



TEXAS WOMAN'S
UNIVERSITY

IRENE R. WOLF, DNP-c, APRN, FNP-C

An evidence-based remote patient monitoring (RPM) curriculum development: A descriptive pilot study for N5143/N6943 Technology Enhanced Health Promotion

NOVEMBER 22, 2019

Introduction

1

- This project is personal

2

- Shortage

3

- Baby boomers

4

- Chronic disease management

5

- Currently, no curriculum for RMP

CAUSES OF SHORTAGE – NATIONALLY

Exhibit ES-1: Total Projected Physician Shortfall Range, 2017-2032

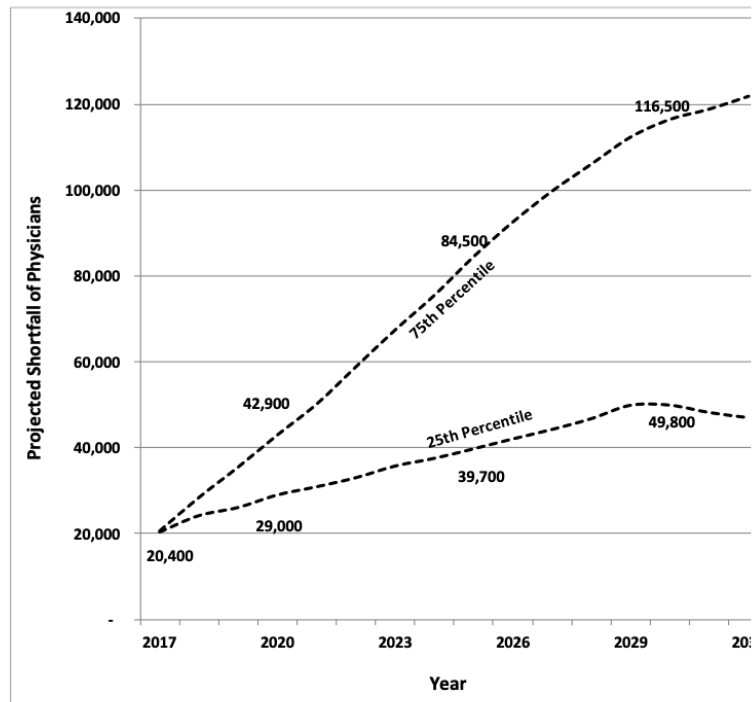


Exhibit ES-1: As complex systems have internal “checks and balances” to avoid 75th percentile of the shortage projections reflects the most likely outcomes over time, reflecting growing uncertainty in key supply and demand trends. The total of physicians in 2032 is between 46,900 and 121,900.

Exhibit ES-2: Projected Change in Physician Supply by Specialty Category, 2017-2032

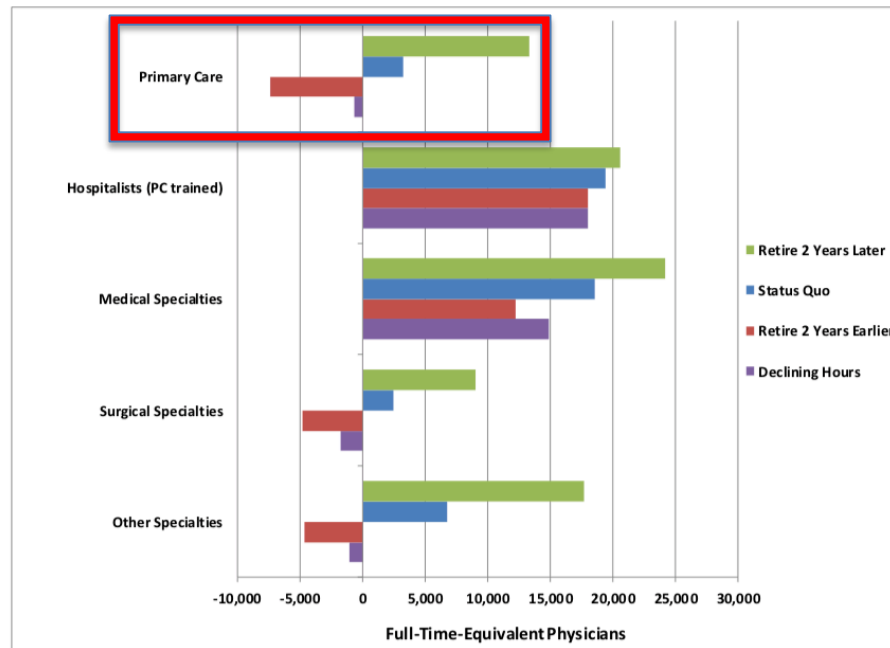
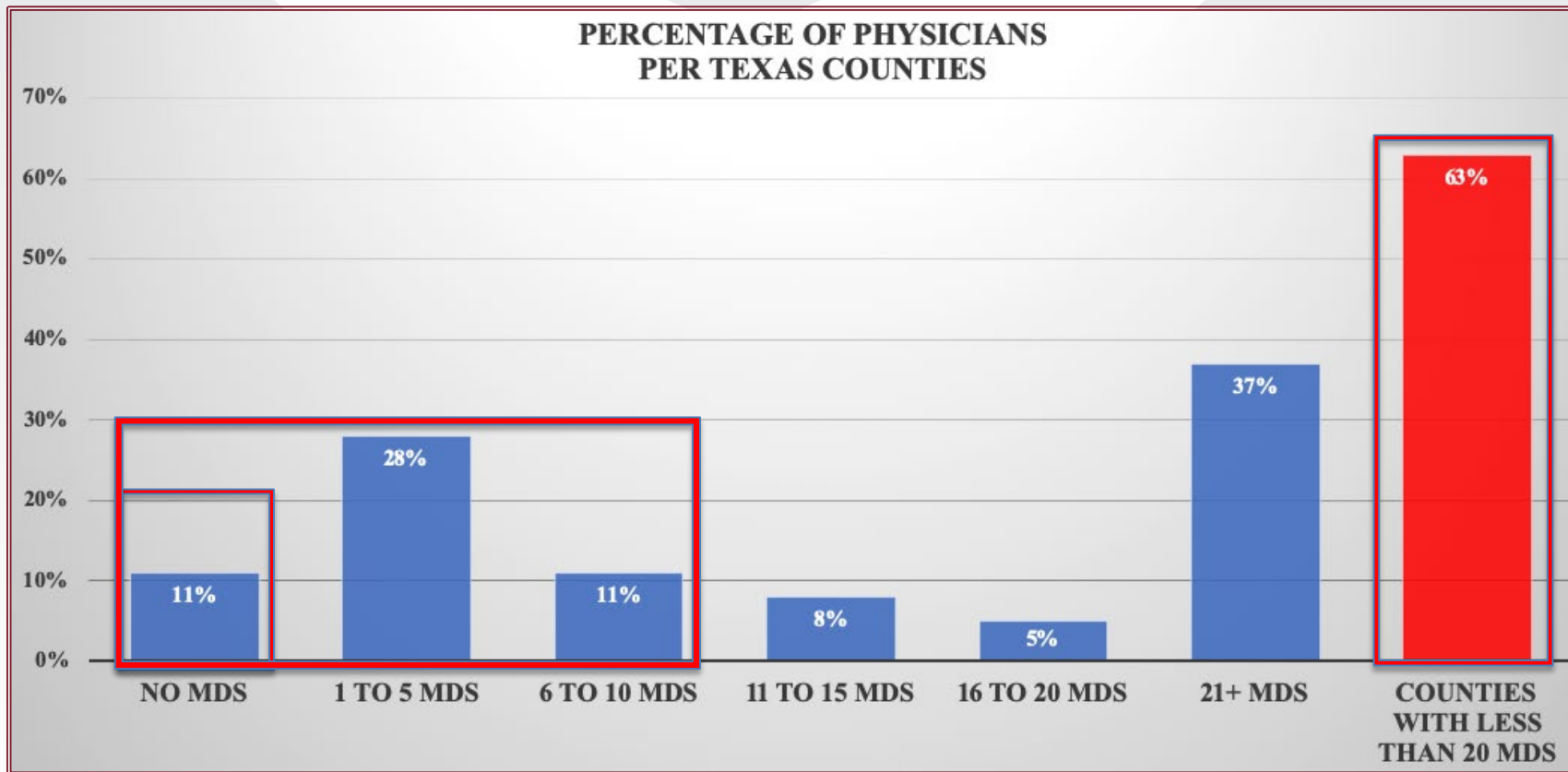


