



香港中文大學
The Chinese University of Hong Kong



香港中文大學醫學院
Faculty of Medicine
The Chinese University of Hong Kong

Blood Pressure Management with New Technology

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Background



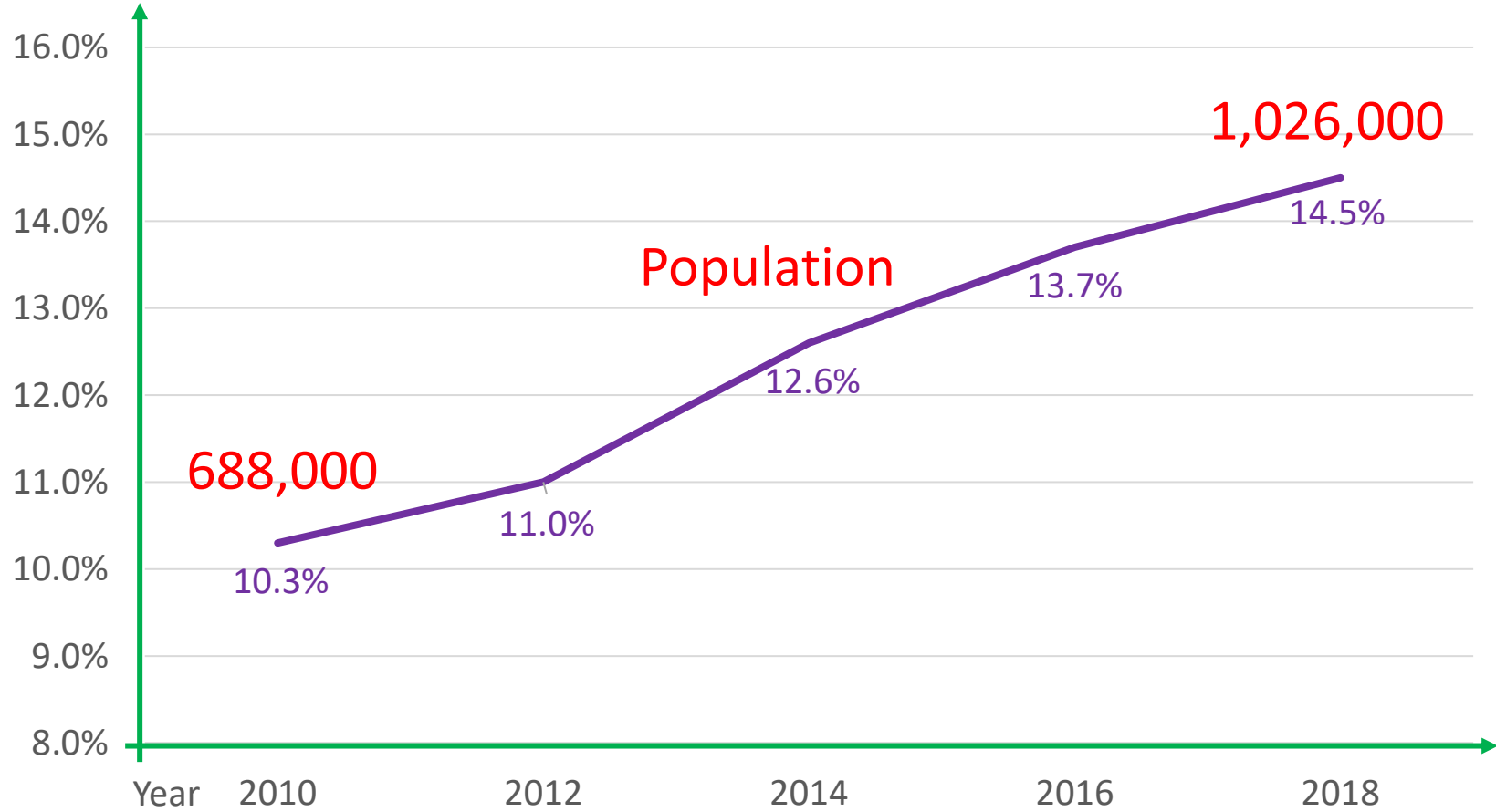
Heart Attack is called
SILENT KILLER

NO obvious symptoms, but Hypertension

Blood Pressure Measurement

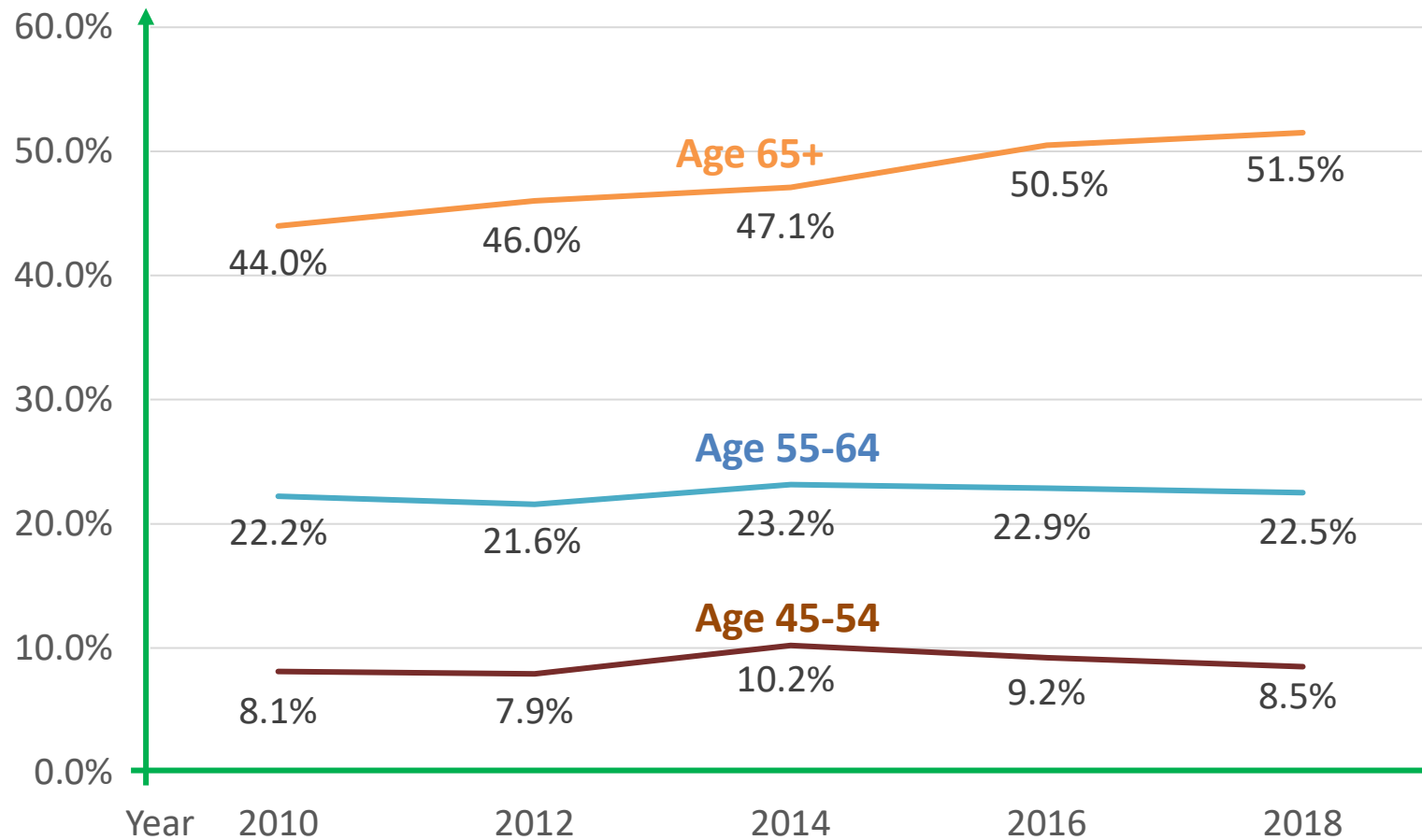


Prevalence of Hypertension in HK



Reference: Thematic Household Survey Report - Report No. 45, 50, 58, 63, 68. Census and Statistics Department, HKSAR.

