Table of Contents

Dedications vi

Foreword vii

Introduction ix

About the Editors xi

About the Authors xii

Chapter 1: The Hourglass Model for Practical Improvement Measurement 1

Challenges of Measurement in Health Care 3

The Hourglass Model for Practical Improvement Measurement 5

Measurement for the Improvement of Health and Health Care 8

Chapter 2: Before Measurement Begins 10

What to Expect in This Chapter 10

Rationale 12

Context 15

Scope, Scale, and Equity Considerations 19

Informatics in Improvement Measurement 21

Take Home Points 23

Chapter 3: Words Before Numbers: Developing Measurement Definitions and a Data Collection Plan 25

What to Expect in This Chapter 26

The Inverted Triangle Approach 28

Types of Measures 32

Concept-Forward Design 35

The *5 Questions* Data Collection Plan 38

Take Home Points 42

Chapter 4: Developing a Data Analysis Plan 44

What to Expect in This Chapter 45

Developing a Data Analysis Plan 46

Step 1: Refine the Data Analysis Plan with Data Operationalization 47

Step 2: Specify Data Attributes and Sources 49

Step 3: Prioritize Your Data Collection Plan 50

The Data Analysis Plan 50

The Data Visualization Plan 55

Application of Concepts 57

Take Home Points 59

Chapter 5: Improvement Measurement Using Run Charts 63
What to Expect in This Chapter 64
Developing Your Improvement Data Strategy 65
Turning the First Data Point into Analysis over Time 68
The Big 3 Approach to Assessment 71
Take Home Points 76

Chapter 6: Statistical Process Control for Continuous Data 77
What to Expect in This Chapter 78
Introduction to Statistical Process Control 78
SPC Chart Analysis: The Big 3 Approach 79
Preparing Your Data 86
Choosing the Right SPC Chart for Your Data 86
SPC Charts for Continuous Data 88
Take Home Points 97

Chapter 7: Statistical Process Control for Attribute Data 98
What to Expect in This Chapter 99
SPC Analyses for Attribute Data 99
SPC for Dichotomous Data (np- and p-Charts) 101
SPC for Counts Data (c-Charts and u-Charts) 106
Cross-Sectional SPC for Attribute Data 110
Take Home Points 113

Chapter 8: Statistical Process Control for the Analysis of Rare and Infrequent Events 114
What to Expect in This Chapter 116
Framing an Analysis of Rare and Infrequent Events 117
SPC Approaches for Rare Events Analysis 124
Take Home Points 131

Chapter 9: Advanced Statistical Process Control Methods for Special Situations 133
What to Expect in This Chapter 134
Revised SPC Analyses: Fixed Limits and Split Limits 135
Reducing Hospital Transfer Times Using Split-Limits Analysis 138
Reducing Unwarranted Transfers Using Fixed- and Split-Limits Analysis 139
Other Advanced SPC Analysis Methods 143
Moving Average Statistical Process Control (MA-SPC) 148
Cumulative Sum (CuSum) 150
The Risk-Adjusted Sequential Probability Ratio Test (RA-SPRT) 153
Research Designs in Improvement and Implementation Research 154
Take Home Points 155

Chapter 10: Disseminating Improvement Results 157
What to Expect in This Chapter 159
The Benefits of Disseminating Improvement Work 159

Planning Dissemination 160
Sharing Data Before Work Is Completed 162
Disseminating Results After Completion 163
Take Home Points 167

Appendix: Detail and Discussions on Advanced SPC Methods 168
What to Expect in This Appendix 169
Section 1: Central Line–Associated Bloodstream Infections (CLABSIs) Using Fixed-Limits Analysis 169
Hospital Length of Stay (Split-Limits Analysis) 172
Section 2: The Risk-Adjusted Sequential Probability Ratio Test (RA-SPRT) 173
Section 3: R Programming Code for RA-CuSum and RA-SPRT Charts 177

Afterword 180

Glossary 182

Index 189