Exhibit ES-2: The projected change in physician supply (by specialty category) is presented for four different scenarios. The status quo supply scenario assumes a continuation of current hours worked and retirement patterns as well as the current number and specialty distribution of physicians completing their graduate medical education. Two supply scenarios modeled the workforce implications if retirement patterns were to change: one scenario models a shift to retiring earlier by an average of two years and a second scenario models an average delay in retirement of two years. The declining hours scenario reflects physician supply if the average annual decline in hours worked (by age and gender cohort) during the past decade continues.

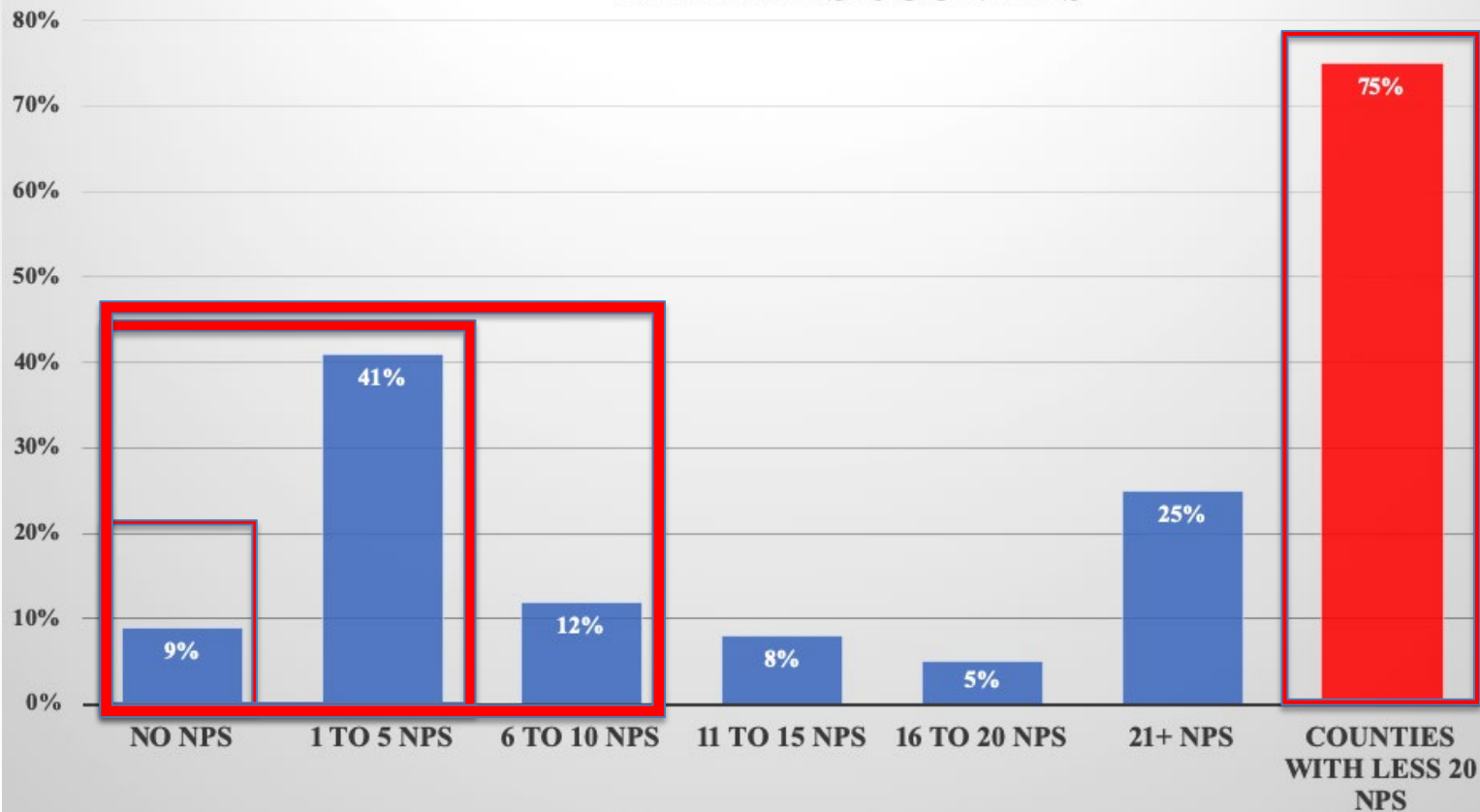
PROVIDER SHORTAGE – LOCALLY

BACKGROUND



PROVIDER SHORTAGE – NATIONALLY

PERCENTAGE OF NURSE PRACTITIONERS PER TEXAS COUNTIES

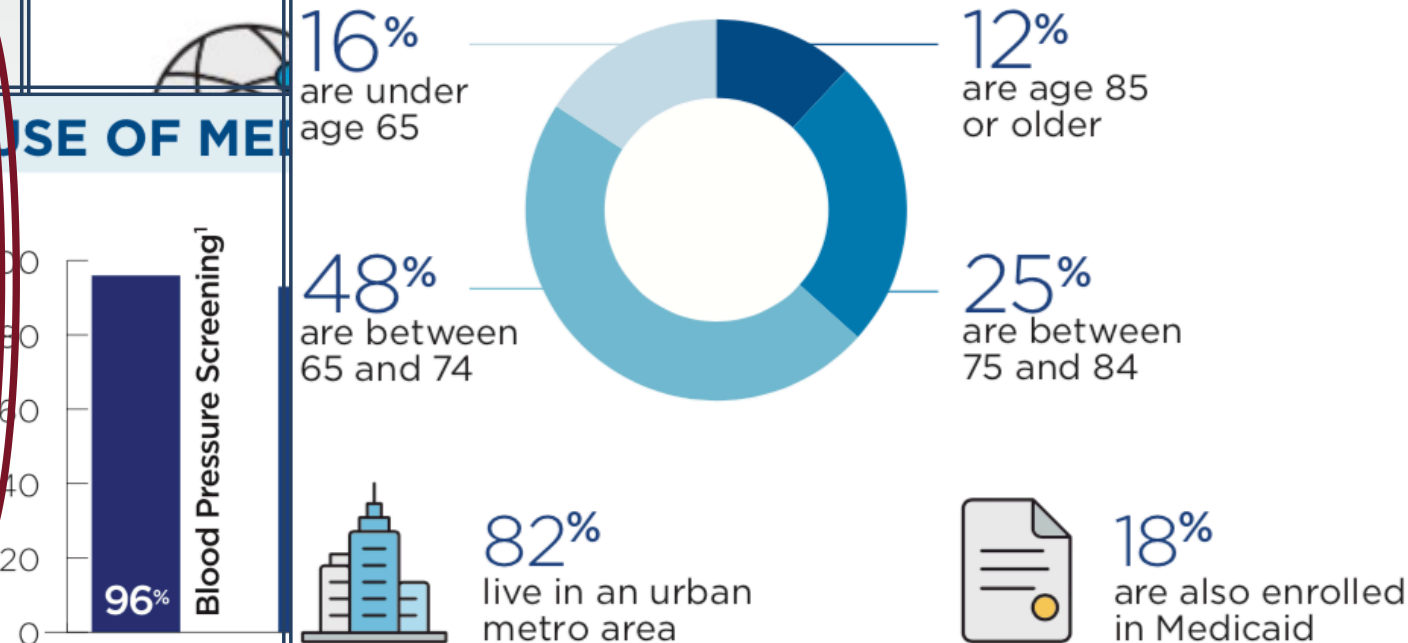


BACKGROUND

SHORTAGE – BABY BOOMERS

WHO'S COVERED BY MEDICARE - 2016:

BACKGROUND



TOP 10 CHRONIC CONDITIONS⁵

- 1 High Blood Pressure 57%
- 2 High Cholesterol 45%
- 3 Arthritis 32%
- 4 Diabetes 27%
- 5 Heart Disease 27%
- 6 Kidney Disease 22%
- 7 Depression 17%
- 8 Heart Failure 14%
- 9 COPD/Emphysema 12%
- 10 Alzheimer's/Dementia 11%

United States[™]
Census
Bureau

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
[census.gov](https://www.census.gov)

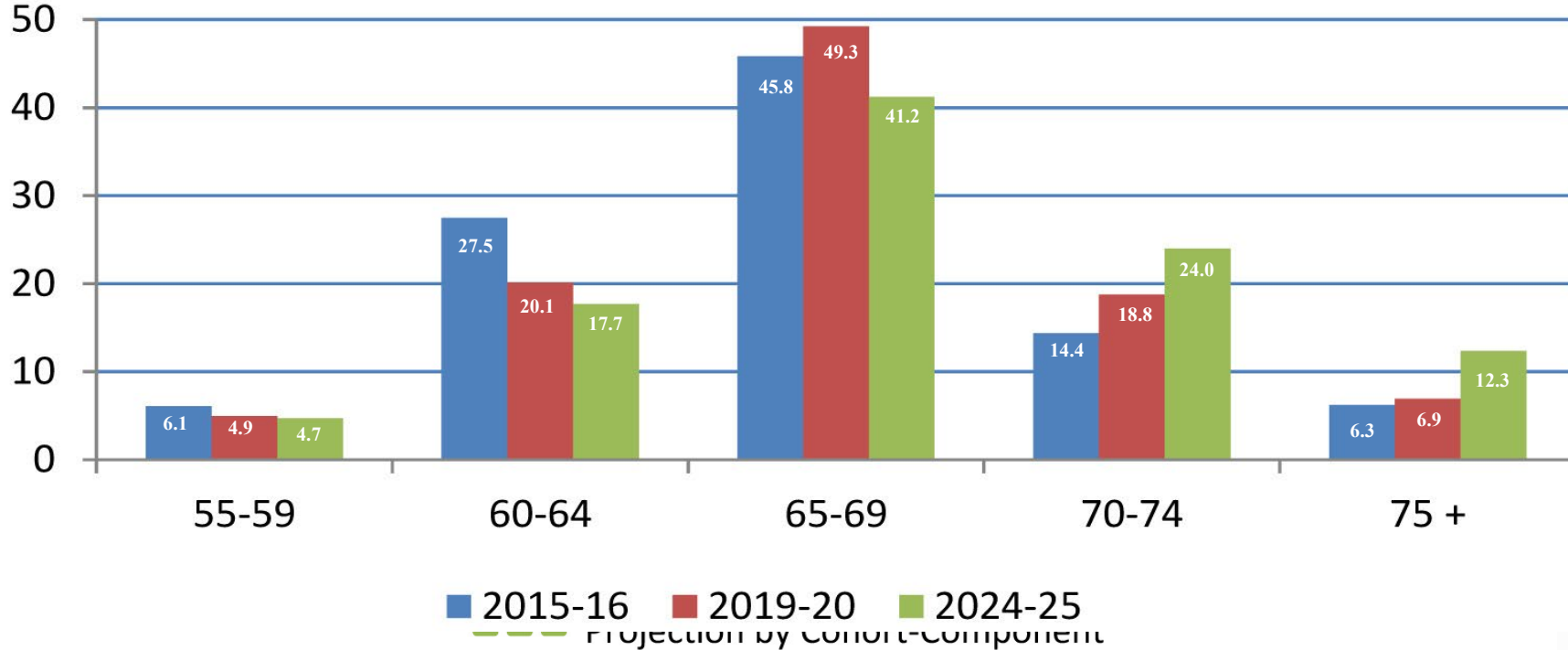
Source: National Population
Projections, 2017
www.census.gov/programs-surveys/popproj.html

FACULTY SHORTAGE – NATIONALLY

Figure 1 - Percentage distribution of full-time nursing faculty by age group.

Figure 2 - Percentage distribution of full-time faculty retirees by age group.

Figure 3 - Projection of full-time faculty retirements 2015-2016 to 2024-2025.



PEST ANALYSIS

	Factor	Opportunity	Threat
Political	<ul style="list-style-type: none"> • Presidential Senate and Representative elections • Medicare changes • Chronic Care Management (CCM) • Changing Nursing Essentials 	<ul style="list-style-type: none"> • Current government making changes to increase access to care • CMS changed policies to include RPM and CCM programs • Implement EBP curriculum to include new Nursing Essential 	<ul style="list-style-type: none"> • Changes in political party can change compensation for care • CMS can change for CCM and RPM. • State restrictions of full authority to practice
Economic	<ul style="list-style-type: none"> • Increase in the age of the population with more people over the age 65 by 2035 • By 2027, the NHE is projected to be close to \$6 trillion • High cost for chronic diseases, obesity 	<ul style="list-style-type: none"> • Medicare will be the key payer for 65+ population • Decrease NHE spending with RPM • Decrease cost of chronic conditions 	<ul style="list-style-type: none"> • CMS only cover beneficiaries that are on traditional Medicare for CCM and RPM. • Unable to maintain practice, if CMS denies claims
Socio-Cultural	<ul style="list-style-type: none"> • Healthcare disparities • Lack of access to care nationally and locally • Lack of clinicians nationally and locally 	<ul style="list-style-type: none"> • Decrease healthcare disparities • Increase access to care • Increase clinicians trained in RPM to reach more pts 	<ul style="list-style-type: none"> • Unable to keep up with the demands • Unable to provide coverage everywhere • Older generation unable to adopt to CCM
Technological	<ul style="list-style-type: none"> • Advances in technology with ability to care for chronically ill patients at home • Changing Nursing Essentials to include more technology and Informatics • CMS is paying for RPM and CCM 	<ul style="list-style-type: none"> • RPM utilizes technology to provide care to patients' in their home • Implement EBP technology and Informatics to curriculum to allow students to be ready for new NCLEX • RPM can increase revenue and save money 	<ul style="list-style-type: none"> • Older generation unable to adopt to RPM technology • Technology changing too fast and doesn't communicate with EHR

NHE = National Health Expenditure

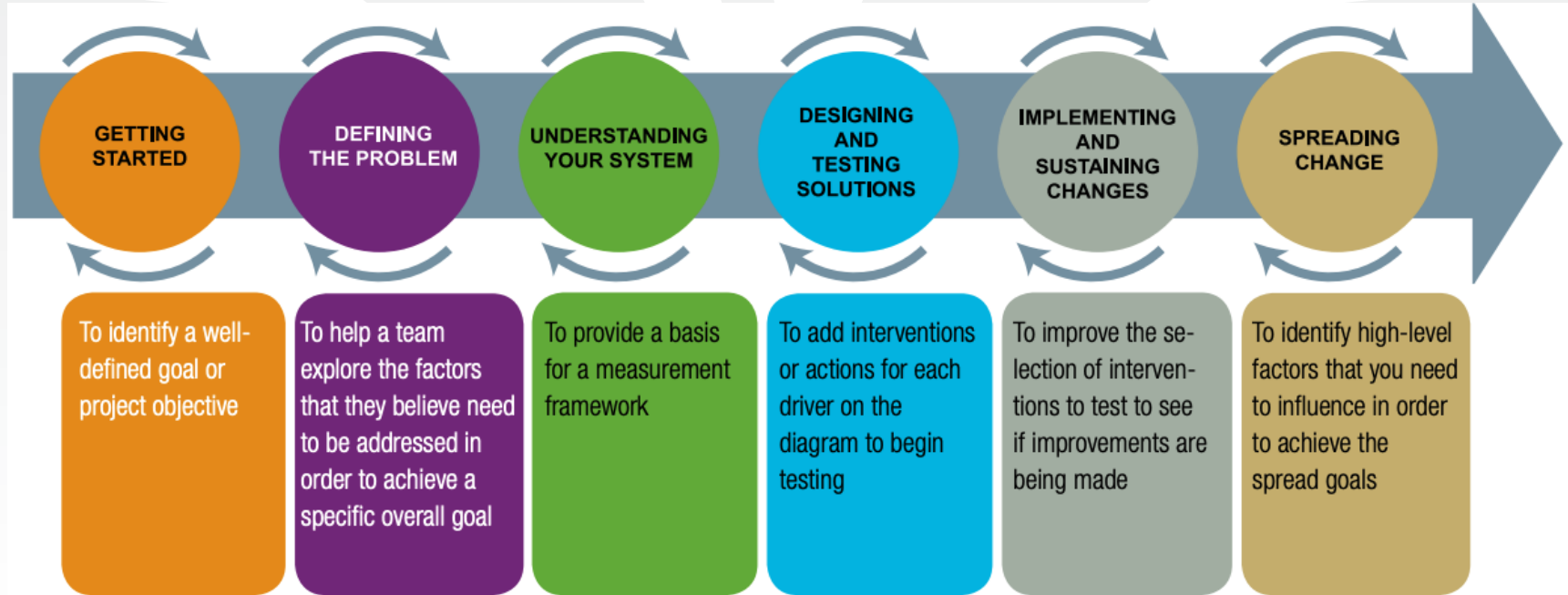
CMS = Centers for Medicare & Medicaid Services

Buttorff, C., Ruder, T. & Bauman, M. (2017). Multiple chronic conditions in the united states: Retrieved from <https://www.rand.org/pubs/tools/TL221.html>

Centers for Medicare and Medicaid Services, (CMS). (2017). National health expenditures 2017 highlights. Retrieved from <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/highlights.pdf>

PROJECTION QUESTION

Is there a difference between the students' knowledge, experience, and attitude before and after being exposed to the content of remote patient monitoring in an online environment?



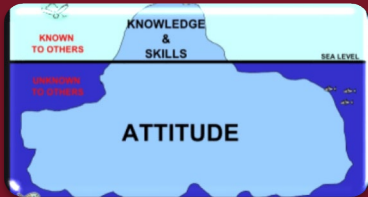
PURPOSE/AIM



Initiate the development of fidelity for remote patient monitoring (RPM) curriculum



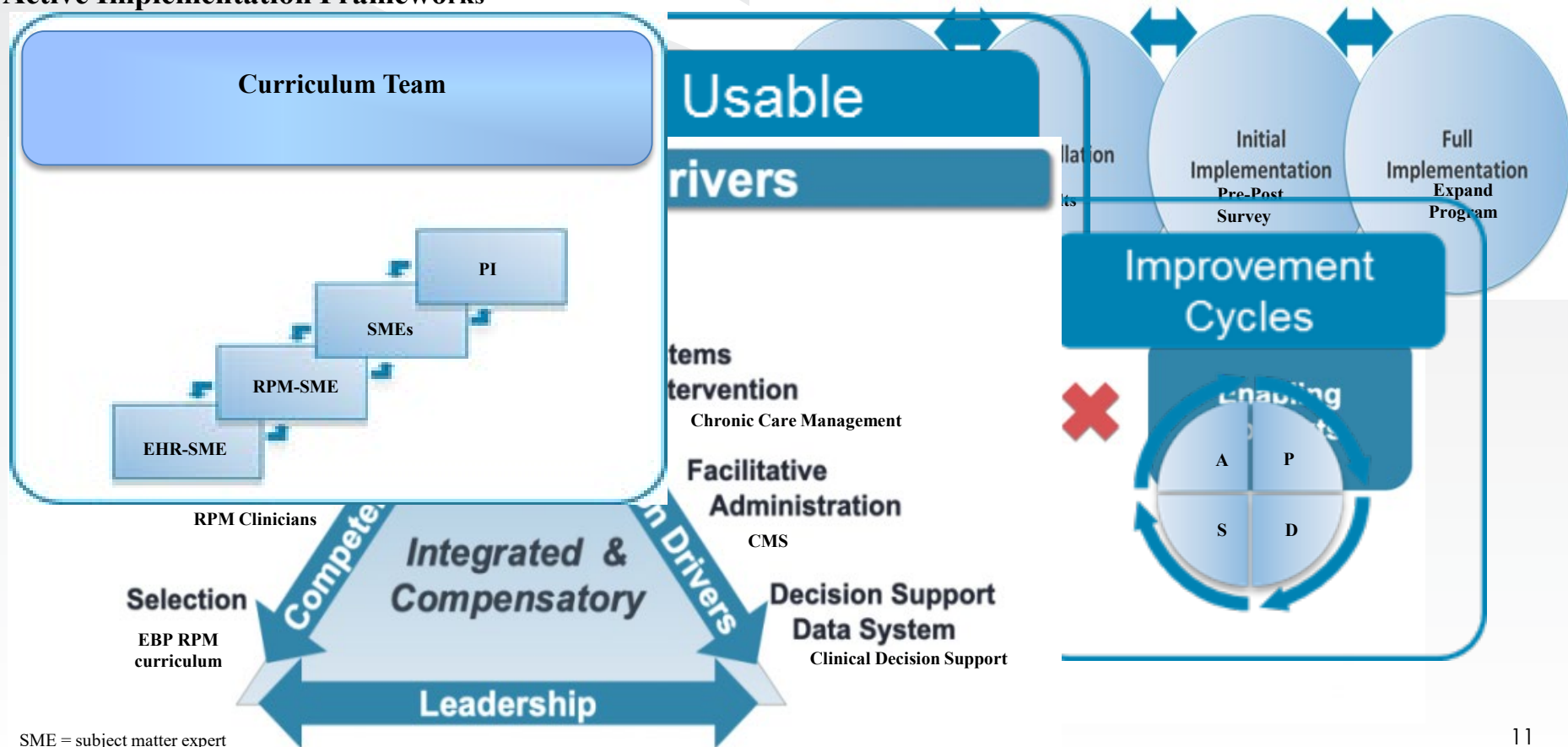
Evaluate current evidence-based research to develop curriculum for RPM



Improve the knowledge, experience, and attitude of clinicians after being exposed to three teaching sections

Theoretical Framework

Active Implementation Frameworks



SME = subject matter expert
EHR = electronic health record

Theoretical Framework

- Revised Content based on CVI and SMEs' comments
- From second reiteration developed Survey and Course content

Act

Plan

- RPM weekly PDSA meetings with curriculum team and SME
- RPM weekly PDSA meetings with chair and SME