Prevalence of Hypertension by Age Groups



Reference: Thematic Household Survey Report - Report No. 45, 50, 58, 63, 68. Census and Statistics Department, HKSAR.

Undiagnosed Hypertension

Age Group (Years)	Self-reported, doctor diagnosed hypertension (%)	Undiagnosed but measured (%)	Total (%)
15-24	1.0	3.4	4.5
25-34	0.4	5.2	5.6
35-44	3.9	11.3	15.2
45-54	10.5	16.2 (61%)	26.7
55-64	27.0	19.4 (42%)	46.4
65-84	43.8	20.9 (31%)	64.8
All age groups	14.6	13.2 (48%)	27.7

* The undiagnosed cases were found by self-reported or measured during the health checkup.
Reference: The Population Health Survey 14/15 of the Department of Health, HKSAR.

Diagnosis of Hypertension (Hong Kong)

**Hong Kong Reference Framework
for Hypertension Care for Adults
in Primary Care Settings**

Revised Edition December 2018

Developed by: 基層醫療概念模式及預防工作常規專責小組
Task Force on Conceptual Model and Preventive Protocols

基層醫療工作小組
Working Group on Primary Care



食物及衛生局
Food and Health Bureau

With the professional advice of: 衛生署
Department of Health



醫院管理局
HOSPITAL AUTHORITY



基層醫療
PRIMARY CARE

First published: 2010

Blood pressure classification Note 1	Initial Blood Pressure (mmHg) Note 2, Note 4		Recommended minimum review period Note 3
	Systolic	Diastolic	
Optimal	<120	<80	Recheck in 2 years
Normal	120-129	80-84	Recheck in 1 year
High normal	130-139	85-89	Recheck in 6 months
Grade hypertension	140-159	90-99	Confirm within 2 months
Grade 2 hypertension	160-179	100-109	Evaluate within 1 month
Grade 3 hypertension	≥180	≥110	Further evaluation within 1 week

Note 1. The classification is based on the average of 3 or more properly measured seated blood pressure readings, at least 1 week apart on office visit.

Note 2. If systolic and diastolic categories are different, follow recommendations for shorter review period.

Note 3. Modify review period according to reliable information about past blood pressure measurements, other cardiovascular risk factors, or target organ diseases.

Note 4. When considering a diagnosis of hypertension, measure blood pressure in both arms:

- If the difference in readings between arms is more than 20 mmHg, repeat the measurements.
- If the difference in readings between arms remains more than 20 mmHg on the second measurement, measure subsequent blood pressure in the arm with the higher reading.



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Lessons from Community Care

CUHK Community eHealth Project

- Well-being Survey (WBS) → Baseline characteristics then annual follow-up
- Participants with BP measurement \geq 3 times per week
- Telecare for abnormal BP readings



