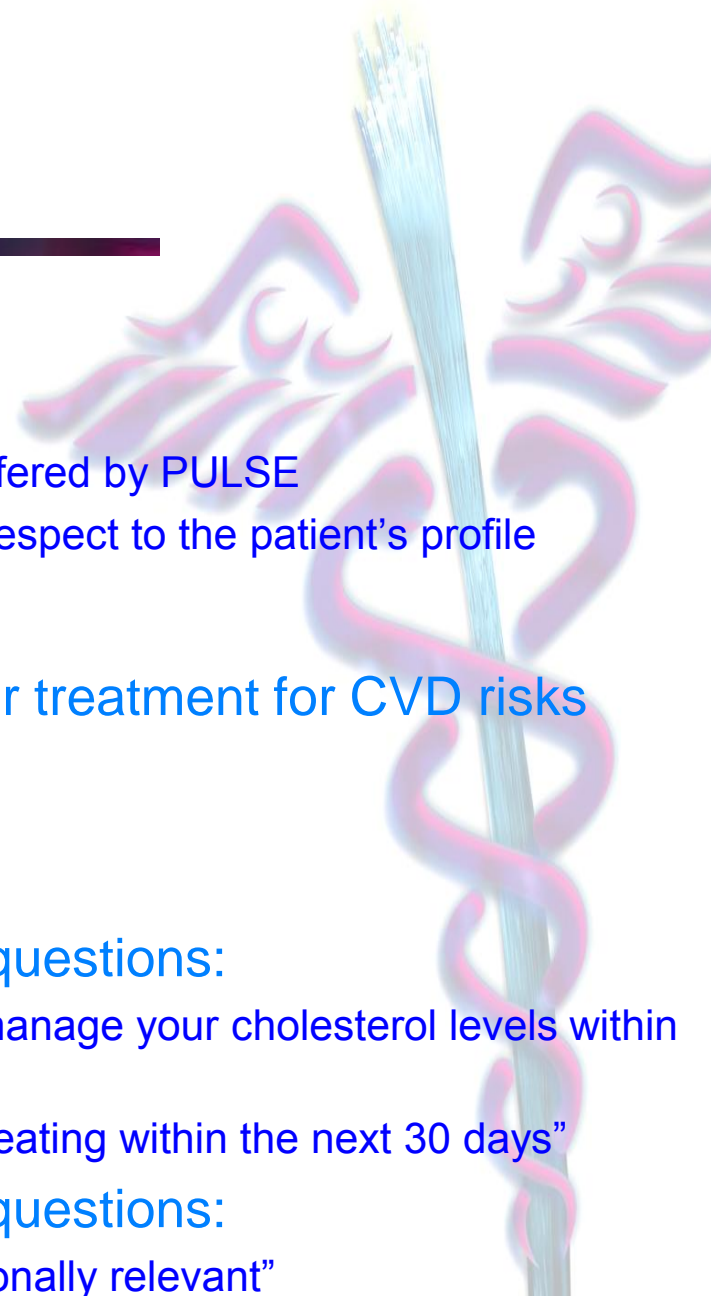
- ❖ 22 questions using 5-point Likert scales
 - ❖ Patients' willingness to follow the suggestions offered by PULSE
 - ❖ Quality of the information being presented with respect to the patient's profile

❖ Subjects

- ❖ Six (6) patients with CVD risk factors under treatment for CVD risks

❖ Results

- ❖ 83% of the responses were POSITIVE to questions:
 - ❖ "Do you intend to try any of the suggestions to manage your cholesterol levels within the next 30 days" or
 - ❖ "Do you intend to try the suggestions to healthy eating within the next 30 days"
- ❖ 91% of the responses were POSITIVE to questions:
 - ❖ "The information on each of the topics was personally relevant"
 - ❖ "The information on each of the topics was individualized"



Concluding Remarks

- ❖ **Combination of evidence-based medical content with behavioral models**
- ❖ **Targeting both disease management and behavior change**
- ❖ **Compositional adaptation approach allows fine-grained personalization**



Thank You

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