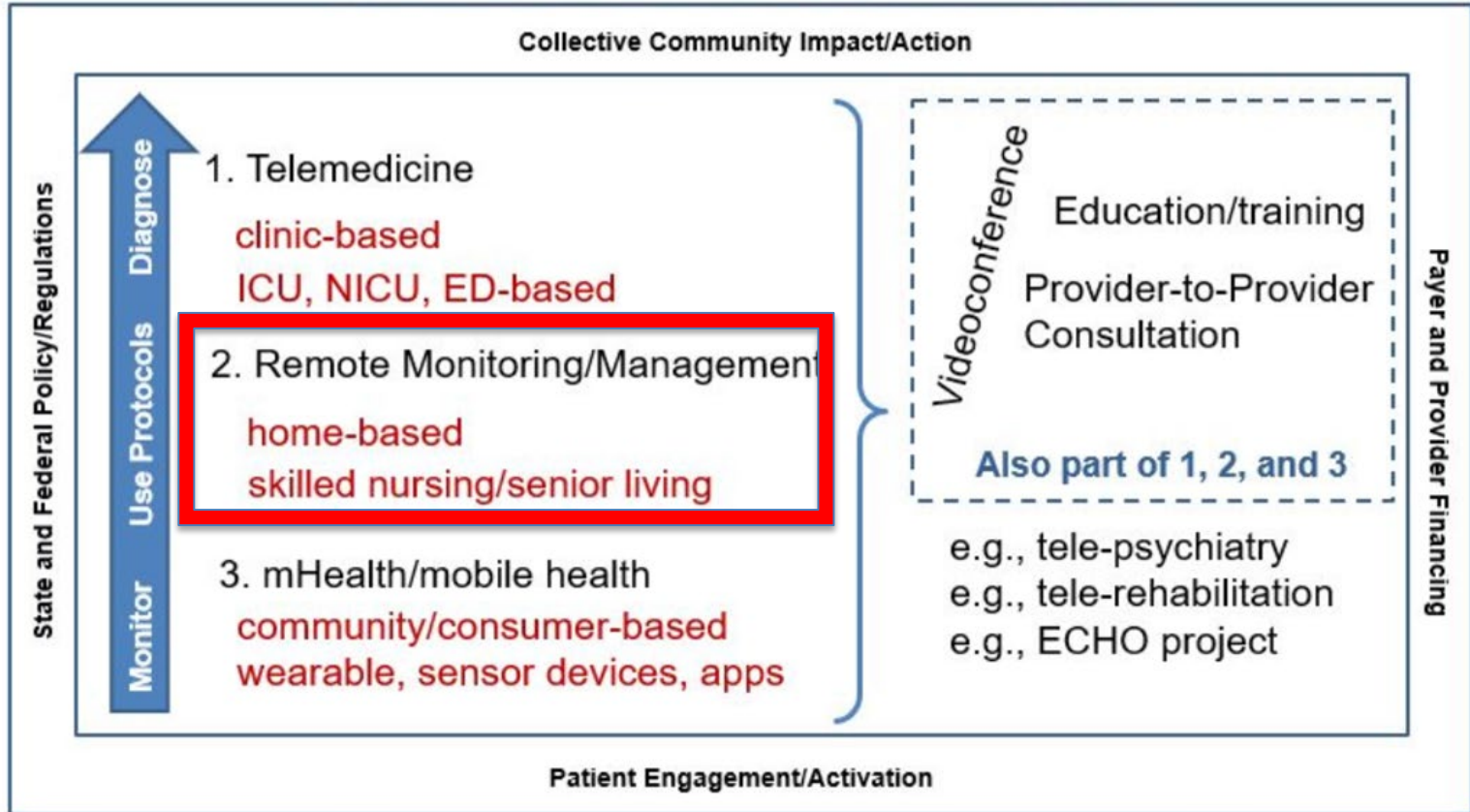
Study

Do

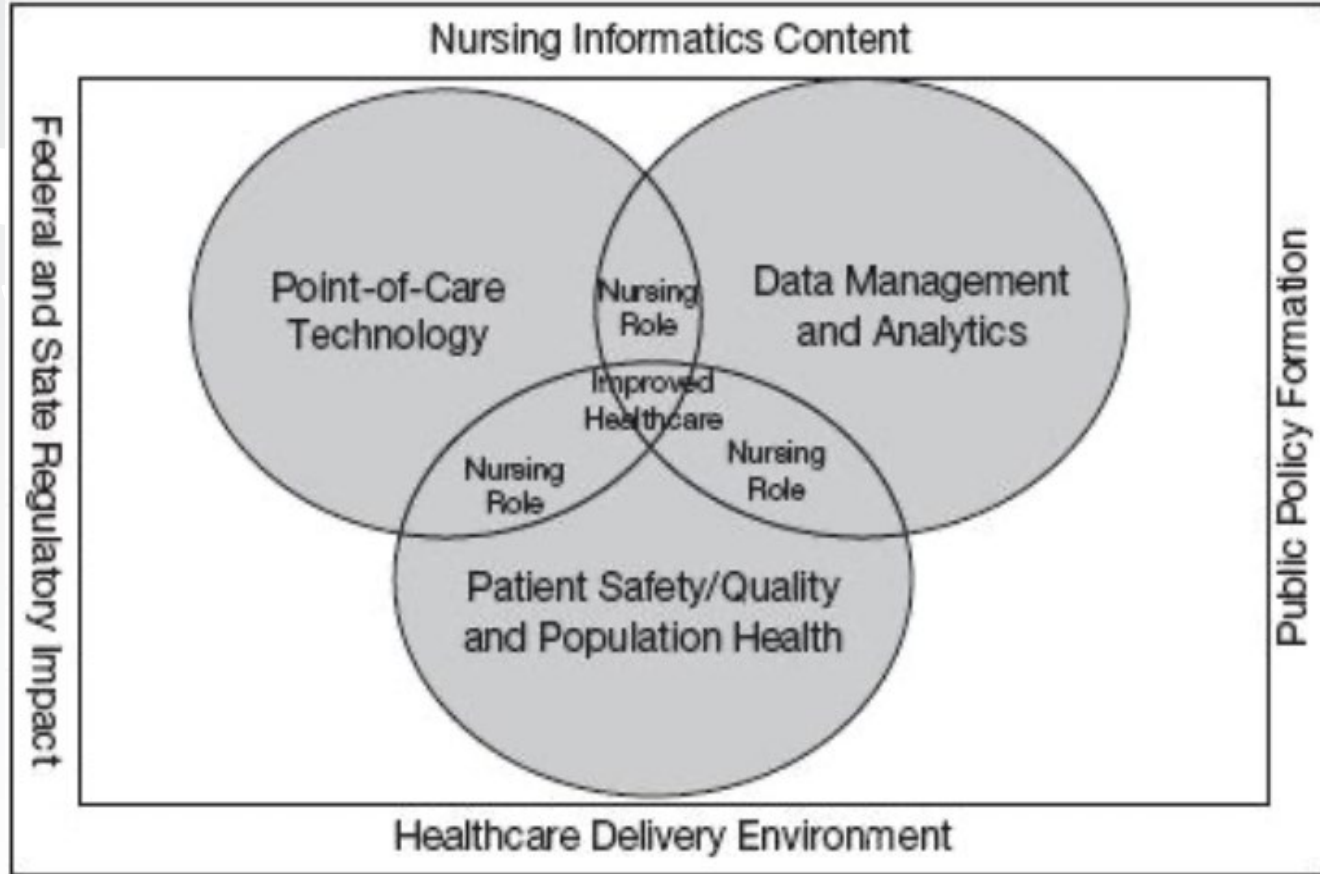
- Obtained CVI results
- Second reiteration of content validity with SME

- Weekly task on development of goals, objectives, criteria for the curriculum, implementation, evaluation
- Develop of Content Validity
- Develop Survey Questions
- Develop Course Content