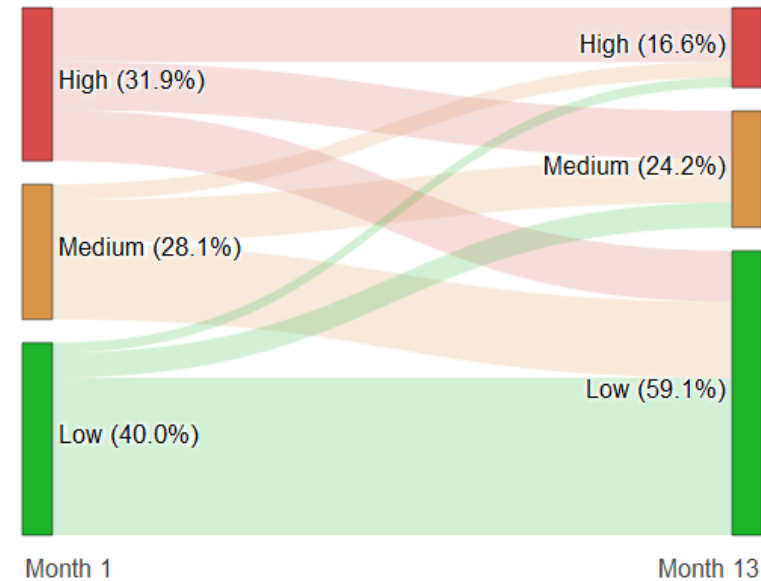
Hypertensive Records over Time

A total of 2,117 participants were follow-up for an year. There were 675 (31.9%) participants classified as high risk group in the 1st month of follow-up. With the same definition, 595 (28.1%) participants and 847 (40.0%) participants were classified as medium and low risk groups.

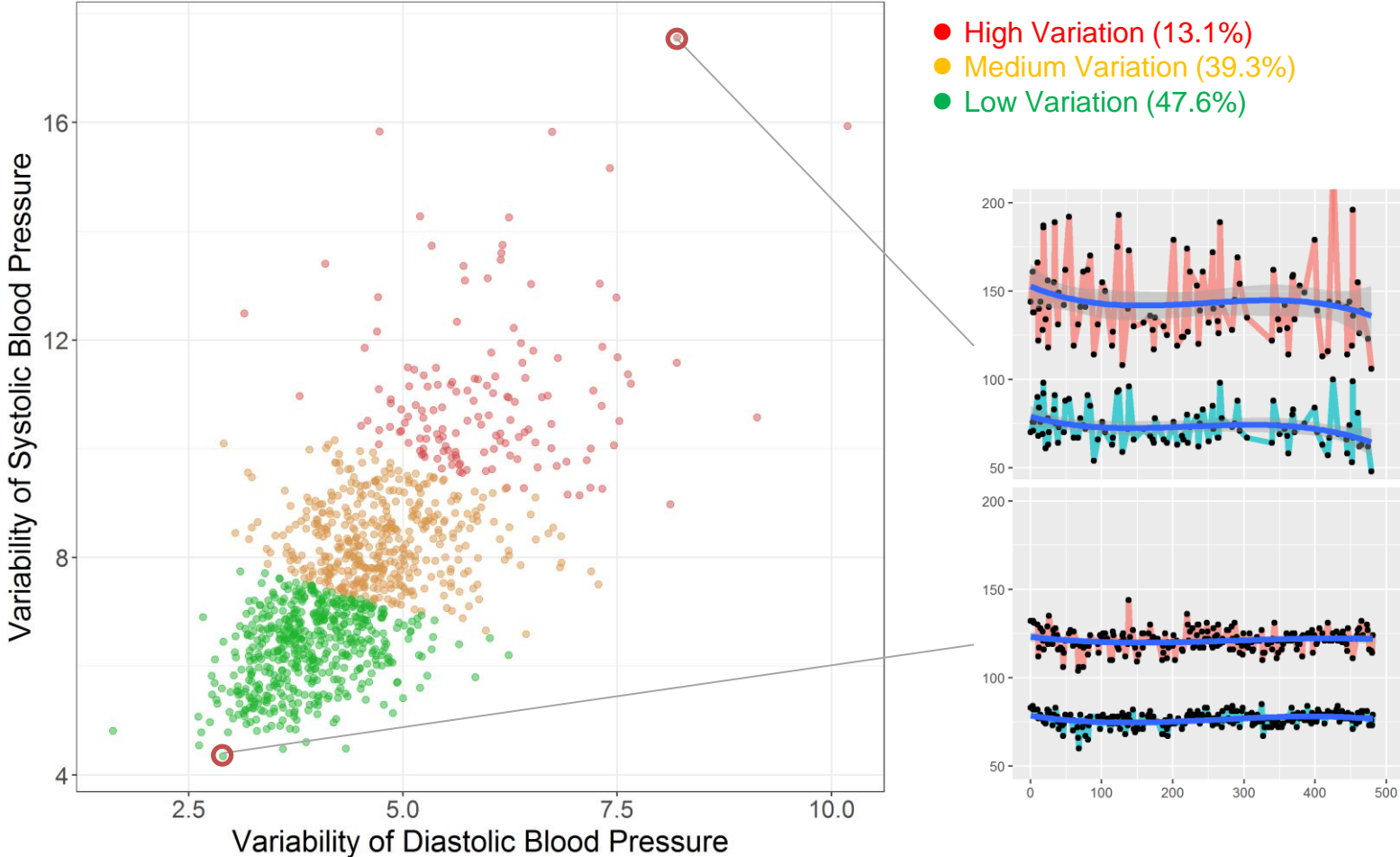
Risk	Proportion of Hypertensive* Records	Proportion of Participants at Baseline
High	More than 50%	31.9%
Medium	Between 20% and 50%	28.1%
Low	Less than 20%	40.0%

