

ASN Dialysis Advisory Group

# ASN DIALYSIS CURRICULUM

# Continuous Quality Improvement in Dialysis Units

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# Disclosures

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# CQI Principles: Industrial Management Science

- **Continuous Quality Improvement (CQI) originated in the industrial and management sciences**
  - **Systems theory or thinking**—developed in system dynamics, provides a holistic perspective emphasizing feedback for greater self-regulation
  - **Walter Shewhart, PhD**—a physicist, he developed many quality methods and tools, father of “statistical quality control,” Plan Do Check Act (PDCA) cycle, and the “run chart”
  - **W. Edward Deming, PhD**—a statistician, he shared his expertise in statistical process control and quality methods to help Japan’s post-WW II economic recovery. Also known for his “System of Profound Knowledge” and “14 Points For Management” that sought to understand and reduce variation
  - **Total Quality Management (TQM)**—a management approach that evolved from quality assurance methods in Japanese industry from the works of Philip B. Crosby, W. Edwards Deming, Armand V. Feigenbaum, Kaoru Ishikawa and Joseph M. Juran. Its principles emphasize customer-driven quality, top management leadership and commitment, continuous improvement, fast response, actions based on facts, employee participation, and a TQM culture.

# CQI Principles: Health Care Context

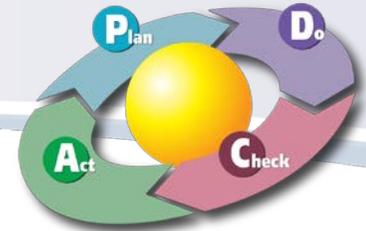
- **Health Systems Research: Avedis Donabedian, MD, MPH**

- Donabedian transformed the approach to thinking about health systems
- In his seminal paper, he introduced the paradigm for evaluating and monitoring the quality of health care through three interrelated (but distinct and not necessarily causal) aspects of the patient's experience:
  - **Structure:** attributes of care providers, settings, other contexts (e.g., facility attribute, physician training, and administrative attributes)
  - **Process:** care provided or characteristics of its provision (e.g., prescription medication, ordering tests, and physician referrals)
  - **Outcome:** a patient characteristic that is presumed to result from the care provided (e.g., death, hospitalization, and infection)
- Of these three indicators, outcomes often remain the sole measure of quality
  - “Outcomes, by and large, remain the ultimate validation of the effectiveness and quality of medical care.”
- But outcomes must always take context into account and cannot distinguish between efficacy and effectiveness.

# Quality and Accountability: Summary

- **QC vs QA vs QI vs PI**
  - **Quality Control (QC):** ensuring products/services are made/delivered to high standards, often through inspection, monitoring, recording
  - **Quality Assurance (QA):** ensuring the processes will produce high quality products/services, often through internal/external audits
  - **Quality Improvement (QI):** continuous process of identifying problems, examining solutions, and regularly monitoring solutions for improvement
  - **Performance Improvement (PI):** measuring output and modifying processes/procedures to increase output, efficiency, or effectiveness
- **Dual monitoring system for End-Stage Renal Disease (ESRD)**
  - **State survey agencies** perform **QA** to require facilities meet minimum standards of operation to prevent harm (conditions of coverage)
  - **ESRD Networks** perform the **QI** function to improve processes intended to improve patient outcomes

# Quality Improvement: Approach



- **FOCUS-PDCA:** an iterative management process—
  - Find a process to improve (improvement opportunity—see next slide)
  - Organize a team of individuals who understand the process
  - Clarify current knowledge of the process (literature, policies, rules)
  - Understand the causes of variation in the process (special/root causes?)
  - Select the improvement that needs to take place
  - Plan how the improvement opportunity will be studied based on what needs to be done (Desired changes? Expected output/target/goals?)
  - Do the process improvement, data collection, data analysis (execute)
  - Check the results to observed vs expected, determine if the plan worked
  - Act by adapting/adjusting the plan if it did not work, or standardizing the change by writing a policy if it did work
- Also known as the “Deming circle/cycle/wheel,” “Shewhart cycle,” “Plan, Do, Study, Act” (PDSA) cycle, or “Define, Measure, Analyze, Improve, Control” (DMAIC) in the Six Sigma programs

# Quality Metrics in ESRD

<b>ESRD Process Measure</b>	<b>Comorbid Process Measure</b>	<b>Outcome Measure</b>
Dialysis adequacy	Lipid management	Standardized mortality rate
Vascular access (fistula > graft > catheter)	Glycemic control	Standardized hospitalization rate
Target hemoglobin	Diabetic foot care	Standardized transplantation rate
Mineral metabolism control	Secondary cardiovascular protection	Quality-adjusted life years
Nutritional status	Adequate immunizations	Patient safety
Infection rates	Age-appropriate screening	Patient satisfaction

# 7 Basic Tools of QI: Ishikawa Diagram

- Also called **fishbone diagram**, **cause-and-effect** diagrams, or **Fishikawa**
- Created by Kaoru Ishikawa to demonstrate causes of a certain event using causal diagrams in which each cause is a source of variation
- The lines originating off the horizontal axis represents main causes, and lines branching off those represent subcauses—for example:
  - Main causes in the service industry: surroundings, suppliers, systems, skills
  - Main causes in manufacturing: machine (technology), method (process), material (raw/ consumables/information), man/mind power, measurement (inspection), milieu/ Mother Nature (environment), management/money, maintenance
- Commonly used in product design and quality defect prevention
- Useful in structuring a brainstorming session

# Ishikawa Diagram

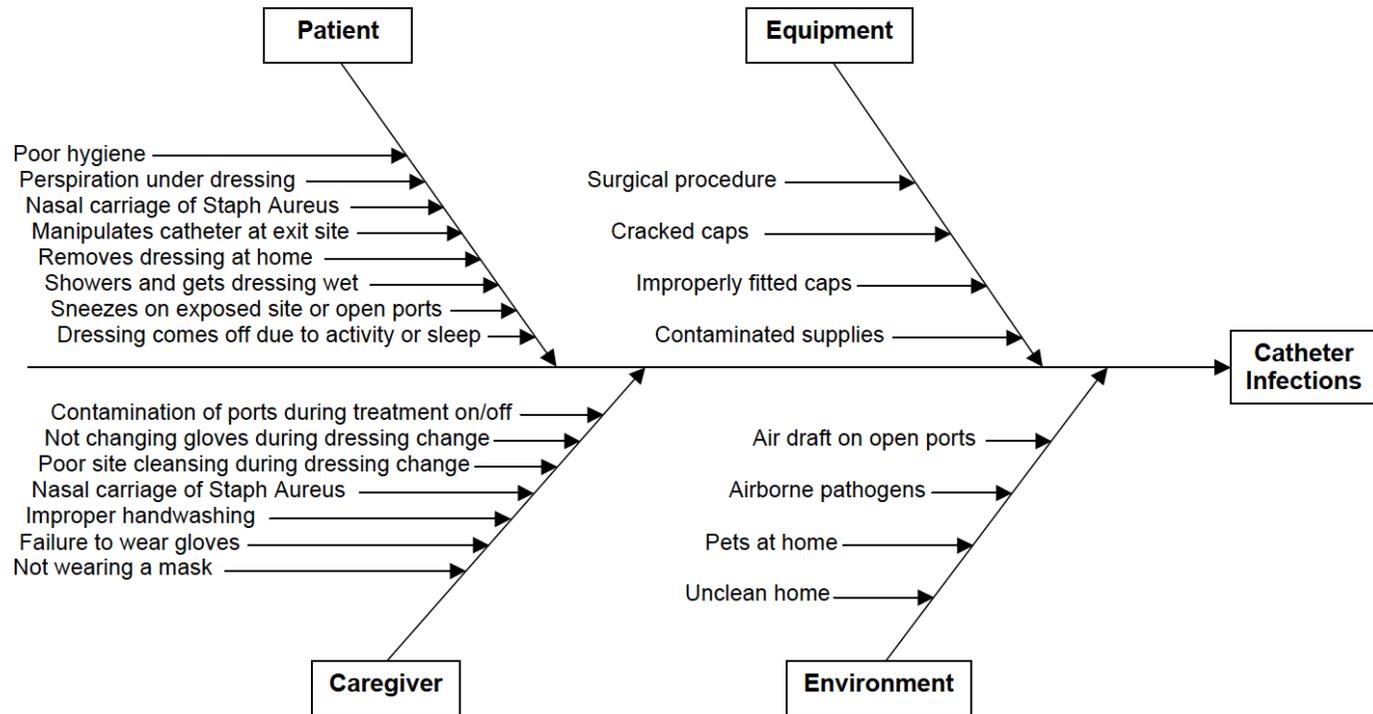


Figure adapted from Fistula First [fistulafirst.org](http://fistulafirst.org)

# 7 Basic Tools of QI: Check Sheet

- Simple document for collecting real-time location-specific event data
- Designed for quick, easy, efficient data recording using “checks”
- Can be divided into regions with varying significance
- Reading data involves observing the location and number of marks on sheet
- Common types of check sheets:
  - Classification—classifies trait such as a defect into categories
  - Location—indicates location of a trait on a picture of a part or item
  - Frequency—indicates presence or absence of a trait or combinations of traits
  - Measurement scale—indicated by checking appropriate interval of measure
  - Checklist—indicates completion of indicated tasks

# Check Sheet

Facility: \_\_\_\_\_ Number of Patients: \_\_\_\_\_  
 Month/Year: \_\_\_\_\_

**For each patient with a CVC to be completed monthly. Put a check mark in each box that applies for the patient.**

Patient initials	New patient awaiting placement of fistula/graft	New patient awaiting maturation/healing of fistula or graft	Patient has no vessels for AV fistula by mapping	Established patient with failed fistula/graft with new fistula/graft planned	Patient refuses	Unable to tolerate increased cardiac output induced by a fistula/graft due to cardiac condition	Severe peripheral vascular disease precludes fistula/graft placement	All possible graft/fistula access sites exhausted documented by vessel mapping	MD referral barrier	Vascular access surgeon barrier	Awaiting a living donor transplant	Catheter infections	Appointment made
	<b>A</b>	<b>B</b>		<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>			<b>H</b>		
Comments:													
Comments:													

Figure adapted from Fistula First [fistulafirst.org](http://fistulafirst.org)

# 7 Basic Tools of QI: Control Chart

- Also called **Shewhart charts**, or **process-behavior charts**
- Created by Walter Shewhart to differentiate natural variation in a process from significant changes, or common and special causes of variation
- Control charts include **points** that represent a statistic (e.g., mean, proportion) of a quality characteristic taken from samples at different times; a **center line** representing the mean of the statistic (mean of means or proportions); and **upper & lower control limits** (“natural process limits”) indicating thresholds at which the process is statistically unlikely (3 standard errors from center line)
- There are various types of control charts that may be best suited to the process being observed (quality characteristics, nonconformances, cumulative sums, fractions, and numbers)

# Control Chart

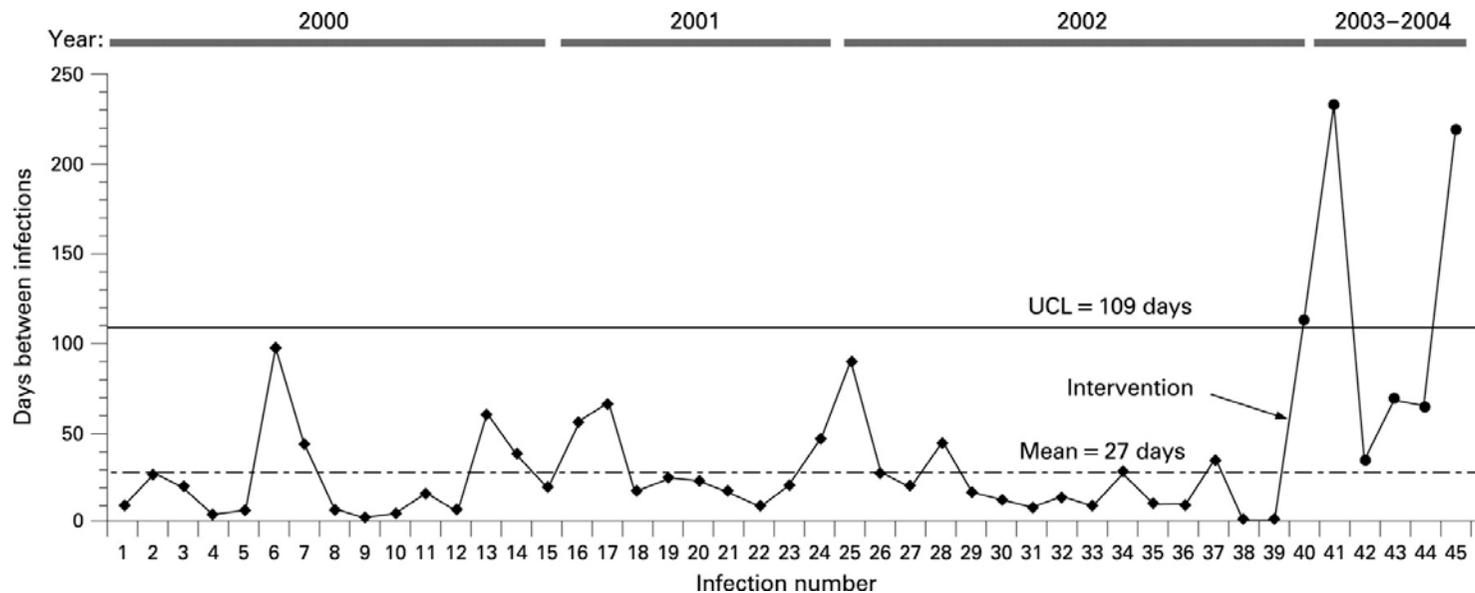


Figure adapted from Ocrinc G, et al. The SQUIRE (Standards for Quality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration. *Qual Saf Health Care* 2008; 17(Suppl 1): 13–32

# 7 Basic Tools of QI: Plots

- **Histogram:** vertical bar chart displays variation and the distribution of the data

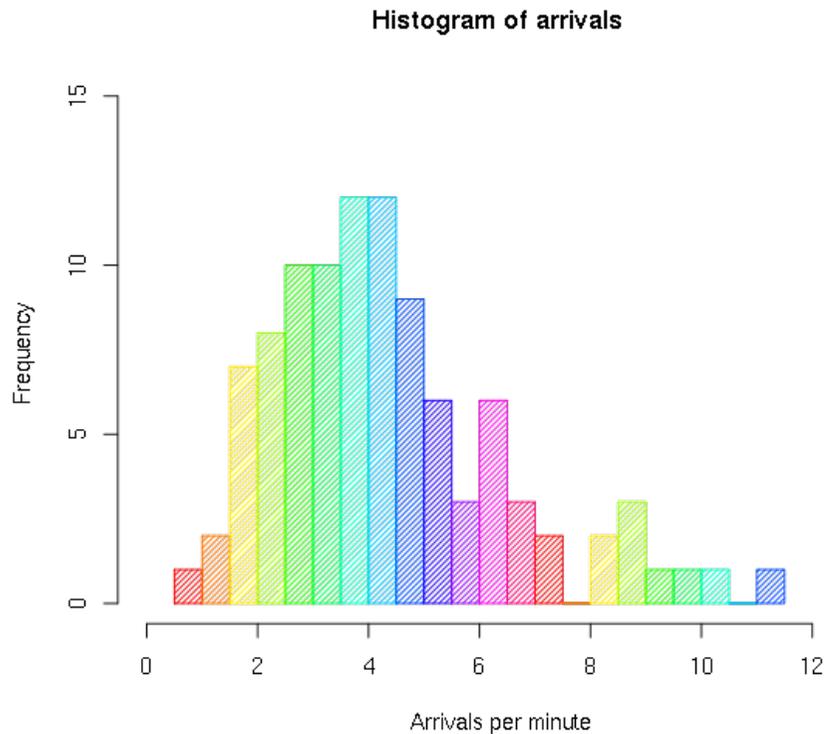


Figure adapted from wikipedia.org

# 7 Basic Tools of QI: Plots

- **Pareto chart:** plot that combines a bar graph (descending order) with a line graph (cumulative total), it displays distribution of items ranking the frequency of problems based upon Juran's Pareto principle (i.e., 80% of the effects arise from 20% of the possible causes)

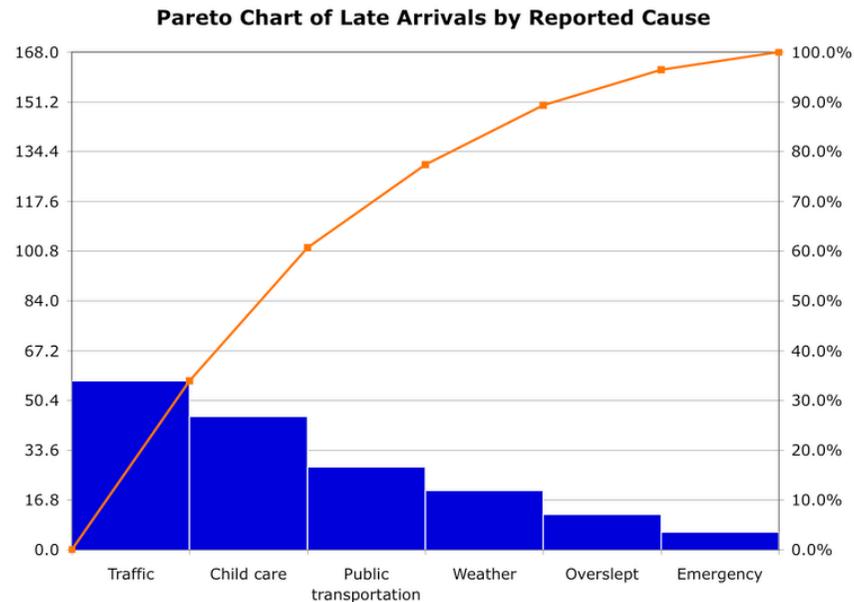


Figure adapted from wikipedia.org

# 7 Basic Tools of QI: Plots

- **Scatter diagram:** plot to analyze possible relationships between 2 variables, it illustrates the degree of correlation (but not causation)

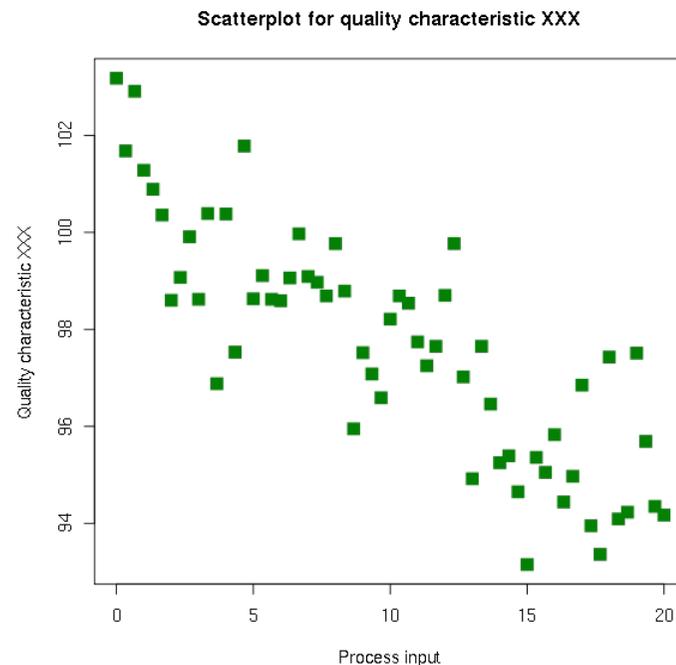


Figure adapted from wikipedia.org

# 7 Basic Tools of QI: Flowchart

- Diagram to represent an algorithm or process, demonstrating the steps through a system
- Process operations (activity) are represented with boxes/rectangles while decision points are represented by diamonds
- The flow of control is represented by arrows connecting the figures
- Most commonly used for identifying problems, but also used to analyze, design, document, or manage any process

# 7 Basic Tools of QI: Flowchart

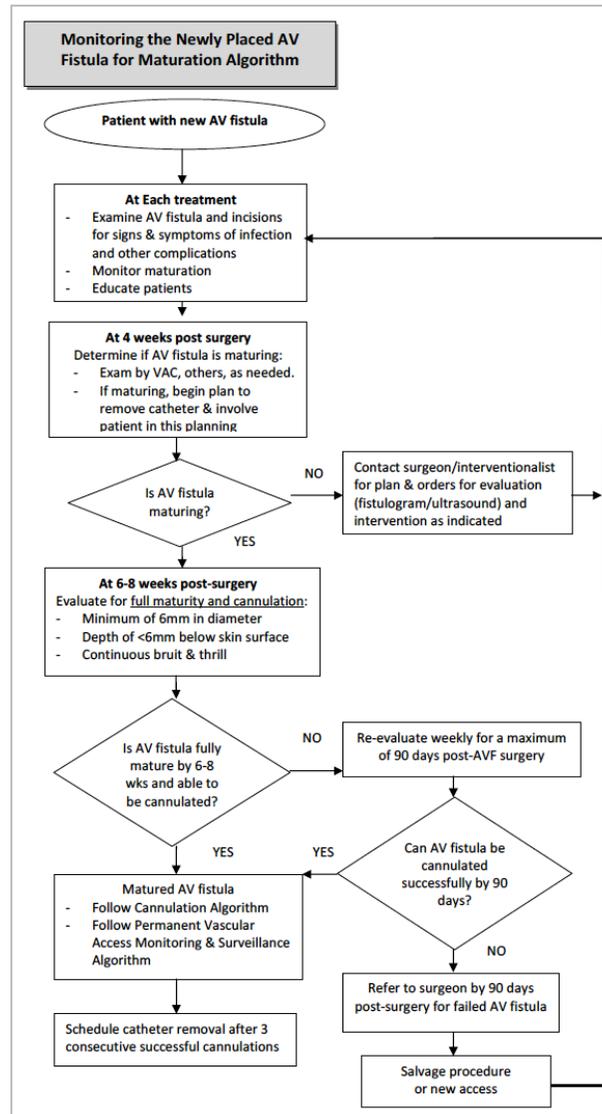


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# Quality Improvement: Future Directions

- **ESRD Quality Improvement Plan (QIP)**
  - First Pay-for-Performance (P4P) in a Medicare PPS
  - Compares “norms” for dialysis facilities across the country, altering payments based on each facility’s patient scoring on QIP measures
- **Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009**
  - Seeks to improve American health care delivery and patient care through an unprecedented investment in health information technology by providing assistance and technical support to providers, enabling coordination and alignment within and among states, establishing connectivity to the public health community, and assuring the workforce is properly trained and equipped to be meaningful users of electronic health records (EHRs)
- **Patient-Centered Medical Home (PCMH)**
  - Integrative approach to patient care in which patients participate at the center of their healthcare, with care coordinated by a lead physician
  - Sponsored by National Committee for Quality Assurance (NCQA)

# Quality Improvement: Pitfalls and Challenges

- **Potential Pitfalls of P4P programs for ESRD**

- Weak evidence base for CPGs—reduces process-outcome link
- “Tyranny of small numbers”—outliers not uncommon among relatively small patient panels per nephrologist and among small dialysis centers
- Case-mix adjustment—often inadequate, little variation explained by MD
- Feedback loop—frequent and timely feedback is needed to be effective
- Spectrum of quality indicators—optimal panel not clear
- Integrated data systems—absent for many, hindering data capture
- Pediatric and other small facilities—face additional challenges

- **Challenges of QI**

- Increasing quality requirements—but, long history of experience in ESRD
- Fear of change—needs to be removed prior to successful implementation
- Costs for EHRs—substantial investment required but need likely inevitable
- Success takes time—but improving quality can be viewed as a journey