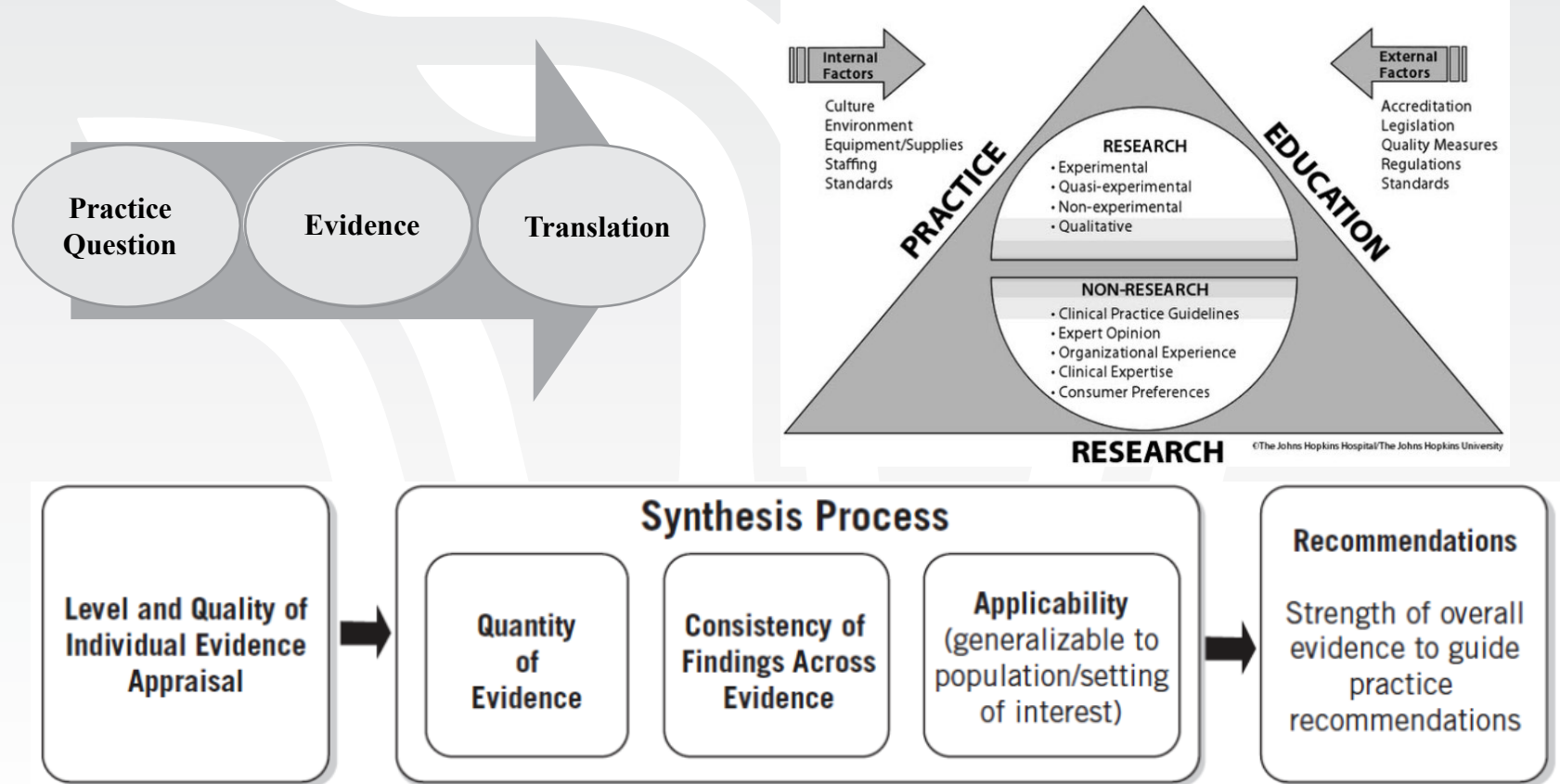
Tietze Telehealth Framework



Nursing Education for the Healthcare Informatics (NEHI) Model



CURRICULUM CREATION



- PubMed MeSH, CINAHL Complete, EBSCO, Cochrane Reviews, Cochrane Trials, Academic Search Complete, Google Scholar, and Google
- Zero entry into PubMed MeSH on remote patient monitoring
- Keywords: remote patient monitoring, telemonitoring, virtual visits, telemedicine, telehealth AND curriculum, education, instruction, provider education, certification
- 214 articles with remote patient monitoring only
- Exclusion criteria: 2014 – 2019 (last 5 years), English, Humans, Full text
- Zero articles found with remote patient monitoring AND curriculum, education, instruction, provider education, certification
- One Cochrane Systematic Review, 46 Cochrane Clinical Trials
- Started data mining to find more articles regarding RPM, patient engagement, technology, patient populations

Level I – II – Majority of the articles

- Systematic review of RCTs with or without meta-analysis
- Explanatory mixed method design that includes only a Level I quantitative study
- Quasi-experimental studies
- Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis
- Explanatory mixed method design that includes only a Level II quantitative study

Level III

- Nonexperimental study
- Systematic review of a combination of RCTs, quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta- analysis
- Qualitative study or meta-synthesis

Level IV

- Opinions of respected authorities and/or reports of nationally recognized expert committees or consensus panels based on scientific evidence

Level V

- Evidence obtained from literature or integrative reviews, quality improvement, program evaluation, financial evaluation, or case reports
- Opinion of nationally recognized expert(s) based on experiential evidence

Nursing 5000 Level:

- Four nurses
- BA - Sociology & MS Human Relations U Business w/Project Management
- Bachelor's in Biochemistry
- Bachelor's in Health Informatics with a minor in Clinical Application & Computer Science with a minor in Mathematics
- Bachelor's in nutritional sciences
- Bachelors in Informatics
- Bachelor's in General Studies with a focus on Health and Business

Working towards:

- All are working towards a Master's in Informatics with clinical applications

Nursing 6000 Level:

- Five nurses;
- One occupational therapist

Working towards:

- Ph.D.: 3
- DNP: 1
- Not provided: 2

This author did not interact with the students, only provided Pre-Post-survey, created assignments with activities, and voice recordings to assist with assignments if the students needed. The students contacted the professor or the TA if needed.

BLOOM'S TAXONOMY



KEY FINDINGS IN THE LITERATURE

- Confidence** • Recommended that to increase the confidence and the capability of the elderly population in RPM
- Education** • Clinicians should have an increase and thorough education of RPM and technology to achieve the advantages of remote monitoring in chronic diseases.
- Adherence** • Clinicians and the patients found the benefit of telemonitoring along with 79% agreement that it helped with medication adherence.
- Interaction** • Positive results from clinical outcomes and with more interaction with the patient
- Technology** • Clinicians need to stay informed about developing technologies to improve the gap between office visits and patient's self-management.

METHOD FOR CVI DETERMINATION

- Gathered items from the literature
- Listed them in a usable form
- Subject matter experts evaluated the items for relevancy on a scale from 1 to 4
- CVI was calculate
- Items with CVI of 80% were retained
- These were the foundation for the RPM module content

CVI of RPM for Technology Enhanced Health Promotion Course



TEXAS WOMAN'S
UNIVERSITY

I. Self-Assessment of RPM Knowledge

II. Self-Assessment of RPM Skills and Attitudes

Instructions to subject matter expert: The purpose of these questions is to measure knowledge gained toward Remote Patient Monitoring after a teaching module. Accordingly, please rate the relevancy of each item, in your opinion

Instructions to student: Please comment on how you expect this material to integrate with your current or future studies, or career.

★41) S2Q01. Please comment on what SKILLS you have gained as a result of this Module

--Select-- ▼

- 1 Item does not measure concept [Value=1]
- 2 Item measures concept but is not clearly stated [Value=2]
- 3 Item needs minor revision for clarity [Value=3]
- 4 Item measures concept and it is clearly stated [Value=4]
- UK Unknown/No opinion [Value=5]

If you believe that an item is not clearly stated or needs revision for clarity, please make your suggestions or changes on the form. Feel free to add any items that you think are missing.

There are two CVI sections for the topics that match the three levels of learning objectives for the content:

- I. Self-assessment of RPM knowledge
- II. Self-assessment of RPM skills and attitudes

Theoretical Framework

Crossing the Quality Chasm: IOM, 2001



Evidence-based Learning Domains
























THREE LEVEL TRANSITION SKILL DEVELOPMENT








**STUDENT LEARN OBJECTIVE 1
BSN/MS/DOC
INFORMATION**

**STUDENT LEARN OBJECTIVE 2
BSN/MS/DOC
APPLICATIONS**

**STUDENT LEARN OBJECTIVE 3
BSN/MS/DOC
CLINICAL DECISION-MAKING**

THREE LEVEL TRANSITION SKILL DEVELOPMENT

	Technology	Data *	Patient Safety & Quality	Role	Industry	Clinical skills
SLO 1 BSN/MS/DOC INFORMATION	 			 	 	
SLO2 BSN/MS/DOC APPLICATIONS	 		 	 		
SLO3 BSN/MS/DOC CLINICAL DM			  	  		  

	Glossary
	Crossword Puzzle
	Video
	Discussion Board
	Written Assignment
	Scenario
	Clinical Decision-Making

- Each cell represents a PowerPoint of information, reading, and rubric-based performance evaluation (grade/score).
- = Data skill development was covered by Dr. Tietze later in the semester.

SAMPLE CURRICULUM - INFORMATION

INTERVENTION

Texas Woman's University

DENTON • DALLAS • HOUSTON

www.twu.edu

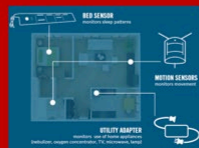
Overview of Remote Patient Monitoring (RPM)



- Care Management
- Care Pathways
- Clinical Protocols
- Content Registry
- Dashboard Services
- Rules Engine

5

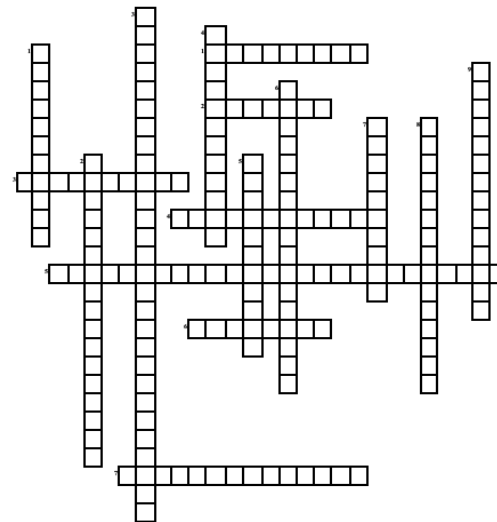
Subject to Food & Drug Administration Regulations for Class I, II, III Medical devices



2

NAME: _____ DATE: _____

M1.2 Remote Patient Monitoring Crossword Puzzle
























Across








- 1) What is the name of Phase 2 in Remote Care Management Fundamentals?
- 2) RPM devices have to follow HIPAA and FDA guidelines on what?
- 3) What is critical for the patient to succeed in RPM?
- 4) Which type of RPM transmission is not real-time?
- 5) What is the name of Phase 4 in Remote Care Management Fundamentals?
- 6) RPM devices have to follow HIPAA and FDA guidelines on what?
- 7) What does Care Management have to

Down

- 1) Name the fifth major component of Care Management.
- 2) Name the second major component of Care Management.
- 3) What is the name of Phase 1 in Remote Care Management Fundamentals?
- 4) Name the first major component of Care Management.
- 5) Which type of RPM transmission is real-time?
- 6) Name the fourth major component of Care Management.
- 7) What is critical for the patient to succeed in
- 8) Name the third major component of Care
- 9) What is the name of Phase 3 in Remote Care

THREE LEVEL TRANSITION SKILL DEVELOPMENT

	Technology	Data *	Patient Safety & Quality	Role	Industry	Clinical skills
SLO 1 BSN/MS/DOC INFORMATION	 			 	 	
SLO2 BSN/MS/DOC APPLICATIONS	 		 	 		
SLO3 BSN/MS/DOC CLINICAL DM			  	  		  

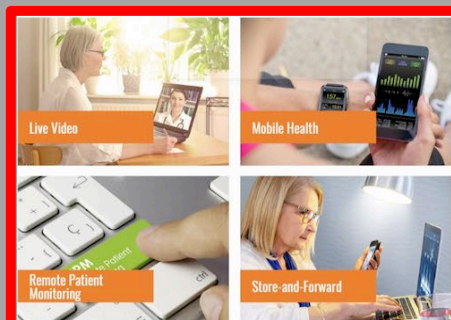
	Glossary
	Crossword Puzzle
	Video
	Discussion Board
	Written Assignment
	Scenario
	Clinical Decision-Making

- Each cell represents a PowerPoint of information, reading, and rubric-based performance evaluation (grade/score).
- = Data skill development was covered by Dr. Tietze later in the semester.

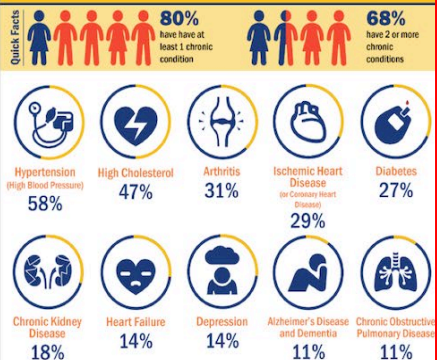
SAMPLE CURRICULUM - APPLICATION

INTERVENTION

Clinical Application



10 Common Chronic Conditions for Adults 65+

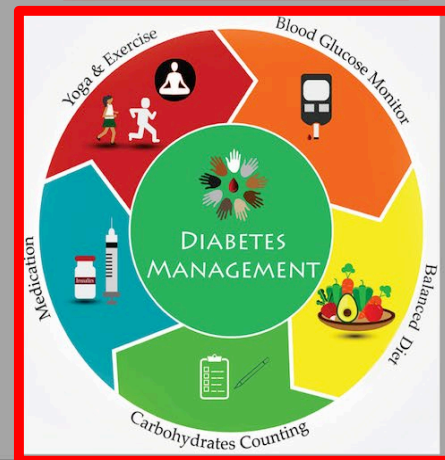


Source: Centers for Medicare & Medicaid Services, Chronic Conditions Prevalence State County Table, All Practice Service Identifiers, 2013






















ncoa.org








ncoa.org

Education and coaching



THREE LEVEL TRANSITION SKILL DEVELOPMENT

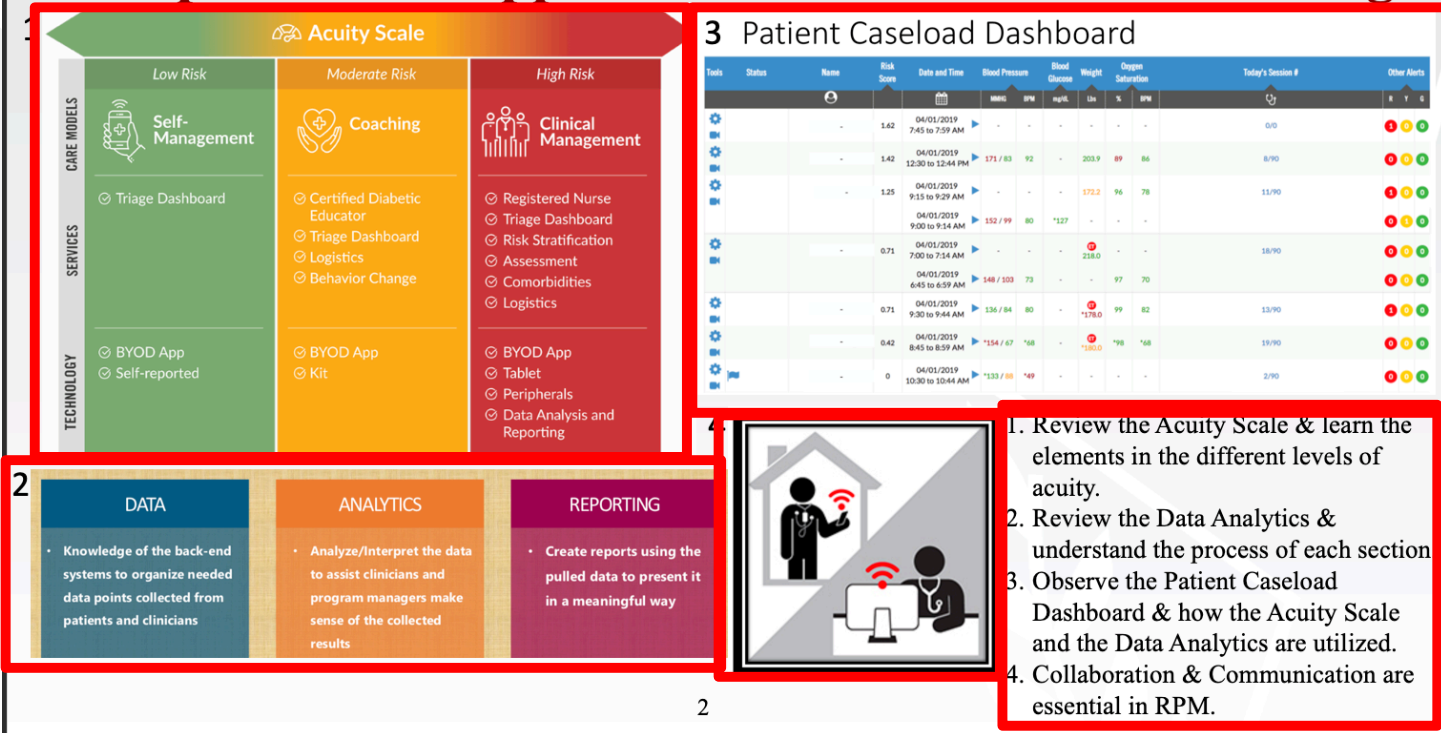
	Technology	Data *	Patient Safety & Quality	Role	Industry	Clinical skills
SLO 1 BSN/MS/DOC INFORMATION	 			 	 	
SLO2 BSN/MS/DOC APPLICATIONS	 		 	 		
SLO3 BSN/MS/DOC CLINICAL DM			  	  		  

	Glossary
	Crossword Puzzle
	Video
	Discussion Board
	Written Assignment
	Scenario
	Clinical Decision-Making

- Each cell represents a PowerPoint of information, reading, and rubric-based performance evaluation (grade/score).
- = Data skill development was covered by Dr. Tietze later in the semester.

SAMPLE CURRICULUM – CLINICAL DECISION MAKING

Components to Support RPM Clinical Decision Making



EXAMPLE OF RPM PRE- AND POST-SURVEY

Section 1.A.

This section addresses *general knowledge* of remote patient monitoring. Select the response that seems to be the best option. Feel free to select "Do not know."

***1)** Q01. What is Remote Patient Monitoring (RPM)?

☐ a. Monitoring vital signs, weights, blood sugars

Section 1.B.

This section addresses *perceptions* of remote patient monitoring. Select the response that seems to be the best option on a scale of 1 to 10 with ten being the highest.

***11)** Q11. How would you rate your experience about what you have read or heard about Remote Patient Monitoring?

☐ 1. No
Experience/
exposure

☐ 2.

☐ 3.

☐ 4.

☐ 5.

☐ 6.

☐ 7.

☐ 8.

☐ 9.

☐ 10.
Expert/Very
experienced

***14)** Q14. How would you rate your attitude towards Remote Patient Monitoring?

☐ 1. Not
Interested

☐ 2.

☐ 3.

☐ 4.

☐ 5.

☐ 6.

☐ 7.

☐ 8.

☐ 9.

☐ 10.
Enthusiastic/T
otally
Supportive

EVALUATION – QUANTITATIVE RESULTS

Case Summaries

DESCRIPTIVE

Pre vs. Post Group		Knowledge Pre and Post- Survey	Experience Pre and Post- Survey	Attitude Pre and Post- Survey
Pre-Survey All	Mean	6.00	4.172	9.417
	Std. Deviation	1.633	2.8559	.9851
	Median	6.50	3.625	10.000
Post-Survey All	Mean	8.75	7.172	9.729
	Std. Deviation	1.238	2.0509	.5865
	Median	9.00	7.250	10.000

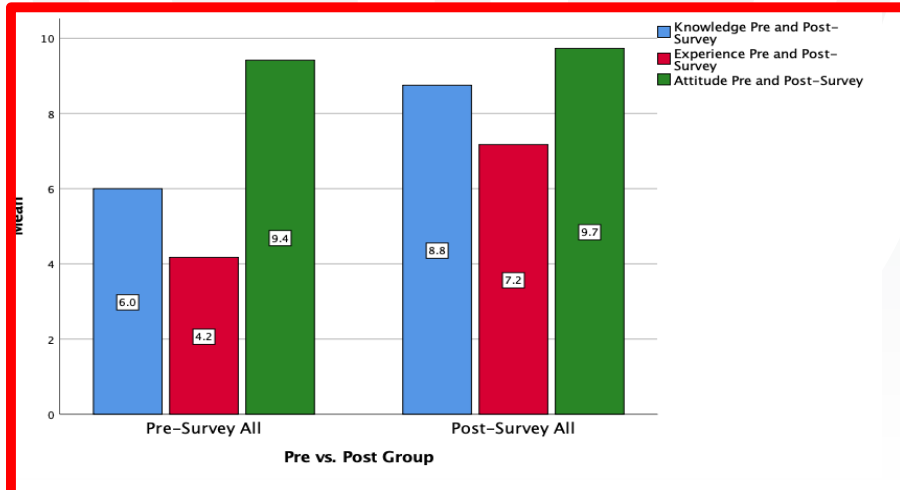
EVALUATION – QUANTITATIVE RESULTS

Mann-Whitney U Test (Group comparisons)

Group ^a	Knowledge	Experience	Attitude
Mann-Whitney U	25.000	52.000	114.000
Asymp. Sig. (2-tailed)	.000***	.004**	.506

Note: **p < .01, and ***p < .001

^a Grouping Variable: Pre vs. Post Group.



EVALUATION – QUALITATIVE RESPONSES

- 17) Q17. Optionally, please feel free to provide any comment you would like about remote patient monitoring and/or your experience with these questions. We are eager to know what you think.

(1000 characters remaining)

Reflected Comments

- “I am eager to learn more about remote patient monitoring and how it can be incorporated into healthcare.”
- “I think remote patient monitoring is very useful for patients and will expand in the near future.”

Course Improvement

- “I want to learn more about development of the interactive platforms.”



CONCLUSION

Research Question

Is there a difference between the students' knowledge, experience, and attitude before and after being exposed to the content of remote patient monitoring in an online environment?

1. Quantitative results indicated that knowledge and experience were significantly improved with RPM content.
2. There was no difference in the attitude score. This may be related to the students themselves because of a high pre-survey score of 9.4 for attitude.
3. Significant results of this pilot study warrant expansion to a large sample and other universities

RECOMMENDATIONS

- RPM certification is warranted for optimum care delivery.
- Continued focus on evidence-based RPM curriculum content should occur for all health professionals.
- These approaches for teaching clinical decision-making seem to provide sound methodology for creating competencies in RPM nurses.

Creating Competencies in Remote Patient Monitoring Nurses

Jasmine Perkins, BSN, RN, CMSRN
Irene R. Wolf, DNP-c, APRN, FNP-C
Devin McElreath, BSN, RN

November 14-15, 2019

Acknowledge contribution by Mari Tietze, PhD, RN-BC, FHIMSS



**Student Creative Arts and
Research Symposium
to be held April 14-15, 2020**