*Define SBP greater than 140mmHg

- High: 50% of all SBP records from an individual are above 140mmHg
- Medium: 20%-50% of all SBP records from an individual are above 140 mmHg
- Low: Less than 20% of all SBP records from an individual are above 140mmHg



Classification of Blood Pressure Variability



(Tsoi et al. Hypertension 2020)





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Digital Solution: HealthCap

Knowledge Transfer from CUHK



Smart Health with Data Technology

DeepHealth is a start-up company with a vision to improve population health through digital platforms and data technology. We treasure **talents** from Public Health and Medicine, Computer Sciences and Engineering, Statistics and Data Sciences, as well as Social Work and General Education. **Interdisciplinary training** is our strategic plan on company development. We are located at the Science Park.

Supported by:



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香港中文大學知識轉移基金支持項目



From Traditional to Digital Management

血壓

13号	早上	139-80	下午	138-82
14号	早上	149-96	141-91	77
	晚上	146-90	149-90	68
15	早上	156-100	147-91	77
	晚上	148-90	147-90	64
16	早上	153-102	73	154 92 61
	晚上	140-85	68	125 79 66
17	早上	146-90-74	146-89	74
		122-74	70	117-71
18	早上	140-91	66	130 86 68
	晚上	117-74	125-81	77
19	早上	131-83	69	126-81 68
	晚上	122-73	70	116-76 68
20	早上	123-78	66	127-79 66
	晚上	130-82	64	
1	早上	132-79	66	121 77 65

(Free)



(Accurate)

Free Version for Individual Users



A One-Stop Health Management Platform

Monitor Blood Pressure Regularly

Personalized reports showing blood pressure trend

Heart and Cardiovascular Disease Prevention

Health AI for prediction of elevated health risk

Sharing Disease Prevention and Health Tips

Fulfilling health management needs of individuals, members of family or a society

The image shows a hand holding a smartphone displaying the Health Cap app interface. The app screen has a green header with the logo and a camera icon. Below the header, there are four main menu items: "Take Photo", "Choose from Gallery", "Manual Input", and "Manual Report". In the background, a family of four (two men and two women) are gathered around a table, looking at a smartphone together. The overall scene is set in a bright, indoor environment.

Health Cap 拍健

A one-stop health management platform
Simple, User Friendly and Convenient

- Easy-to-follow user interface with clear instructions
- Screen capture your SBP, DBP and heart rate with your fingertip
- Fulfilling health management needs of individuals, members of family or a society

Download HealthCap now:

Available on the App Store

Google play

人工智慧及數據分析技術支援：Deep Health

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香港中文大學知識轉移基金支持項目

Capture Blood Pressure Readings by Machine Learning



Central Portal and Health Reports



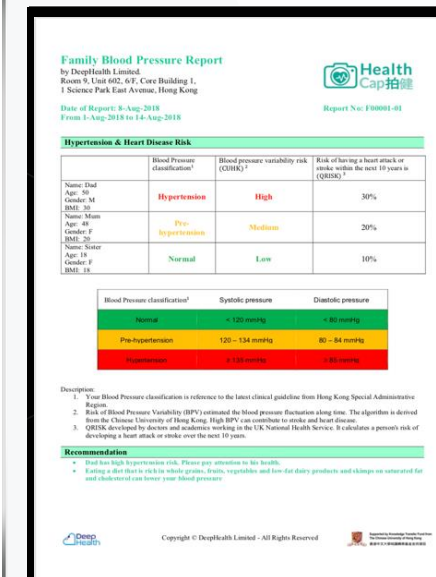
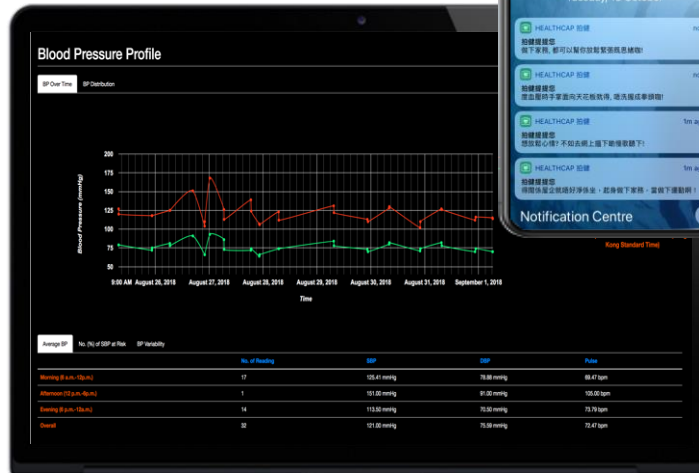
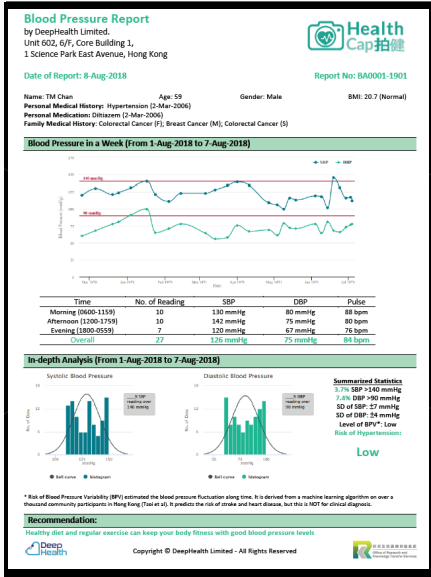
Individual Health Report



Central Portal



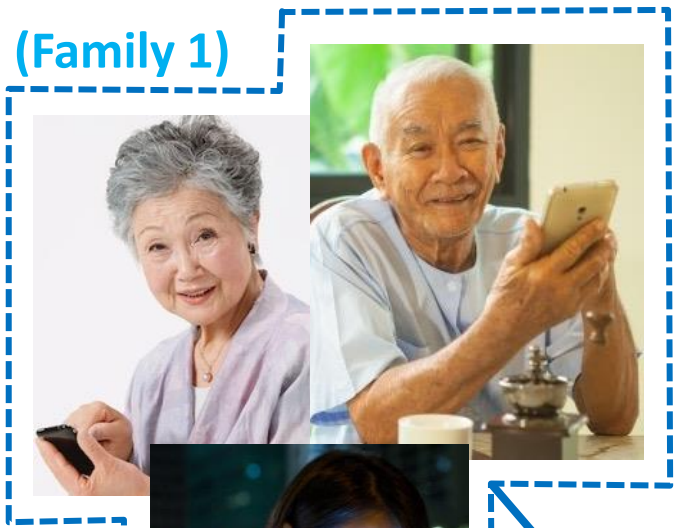
Family Health Report



(Family 2)

(Family 1)

(Family 3)



(Family 5)



(Family 4)

Central Portal

Health Assessment for Caring Plans

Blood Pressure Report

by DeepHealth Limited.
Unit 602, 6/F, Core Building 1,
1 Science Park East Avenue, Hong Kong

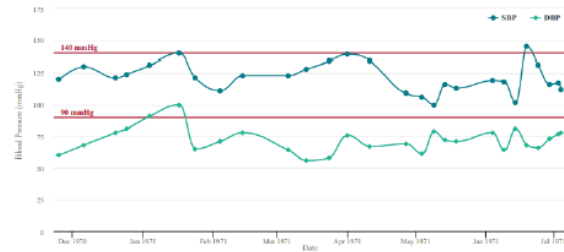


Date of Report: 8-Aug-2018

Report No: BA0001-1901

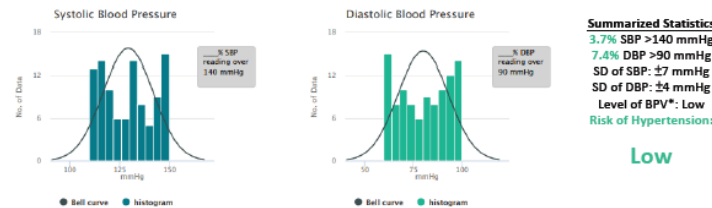
Name: TM Chan Age: 59 Gender: Male BMI: 20.7 (Normal)
Personal Medical History: Hypertension (2-Mar-2006)
Personal Medication: Diltiazem (2-Mar-2006)
Family Medical History: Colorectal Cancer (F); Breast Cancer (M); Colorectal Cancer (S)

Blood Pressure in a Week (From 1-Aug-2018 to 7-Aug-2018)



Time	No. of Reading	SBP	DBP	Pulse
Morning (0600-1159)	10	130 mmHg	80 mmHg	88 bpm
Afternoon (1200-1759)	10	142 mmHg	75 mmHg	80 bpm
Evening (1800-0559)	7	120 mmHg	67 mmHg	76 bpm
Overall	27	126 mmHg	75 mmHg	84 bpm

In-depth Analysis (From 1-Aug-2018 to 7-Aug-2018)



* Risk of Blood Pressure Variability (BPV) estimated the blood pressure fluctuation along time. It is derived from a machine learning algorithm on over a thousand community participants in Hong Kong (Tsoi et al). It predicts the risk of stroke and heart disease, but this is NOT for clinical diagnosis.

Recommendation:

Healthy diet and regular exercise can keep your body fitness with good blood pressure levels



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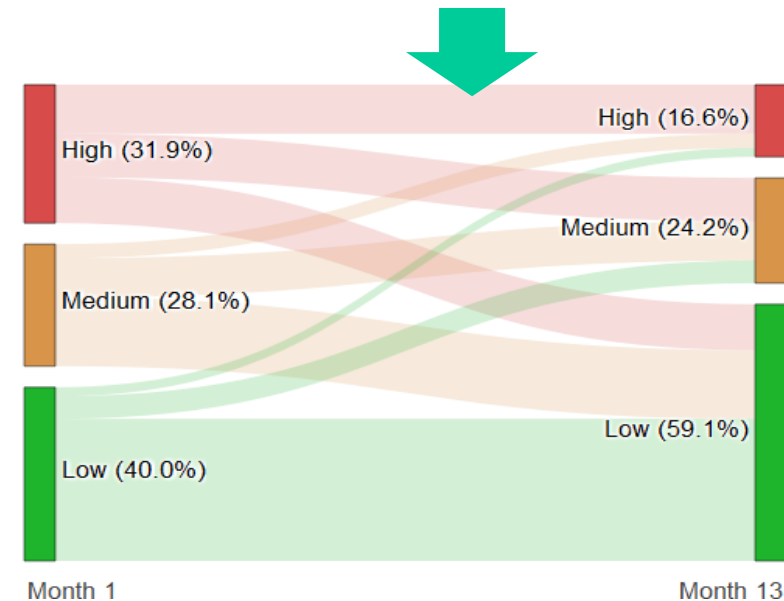


➔
≥30 blood pressure readings in 2 months

Different Caring Plans

- Relax Group (暢懷組)
(≤20% SBP readings above normal*)
- Leisure Group (開懷組)
(>20% & ≤50% SBP readings above normal*)
- Caring Group (關懷組)
(>50% SBP readings above normal*)

* Normal SBP at home monitoring is 135mmHg



Family Engagement Version

- Better Engagement with Family Support
- Develop Family Profile
- Insight on Family Data
- Improvement of Family Relationship



Thank You

Welcome for Questions and Comments!



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