

Appendix 2. Core Elements (CE) Survey Questions Scoring Guide (2018 & 2021)

2018			
Core Element	Question	Variable Name	Scoring
<b>Leadership</b> (7 variables for CE adherence & scoring)			
	*Q31: Our facility has a formal statement of support for antibiotic stewardship (e.g., a written policy or statement approved by the board).	<i>absFormalSupport</i>	0.1428 points if Y 0 points if N
	*Q32 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: -Communicating to staff about stewardship activities, via email, newsletters, events, or other avenues -Providing opportunities for staff training and development on antibiotic stewardship -Allocating information technology resources to support antibiotic stewardship efforts	<i>absCommitCommun</i> <i>absCommitTrain</i> <i>absCommitIT</i>	For each variable: 0.1428 points if Y 0 points if N
	*Q33 (lead question): Our facility has a committee responsible for antibiotic stewardship.	<i>absCommittee</i>	0.1428 points if Y 0 points if N
	*Q34 (second and third sub questions and specific response options): - If Physician or Co-led is selected, which of the following describes your antibiotic stewardship physician leader? "Has antibiotic stewardship responsibilities in their contract or job description" - If Pharmacist or Co-led is selected, which of the following describes your antibiotic stewardship pharmacist leader? "Has antibiotic stewardship responsibilities in their contract or job description"	<i>abxStewardPhyJob</i> <i>abxStewardPhar</i>	For each variable: 0.1428 points if Y 0 points if N
<b>Accountability</b> (1 variable for CE adherence & scoring)			
	*Q34 (lead question): Our facility has a leader (or co-leaders) responsible for antibiotic stewardship outcomes.	<i>abxSteward</i>	1 point if Y 0 points if N
<b>Pharmacy Expertise</b> (2 variables for CE adherence & scoring)			
	*Q34 (first sub question, specific response options): If Yes [to 34, lead question], what is the position of this leader? - Pharmacist - Co-led by both pharmacist and physician.	<i>abxStewardPos</i>	0.5 points if PHARM or CO-LED 0 points if PHY, OTH, or blank
	*Q34 (final sub question): If Yes [to 34, first sub question], if Physician or Other, is there at least one pharmacist responsible for improving antibiotic use at your facility?	<i>abxPharm</i>	0.5 points if Y 0 points if blank
<b>Action</b> (7 variables for CE adherence & scoring)			

	*Q35 (specific response options): Our facility has a policy or formal procedure for:		
	- Required documentation of indication for antibiotic orders.	<i>absFormalProcDoc</i>	0.1428 points if Y 0 points if N
	- Required documentation of duration for antibiotic orders	<i>absFormalProcReqDur</i>	0.1428 points if Y 0 points if N
	- The treating team to review antibiotics 48-72 hours after initial order (i.e., antibiotic time-out).	<i>absFormalProcTreatTeam</i>	0.1428 points if Y 0 points if N
	- The stewardship team to review courses of therapy for specific antibiotic agents and provide real-time feedback and recommendations to the treating team (i.e., prospective audit and feedback).	<i>absFormalProcStwrdTeam</i>	0.1428 points if Y 0 points if N duplicated in Action & Reporting; points given in Action (here)
	- Required authorization by the stewardship team before restricted antibiotics on the formulary can be dispensed (i.e., prior authorization).	<i>abxPriorAuth</i>	0.1428 points if Y 0 points if N
	*Q36 (lead question): Providers have access to facility- or region-specific treatment guidelines or recommendations for commonly encountered infections.	<i>abxGuidelines</i>	0.1428 points if Y 0 points if N
	*Q37: Our facility targets select diagnoses for active interventions to optimize antibiotic use (e.g., intervening on duration of therapy for patients with community-acquired pneumonia according to clinical response).	<i>abxIntervention</i>	0.1428 points if Y 0 points if N
<b>Tracking</b> (6 variables for CE adherence & scoring)			
	*Q35 (sub question): [If Required documentation of indication for antibiotic orders is selected] Our stewardship team audits antibiotic orders to review appropriateness of indications.	<i>absFormalProcStwrdMonitor</i>	0.1666 points if Y 0 points if N or blank
	*Q36 (sub question): Providers have access to facility- or region-specific treatment guidelines or recommendations for commonly encountered infections and our stewardship team monitors adherence to those guidelines or recommendations.	<i>abxGuidelinesAdhere</i>	0.1666 points if Y 0 points if N or blank
	*Q38 (specific response options): Our stewardship team monitors:		

	- Antibiotic resistance patterns (either facility- or region-specific)	<i>abxMonResist</i>	0.1666 points if Y 0 points if N
	- Antibiotic use in days of therapy (DOT) per 1000 patient days or days present, at least quarterly	<i>abxMonDOT</i>	0.1666 points if Y 0 points if N
	- Antibiotic use in defined daily doses (DDD) per 1000 patient days, at least quarterly	<i>abxMonDDD</i>	0.1666 points if Y 0 points if N
	- Antibiotic expenditures (i.e., purchasing costs), at least quarterly	<i>abxMonPurch</i>	0.1666 points if Y 0 points if N
<b>Reporting</b> (3 variables for CE adherence & scoring)			
	Q35 (specific response option): Our facility has a policy or formal procedure for: - The stewardship team to review courses of therapy for specific antibiotic agents and provide real-time feedback and recommendations to the treating team (i.e., prospective audit and feedback).	<i>absFormalProcStwrdTeam</i>	0 points  duplicated in Action & Reporting; points given in Action (not here)
	*Q38 (first sub question): If antibiotic use in DOT, DDD, or some other way is selected: Our stewardship team provides individual-, unit-, or service-specific reports on antibiotic use to prescribers, at least annually.	<i>abxUsageRpt</i>	0.3333 points if Y  0 points if N or blank
	*Q39 (specific response options): Our stewardship team provides the following updates or reports, at least annually: - Updates to facility leadership on antibiotic use and stewardship efforts - Outcomes for antibiotic stewardship interventions to staff	<i>abxUpdateLead</i> <i>abxUpdateStaff</i>	For each variable:  0.333 points if Y  0 points if N
<b>Education</b> (3 variables for CE adherence & scoring)			
	*Q40 (specific response options): Which of the following groups receive education on appropriate antibiotic use at least annually: - Prescribers - Nursing staff - Pharmacists	<i>abxEdPrescribe</i> <i>abxEdNurse</i> <i>abxEdPhar</i>	For each variable:  0.3333 points if Y  0 points if N

2021				
Core Element	Question	Variable Name	Notes (comparing to 2018/2019 survey)	Scoring
<b>Leadership</b> (10 variables for CE adherence & scoring)				
	*Q39 (specific response options): Facility leadership has demonstrated commitment to antibiotic stewardship efforts by: - Providing a formal statement of support for antibiotic stewardship (e.g., a written policy or statement approved by the board)	<i>absCommitFormalSt</i>	Formerly <i>absFormalSupport</i> CDC: "This item was moved from a standalone question to a response option of a larger question, in accordance with the updated Core Elements (updated in 2019), but the intent and wording has not changed. This was intended to reduce the number of questions and minimize burden to the respondent."	0.1 points if Y 0 points if N
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Communicating to staff about stewardship activities, via email, newsletters, events, or other avenues.	<i>absCommitCommun</i>	No change	0.1 points if Y 0 points if N
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Providing opportunities for hospital staff training and development on antibiotic stewardship.	<i>absCommitTrain</i>	No change	0.1 points if Y 0 points if N
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Allocating resources (e.g., IT support, training for stewardship team) to support antibiotic stewardship efforts.	<i>absCommitResource</i>	Formerly <i>absCommitIT</i> CDC: "Slight modifications were made to ask more broadly about resources, rather than restricting the question to IT resources. This is in accordance with the updated Core Elements (updated in 2019)."	0.1 points if Y 0 points if N
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Presenting information on stewardship activities and outcomes to facility leadership and/or board at least annually	<i>absCommitPresent</i>	Formerly <i>absUpdateLead</i> CDC: "The updated Core Elements (updated in 2019) indicate this is a priority aspect of leadership commitment, so this item now meets the Leadership core element as well as Reporting."	0 points here  duplicated in Leadership & Reporting; points given in Reporting (not here)
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Ensuring that staff from key support departments and groups (e.g., IT and hospital medicine) are contributing to stewardship activities.)	<i>absCommitSupport</i>	Formerly <i>absCommittee</i> CDC: "Based on the updated Core Elements (updated in 2019), a committee is not necessarily a focus of antibiotic stewardship programs as much as engagement of key groups or departments."	0.1 points if Y 0 points if N
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Providing stewardship program leader(s) dedicated time to manage the program and conduct daily stewardship interventions - Having a senior executive that serves as a point of contact or "champion" to help ensure the program has resources and support to accomplish its mission - Ensuring the stewardship program has an opportunity to discuss resource needs with facility leadership and/or board at least annually	<i>absCommitTime</i> <i>absCommitPOC</i> <i>absCommitEnsureRes</i>	Not a question before CDC: "The updated Core Elements (updated in 2019) indicate this is a priority."	For each variable:  0.1 points if Y 0 points if N

	*Q40 (second and third sub questions and specific response options): - If Physician or Co-led is selected, which of the following describes your antibiotic stewardship physician leader? "Has antibiotic stewardship responsibilities in their contract or job description" - If Pharmacist or Co-led is selected, which of the following describes your antibiotic stewardship pharmacist leader? "Has antibiotic stewardship responsibilities in their contract or job description"	<i>abxStewardPhyJob</i> <i>abxStewardPhar</i>	No change	0.1 points if Y 0 points if N
<b>Accountability</b> (1 variable for CE adherence & scoring)				
	*Q40 (lead question): Our facility has a leader or co-leaders responsible for antibiotic stewardship program management and outcomes.	<i>abxSteward</i>	No change to variable name CDC: "Clarified language"	1 point if Y 0 points if N
<b>Pharmacy Expertise</b> (2 variables for CE adherence & scoring)				
	*Q40 (second and third sub questions and specific response options): If Yes [to 40, lead question], what is the position of this leader? - Pharmacist - Co-led by both pharmacist and physician.	<i>abxStewardPos</i>	No change	0.5 points if PHARM or CO-LED 0 points if N
	*Q40 (final sub question): If Yes [to 40, first sub question], If a pharmacist is not the leader or co-leader for the program, is there at least one pharmacist responsible for improving antibiotic use at your facility?	<i>abxPharm</i>	No change to variable name CDC: "Revised language to make clear to the respondents who should answer this question. Revised logic so that all eligible facilities answer this question (previously, logic was set up so that some facilities who should have answered this question did not). "	0.5 points if Y 0 points if N
<b>Action</b> (17 variables for CE adherence & scoring)				
	*Q41 (specific response): Our facility has the following priority antibiotic stewardship interventions: - Prospective audit and feedback for specific antibiotic agents. - Preauthorization for specific antibiotic agents.	<i>absIntervAudFB</i> <i>absIntervPreauth</i>	Formerly <i>absFormalProcStwrTeam</i> & <i>abxPriorAuth</i> CDC: "Simplified language"	For each variable: 0.0588 points if Y 0 points if N <i>absIntervAudFB</i> duplicated in Action, Reporting, & Education; points given in Action (here) <i>absIntervPreauth</i> duplicated in Action & Education; points given in Action (here)
	*Q41 (specific response): Our facility has the following priority antibiotic stewardship interventions: - Facility-specific treatment recommendations, based on national guidelines and local pathogen susceptibilities, to assist with antibiotic selection for common clinical conditions (e.g., community acquired pneumonia, urinary tract infection, skin and soft tissue infection).	<i>absIntervRecom</i>	Formerly <i>abxGuidelines</i> CDC: "Reframed question to indicate that facility-specific treatment recommendations is a priority intervention. Updates to language are based on the updated Core Elements (updated in 2019)."	0.0588 points if Y 0 points if N

	<p>*Q42 (specific response type): Our facility has a policy or formal procedure for other interventions to ensure optimal use of antibiotics:</p> <ul style="list-style-type: none"> <li>- Early administration of effective antibiotics to optimize the treatment of sepsis</li> <li>- Treatment protocols for Staphylococcus aureus bloodstream infection</li> <li>- Stopping unnecessary antibiotic(s) in new cases of Clostridioides difficile infection (CDI)</li> <li>- Review of culture-proven invasive (e.g., bloodstream) infections</li> <li>- Review of planned outpatient parenteral antibiotic therapy (OPAT)</li> <li>- Assess and clarify documented penicillin allergy</li> </ul>	<p><i>absFormalProcEarly</i>  <i>absFormalProcSABSI</i>  <i>absFormalProcCDI</i>  <i>absFormalProcInvInf</i>  <i>absFormalProcOPAT</i>  <i>absFormalProcAllergy</i></p>	<p>Not a question before  CDC: "The updated Core Elements (updated in 2019) indicate this can be an important intervention."</p>	<p>For each variable:  0.0588 points if Y  0 points if N</p>
	<p>*Q42 (specific response type): Our facility has a policy or formal procedure for other interventions to ensure optimal use of antibiotics:</p> <ul style="list-style-type: none"> <li>- The treating team to review antibiotics 48-72 hours after initial order (i.e., antibiotic time-out).</li> </ul>	<p><i>absFormalProcTreatTeam</i></p>	<p>No change to variable name  CDC: "Reformatted question as a response option rather than a standalone question; the updated Core Elements (updated in 2019) indicate this can be an important intervention."</p>	<p>0.0588 points if Y  0 points if N</p>
	<p>*Q42 (specific response): Our facility has a policy or formal procedure for other interventions to ensure optimal use of antibiotics:</p> <ul style="list-style-type: none"> <li>- Using the shortest effective duration of antibiotics at discharge for common clinical conditions (e.g. community-acquired pneumonia, urinary tract infections, skin and soft tissue infections)</li> </ul>	<p><i>absFormalProcDisch</i></p>	<p>Formerly <i>abxIntervention</i>  CDC: "Specified language, based on updated Core Elements (updated in 2019) that indicate that optimizing the duration of therapy can be an especially important infection-based intervention."</p>	<p>0.0588 points if Y  0 points if N</p>
	<p>*Q43 (select response). Our facility has in place the following specific 'pharmacy-based' interventions:</p> <ul style="list-style-type: none"> <li>- Pharmacy-driven changes from intravenous to oral antibiotics without a physician's order (e.g., hospital-approved protocol)</li> <li>- Alerts to providers about potentially duplicative antibiotic spectra (e.g., multiple antibiotics to treat anaerobes)</li> </ul>	<p><i>absPhIntervIVtoOral</i>  <i>absPhIntervDup</i></p>	<p>Not a question before  CDC: "This new question is a result of CDC's updated Core Elements (updated in 2019). The updated Core Elements specify pharmacy-based interventions that can improve patient outcomes."</p>	<p>For each variable:  0.0588 points if Y  0 points if N</p>
	<p>*Q43 (select response). Our facility has in place the following specific 'pharmacy-based' interventions:</p> <ul style="list-style-type: none"> <li>- Automatic antibiotic stop orders in specific situations (e.g., surgical prophylaxis)</li> </ul>	<p><i>absPhIntervAutoStop</i></p>	<p>Formerly <i>absSurgProphy</i>  CDC: "This question replaces a an item previously focused on Tracking (though was not a criteria used to meet the core element). This revision is based on CDC's updated Core Elements (updated in 2019) that specifies pharmacy-based interventions that can improve patient outcomes."</p>	<p>0.0588 points if Y  0 points if N</p>
	<p>*Q44 (second and third response): If Yes is selected: Our facility has in place the following specific 'nursing-based' interventions</p> <ul style="list-style-type: none"> <li>- Nurses initiate discussions with the treating team on switching from intravenous to oral antibiotics.</li> <li>- Nurses initiate antibiotic time-out discussions with the treating team</li> <li>- Nurses track duration of therapy</li> </ul>	<p><i>absNurseIntervIVtoOral</i>  <i>absNurseIntervTO</i>  <i>absNurseIntervDur</i></p>	<p>Not a question before  CDC: "This new question is a result of CDC's updated Core Elements (updated in 2019). The updated Core Elements specify nursing-based interventions that can improve patient outcomes."</p>	<p>For each variable:  0.0588 points if Y  0 points if N</p>
<p><b>Tracking</b> (8 variables for CE adherence &amp; scoring)</p>				

	*Q41 (specific response and third response): If Facility-specific treatment recommendations is selected: - Our stewardship program monitors adherence to our facility's treatment recommendations for antibiotic selection for common clinical conditions (e.g., community acquired pneumonia, urinary tract infection, skin and soft tissue infection).	<i>absIntervRecomMon</i>	Formerly <i>absGuidelinesAdhere</i> CDC: "Minor edits to parallel language in current question and align with language in updated Core Elements (updated in 2019)."	0.125 points if Y 0 points if N or blank
	*Q41 (specific response and third response). If Prospective audit and feedback is selected: - Our antibiotic stewardship program monitors prospective audit and feedback interventions (e.g., by tracking antibiotic use, types of interventions, acceptance of recommendations). If Preauthorization is selected: - Our antibiotic stewardship program monitors preauthorization interventions (e.g., by tracking which agents are requested for which conditions).	<i>absIntervAudFBMon</i> <i>absIntervPreauthMon</i>	Not a question before CDC: "Based on the updated Core Elements (updated in 2019), this is a priority process measure."	For each variable: 0.125 points if Y 0 points if N or blank
	*Q42 (specific response). If 'Using the shortest effective duration of antibiotics at discharge for common clinical conditions' is selected: Our stewardship program monitors adherence to use of shortest effective duration of antibiotics at discharge for common clinical conditions (e.g., community-acquired pneumonia, urinary tract infections, skin and soft tissue infections), at least annually.	<i>absFormalProcDischMon</i>	Not a question before CDC: "Based on the updated Core Elements (updated in 2019), this can be an important process measure for quality improvement. Aligns with revisions reflected in the 2020 survey's Q40(8)."	0.125 points if Y 0 points if N or blank
	*Q45 (specific response options): Our stewardship team monitors: - Antibiotic resistance patterns (either facility- or region-specific), at least annually - Antibiotic use in days of therapy (DOT) per 1000 patient days, at least quarterly - Antibiotic use in defined daily doses (DDD) per 100 patient days, at least quarterly - Antibiotic expenditures (i.e., purchasing costs), at least quarterly	<i>abxMonResist</i> <i>abxMonDOT</i> <i>abxMonDDD</i> <i>abxMonPurch</i>	No change	For each variable: 0.125 points if Y 0 points if N
<b>Reporting</b> (5 variables for CE adherence & scoring)				
	*Q39 (specific response options): Facility leadership has demonstrated a commitment to antibiotic stewardship efforts by: - Presenting information on stewardship activities and outcomes to facility leadership and/or board at least annually	<i>absCommitPresent</i>	Formerly <i>absUpdateLead</i> CDC: "The updated Core Elements (updated in 2019) indicate this is a priority aspect of leadership commitment, so this item now meets the Leadership core element as well as Reporting."	0.2 points if Y 0 points if N duplicated in Leadership & Reporting; points given in Reporting (here)
	*Q41 (specific response): Our facility has the following priority antibiotic stewardship interventions: - Prospective audit and feedback for specific antibiotic agents	<i>absIntervAudFB</i>	Formerly <i>absFormalProcStwrTeam</i> CDC: "Simplified language"	0 points duplicated in Action, Reporting, & Education; points given in Action (not here)

	*Q46 (specific response): Our stewardship team provides the following reports on antibiotic use to prescribers, at least annually: - Individual, prescriber-level reports - Unit- or service-specific reports	<i>abxUsageRptInd</i> <i>abxUsageRptUnit</i>	Formerly <i>abxUsageRpt</i> CDC: "Updated Core Elements (updated in 2019) indicate that provider-level reports have been effective in improving antibiotic use in outpatient settings. This revision split up response options to look at prescriber-level reports and unit- or service-specific reports separately. This revision will be useful in determining if prescriber-level reports are effective in in-patient settings and maintains continuity from the 2019 survey question."	For each variable: 0.2 points if Y 0 points if N
	*Q47. