The Power of Quality

Lindsay R. Smith, MSN, RN
Quality Manager
Vanderbilt Transplant Center
What do you think of when you hear the word quality?
Objectives

• Transplant Quality Background
• SRTR and CUSUM
• Root Cause Analysis
• Process Improvement projects
What is Quality?

- Policies and Regulations
- Clinical and Compliance Monitoring
- Adverse Events
- Education
- Process Improvement Projects
Transplant & Quality

CMS

UNOS/SRTR

Patient Care
Monitoring Compliance, Clinical, & Outcome Metrics
Different Types of Metrics: Compliance

UNOS Compliance
• ABO verification
• Pt Notification Letters
• PHS consent

CMS Compliance
• Informed Consent
• Multidisciplinary documentation
• Removal from the waitlist
Different Types of Metrics: Clinical

- Length of Stay
- Readmission
- Return to OR
- Infection
- Rejection
- Delayed Graft Function
- Malignancy ➔ Stay tuned for the skin cancer presentation
### A note about metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Indicator Type: Outcome/Process/Regulatory/PI</th>
<th>Source</th>
<th>Target</th>
<th>Last updated/reviewed</th>
<th>Frequency Reported</th>
<th>Responsible Party</th>
<th>Source Data</th>
<th>Time Period</th>
<th>Status Open/Closed/Trending</th>
<th>Comments/Source of Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Transplant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABO Verification x 2 prior to listing with UNOS</td>
<td>1. Monitored for accuracy of correct ABO patient verification x2 at 2 different times prior to UNOS listing. 2. Verification Form completed.</td>
<td>Process/Regulatory</td>
<td>UNOS/CMS</td>
<td>100%</td>
<td>2016</td>
<td>Monthly Audit: qtrly report</td>
<td>Quality analyst</td>
<td>EMR</td>
<td>2011-CURRENT</td>
<td>Open</td>
<td>Continue to monitor</td>
</tr>
</tbody>
</table>
### Example of the Transplant Dashboard

<table>
<thead>
<tr>
<th>Transplant Phase Measures</th>
<th>Source</th>
<th>Goal</th>
<th>CY15</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>Cum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRANSPANT VOLUME</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABO verification by surgeon/OR nurse at time of transplant</td>
<td>UNOS/CM (95%)</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>↑98%</td>
<td>↑100%</td>
<td>↑100%</td>
<td>↑100%</td>
<td>↑100%</td>
</tr>
<tr>
<td>Timely removal from Waitlist</td>
<td>UNOS (95%)</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>↑100%</td>
<td>↑100%</td>
<td>↑100%</td>
<td>↑100%</td>
<td>↑100%</td>
</tr>
<tr>
<td>cc referring internal</td>
<td>VUMC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>↑75%</td>
<td>↓0%</td>
<td>↑50%</td>
<td>↑42%</td>
<td></td>
</tr>
<tr>
<td>Median Number of days intubated</td>
<td>literature</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>↑2</td>
<td>↑1</td>
<td>↑1</td>
<td>↑1.50</td>
<td>↑1</td>
</tr>
<tr>
<td>Number of ICU days median</td>
<td>literature</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>↑4</td>
<td>↑2.5</td>
<td>↑4</td>
<td>↑3.5</td>
<td>↑3</td>
</tr>
<tr>
<td>LOS median</td>
<td>literature</td>
<td>15 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>↑8.9</td>
<td>↑10</td>
<td>↑9</td>
<td>↑6.5</td>
<td>↑8</td>
<td></td>
</tr>
<tr>
<td>Return to OR during initial admission</td>
<td>VUMC</td>
<td>&lt;25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>↑14%</td>
<td>↑0%</td>
<td>↑0%</td>
<td>↑0%</td>
<td>↑0%</td>
<td></td>
</tr>
<tr>
<td>DC education/planning RN</td>
<td>CMS</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New 2016</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>LAS score at Tx median trending</td>
<td>trend</td>
<td></td>
<td>42.60</td>
<td>34.45</td>
<td>38.42</td>
<td>40.13</td>
<td>37.67</td>
</tr>
</tbody>
</table>
Metric Monitoring ➔ ACTIONS
Different Types of Metrics: Outcomes

• SRTR
• CUSUM
• Predicting future outcomes
Overview of SRTR
What is SRTR
Scientific Registry of Transplant Recipients
Data Flow

Organ Procurement Organizations

Organ Procurement and Transplantation Network (OPTN/UNOS)

Scientific Registry of Transplant Recipients (SRTR)

Public

Professional Community (Programs, OPOs, Etc…)

OPTN Membership & Professional Standards

Payers (CMS, Insurance Companies)

Data Collection

Data Analysis

*Adapted from the SRTR Quality Conference Presentation
Data turns into information:

**Major Deliverables**

- Program-Specific Reports
- OPO-Specific Reports
- Annual Data Report
- Community Resources: SAFs, SAMs, Tools
Different Audiences, Different Questions: Different Statistics and Interpretations

- **Patients and families**
  - What will happen to me?
  - Percent survival at 1 year, 3 years.
  - Chances of transplant or death while on the waiting list.
  - CMS-required consent process.

- **Payers (including CMS) and MPSC**
  - Does a program perform up to standard or systematically fail to do so?

- **Transplant programs**
  - What choices do our patients have?
  - What can we tell our patients about waiting time and survival?
  - How well are we doing? How can we improve?
Two Main Components:

**OBSERVED**
- The actual number of patients in that cohort that lived post a year transplant.

**EXPECTED**
- The anticipated number of patients that were supposed to live based on characteristics of
  - Recipients
  - Donors
  - Transplant center
Table C5. Adult (18+) 1-month survival with a functioning graft
Single organ transplants performed between 07/01/2012 and 12/31/2014
Deaths and retransplants are considered graft failures

<table>
<thead>
<tr>
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<th>TNVU</th>
<th>U.S.</th>
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<tbody>
<tr>
<td>Number of transplants evaluated</td>
<td>460</td>
<td>38,989</td>
</tr>
<tr>
<td>Estimated probability of surviving with a functioning graft at 1 month (unadjusted for patient and donor characteristics)</td>
<td>98.70%</td>
<td>98.39%</td>
</tr>
<tr>
<td>Expected probability of surviving with a functioning graft at 1 month (adjusted for patient and donor characteristics)</td>
<td>98.64%</td>
<td>–</td>
</tr>
<tr>
<td>Number of observed graft failures (including deaths) during the first month after transplant</td>
<td>6</td>
<td>629</td>
</tr>
<tr>
<td>Number of expected graft failures (including deaths) during the first month after transplant</td>
<td>6.25</td>
<td>–</td>
</tr>
<tr>
<td>Estimated hazard ratio*</td>
<td>0.97</td>
<td>–</td>
</tr>
<tr>
<td>95% credible interval for the hazard ratio**</td>
<td>[0.42, 1.75]</td>
<td>–</td>
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* The hazard ratio provides an estimate of how Vanderbilt University Medical Center (TNVU)'s results compare with what was expected based on modeling the transplant outcomes from all U.S. programs. A ratio above 1 indicates higher than expected graft failure rates (e.g., a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected graft failure rates (e.g., a hazard ratio of 0.75 would indicate 25% lower risk). If TNVU's graft failure rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

** The 95% credible interval, [0.42, 1.75], indicates the location of TNVU's true hazard ratio with 95% probability. The best estimate is 3% lower risk of graft failure compared to an average program, but TNVU's performance could plausibly range from 58% reduced risk up to 75% increased risk.
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Why Compare Observed and Expected Outcomes?

• Allows fair comparison among programs that treat different types of patients.
  • Programs that treat older or sicker patients might provide excellent care even though outcomes are worse than average.
  • Programs that treat healthier patients might not provide excellent care even though outcomes are better than average.
So I am confused, is this all real time data? NO!
Timeline for Program-Specific Reports

• Updated every 6 months (June, December).

• Patient and graft survival tables report 1-month, 1-year, and 3-year outcomes for 2.5-year cohorts of recipients.
Why Don’t We Have 1-Year Survival for the Last 6 Months of Transplants?

1. 1-year outcomes are not available for 18 months.
   • One year needed to determine 1-year survival.
   • Time needed for programs to submit 1-year follow-up forms to OPTN.
   • Two months needed for SRTR to calculate statistics and for centers to comment.

2. Must include enough transplants to allow stable estimates; PSRs use 2.5 years.

Together, these factors require a 2.5-year cohort ending 12 to 18 months before the report date, with some transplants occurring as long as 3.5 to 4 years before.
A little more on understanding that tricky expected calculation...

Risk Adjustment
Examples of Factors Used for Risk Adjustment

• Recipient and donor demographic characteristics
• ABO compatibility
• Primary disease
• Donor cause of death
• Ischemia time

• Previous transplant
• Life support
• HLA mismatch and CPRA (KI)
• Duration on dialysis (KI)
• Creatinine (LI)
Interpreting Model Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Hazard Ratio = exp (Estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donor age: 0-17 yr (ref 35-49 yr)</td>
<td>0.002</td>
<td>1.00</td>
</tr>
<tr>
<td>Donor age: 18-34 yr</td>
<td>-0.044</td>
<td>0.96</td>
</tr>
<tr>
<td>Donor age: 50-64 yr</td>
<td>0.220</td>
<td>1.25</td>
</tr>
<tr>
<td>Donor age: ≥ 65 yr</td>
<td>0.377</td>
<td>1.46</td>
</tr>
<tr>
<td>Recipient race: Black (ref white)</td>
<td>0.211</td>
<td>1.23</td>
</tr>
<tr>
<td>Recipient race: Hispanic, Latino</td>
<td>-0.107</td>
<td>0.90</td>
</tr>
<tr>
<td>Recipient race: Asian</td>
<td>-0.148</td>
<td>0.86</td>
</tr>
<tr>
<td>Recipient race: other/missing</td>
<td>-0.279</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Hazard Ratio > 1, failure/death more likely, lower than expected.

Hazard Ratio < 1, failure/death less likely, higher than expected.
Lightbulb Moment

Risk Adjustment ➔ Our EXPECTED value
How does this impact you?

Every piece of data we enter into UNOS impacts our EXPECTED VALUE and thus our outcomes!
CUSUM
Purpose

• Provide programs with close to real-time data
• CUSUM is designed to track outcomes over time for individual programs
• Doesn’t replace PSRs
• CUSUM charts DO NOT go through a formal review period
WHAT are CUSUM Charts?

• Quality control method used in statistical analysis
• Used to detect a *change* in a process
• Looks at performance over time (3 years time)
• *If there are no deaths the CUSUM line trends down….if deaths occur the line goes up*
O-E CUSUM Chart

Observed - Expected CUSUM

Date

Reliability: CUSUM less reliable after 2015-09-30
O-E CUSUM Chart

Baseline is zero, your observed was the same as your expected

Reliability: CUSUM less reliable after 2015-09-30
O-E CUSUM Chart

Observed - Expected CUSUM

CUSUM line indicating trends in outcomes

Reliability: CUSUM less reliable after 2015-09-30
O-E CUSUM Chart

A period of higher than expected events

Reliability: CUSUM less reliable after 2015-09-30
O-E CUSUM chart

Always locate the zero/ baseline first

A period of lower than expected events
One Sided CUSUM

One-Sided CUSUM (5% Threshold)

Reliability: CUSUM less reliable after 2015-09-30
One Sided CUSUM

One-Sided CUSUM (5% Threshold)

“Indicates when a program may wish to consider a formal process review”

Reliability: CUSUM less reliable after 2015-09-30
One Sided CUSUM

Each tick marks an event.

When the 5% threshold is hit it resets to zero.

Reliability: CUSUM less reliable after 2015-09-30
QUIZ TIME!
Question 1: How are we trending?

Reliability: CUSUM less reliable after 2015-09-30
Question 2:
How is our program doing?
Can you predict your outcomes?
### 1 Year Graft Survival Estimates

<table>
<thead>
<tr>
<th>Transplant Period</th>
<th>SRTR Report Publication</th>
<th>n</th>
<th>Expected Failures</th>
<th>Observed Failures</th>
<th>Expected Survival Rate</th>
<th>Observed Survival Rate</th>
<th>O/E</th>
<th>O-E</th>
<th>1-sided p-value</th>
<th>CMS Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/12-6/14</td>
<td>6/15</td>
<td>454</td>
<td>18.6</td>
<td>16.0</td>
<td>96%</td>
<td>96%</td>
<td>0.86</td>
<td>(2.6)</td>
<td>0.758</td>
<td>-</td>
</tr>
<tr>
<td>7/12-12/14</td>
<td>12/15</td>
<td>460</td>
<td>18.6</td>
<td>21.0</td>
<td>96%</td>
<td>95%</td>
<td>1.13</td>
<td>2.4</td>
<td>0.315</td>
<td>-</td>
</tr>
<tr>
<td>1/13-5/15</td>
<td>6/16</td>
<td>462</td>
<td>19.6</td>
<td>23.0</td>
<td>96%</td>
<td>95%</td>
<td>1.18</td>
<td>3.4</td>
<td>0.247</td>
<td>1</td>
</tr>
<tr>
<td>7/13-12/15</td>
<td>12/16*</td>
<td>480</td>
<td>20.3</td>
<td>22.0</td>
<td>96%</td>
<td>95%</td>
<td>1.08</td>
<td>1.7</td>
<td>0.385</td>
<td>-</td>
</tr>
<tr>
<td>1/14-5/16</td>
<td>5/17*</td>
<td>480</td>
<td>20.3</td>
<td>17.0</td>
<td>96%</td>
<td>96%</td>
<td>0.84</td>
<td>(3.3)</td>
<td>0.800</td>
<td>-</td>
</tr>
<tr>
<td>7/14-12/16</td>
<td>12/17*</td>
<td>407</td>
<td>17.2</td>
<td>12.0</td>
<td>96%</td>
<td>97%</td>
<td>0.70</td>
<td>(5.2)</td>
<td>0.924</td>
<td>-</td>
</tr>
<tr>
<td>1/15-5/17</td>
<td>6/18*</td>
<td>320</td>
<td>13.6</td>
<td>6.0</td>
<td>96%</td>
<td>98%</td>
<td>0.44</td>
<td>(7.6)</td>
<td>0.993</td>
<td>-</td>
</tr>
<tr>
<td>7/15-12/17</td>
<td>12/18*</td>
<td>234</td>
<td>9.9</td>
<td>2.0</td>
<td>96%</td>
<td>99%</td>
<td>0.20</td>
<td>(7.9)</td>
<td>0.999</td>
<td>-</td>
</tr>
<tr>
<td>1/16-5/18</td>
<td>6/19*</td>
<td>135</td>
<td>5.7</td>
<td>-</td>
<td>96%</td>
<td>100%</td>
<td>-</td>
<td>(5.7)</td>
<td>1.000</td>
<td>-</td>
</tr>
</tbody>
</table>

Looking at Flagging Criteria
Adverse Events
Transplant Adverse Events

• Potential donor transmission
• ABO verification/ documentation error
• Prescription error
• Missed abnormal results
• Any breakdown in process that could have resulted in harm
Certain events must be reported to UNOS
ADVERSE EVENTS that need to be reported to UNOS Immediately...

- Death or serious injury during the initial admission for transplantation
- Medical device related death
- Unintentional transplant
- Death or organ failure of a living donor during initial admission
- Major living donor complication
- Incorrect ABO UNOS waitlist activation of a potential transplant patient
- A transplant is cancelled intraoperatively
- Potential Disease Transmission
When a Serious Event Occurs, what happens next?

• Communication with transplant management staff, patient, hospital quality, risk management
• Identification of who was involved
• ‘Thorough review’ or RCA (Root Cause Analysis) performed
• Action plan developed
• F/U monitoring for sustainability of action plan
Root Cause Analysis (RCA)

• Investigation into:
  • What happened?
  • Why did it happen?
  • What needs to be done to correct the problem?
  • How to prevent this problem from happening again?

So basically....
So what is the benefit of this method?

- Focuses on all variables vs. one factor in particular
- Instead of focusing on the error/mistake/event an RCA approaches the problem from a systems approach
- **KEY POINT:** Embraces safety culture ideology by not placing blame on individuals
“The biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures but as opportunities to improve the system and prevent harm.”

-Institute of Medicine, 2001
So let's think about this...

This nurse gave the wrong medication to her patient.

Fifth 12 hr shift in a row

Look alike sound alike drugs

Patient Assignment

Bar Code System Error
Case Example:

Medication Error
Event Occurs

Inpatient lung post-transplant patient receiving vancomycin for MRSA wound infection

- AM labs indicated a high trough level of 40mcg/ml
- Pharmacy consulted, decide to hold all Vancomycin doses
- Pharmacy documents this in the patients medical record
- Later that day patient was transferred from the ICU to the floor
- Patient receives afternoon vancomycin dose, possibly exposing him to vancomycin levels associated with drug related toxicities

-VERITAS Report
Don’t Jump to Solutions

Yeah, if everybody could just stop jumping to conclusions, that would be great.
RCA team is formed

- Transplant physician
- Pharmacist
- Lab
- Inpatient nursing
- Transplant quality
- Transplant pharmacy
- Objective outsiders
Gather data

- Thorough chart review
- Interview staff involved
- Evaluate technology and systems involved
  - Are there processes in place to prevent this error from occurring? If so why did they fail?
- Create a time line
Identification of Contributing Factors

• Fishbone Diagram
• 5 whys
5 Whys?

Why did the patient get the afternoon dose of vancomycin despite being held?

Because the floor nurse did not know the patient was not suppose to receive the afternoon dose.

Why?

Because the nurse did not get that information in report from the ICU nurse during the transfer

Why?

Because the ICU nurse did not communicate that the patient’s vancomycin was being held.

Why?

Because pharmacy had communicated to the ICU nurse that they were holding the dose for the day and they would document that in the patients chart

Patient’s POC was not adequately communicated to all members of the multidisciplinary team.
Problem: Pt received vancomycin after it was held

Communication
- Transfer Report
- Pharmacy and nursing communication

Administration
- MAR did not trigger a warning at time of administration
- MAR and lab systems lack of communication
  - Lack of highlighted pertinent patient information
  - Lack of standard in charting

Documentation
- Dose was still active on patient’s order set
<table>
<thead>
<tr>
<th>Action</th>
<th>Person Responsible</th>
<th>Implementation Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create standardized transfer report template that includes medication reconciliation</td>
<td>Nurse Manager of ICU, Nurse manager of floor</td>
<td>Oct 1st</td>
</tr>
<tr>
<td>Pharmacy will create a policy that when a medication is on hold it will be discontinued and have to be restarted</td>
<td>Pharmacy manager</td>
<td>Nov 1st</td>
</tr>
<tr>
<td>Lab values will populate on both the order entry system and during medication administration</td>
<td>IT, Dr. Smith and Nurse Tim</td>
<td>Nov 15th</td>
</tr>
<tr>
<td>Pharmacy will clearly document and highlight medication concerns in the patient summary</td>
<td>Pharmacy</td>
<td>Already started</td>
</tr>
</tbody>
</table>
Hardest Part... Following up!

• Sustainment
  • Did the project work?
  • Did we forget an important step?
  • Are these solutions helping or hurting?
  • How do we measure success?
30-60-90-120

• Check in
  • With staff
  • Determine if any other errors have occurred
  • Is the process working?

Continuous improvement never ends.
Shout it from the roof tops!

• Lessons Learned
  • Communicate:
    • Top to bottom
    • Horizontal
A moment to talk about the importance of TRANSPARENCY
Process Improvement Projects
Value Stream Map your referral process

- "Process is getting much better" in Oxford Hills.
- Oxford house phone number on website.
- Provider often hang up and call back because no one answer.
- Patients cannot self-referral.
- Secret Shopper calls multiple times a day.
- Doesn’t wait on record to schedule patient.
- GI Access Center (green Hills): only entry point in referral.
- PACT Team (TVC) RN/LPN 2 Schedulers: PACT has voicemail.
- PACT has voicemail.
- RN can elevate patient based on acuity.
- 5 day Access: Graft patient seen sooner based on criteria determined by:
  1. MELD ->
  2. Not actively drinking
  3. Tumor
  4. MELD preference

- Outside/inside medical providers need to be trained on dashboard.
- PACT captures a ton of useful data.

- Lack of transplant guidance on elevation criteria.
Identify waste in current workflows

Before
Spaghetti Diagram- Work Flow

After
Spaghetti Diagram- Work Flow
Help bring standardization to your programs
Use the 5s system
Quality Challenge
Does this look familiar?
Or this?

• How does this waste time?

• What is the impact of this on patient care?

• What is the impact on your satisfaction?
Step 1: Sort

Defined
• Get RID of unneeded items
• “When in doubt move it out”
• DO I need this?
• Is this really important?
• When was the last time I used this?

Examples:
• Paper copies that are available electronically
• Old policies or forms that have been updated
• Trash
Step 2: Straighten

Defined

• Organize and label the location for items

• THERE IS A PLACE FOR EVERYTHING—EVERYTHING IN ITS PLACE
Hospital Example of Straighten
Step 3: Shine

**Defined**

- Give your workspace a good clean
Step 4: Standardize

Defined
• Develop cleaning methods and cleanliness standards to maintain the first 3 S’s
• How often do you fall back into your old habits?

Example
• Put organizing your desk on your to-do list
• My personal one: Clean my desk every Friday afternoon
Step 5: Sustain

Defined
• The hardest part of any change
• Make it a habit
5S in Your Office

Before 5S...

After 5S...
After Pictures

Before

After
Final comments.....
What is your role in Quality?

• Be alert for potential opportunities for improvement and areas of potential risk

• Identify objectives that are of particular interest to your practice
  • Streamline a process
  • Monitor for a change in outcomes associated with a change in patient management

• Collaborate with other team members to develop and standardize best practices based on the results of your initiatives

• Present results of your outcomes metrics to a national meeting
Quality inspires action.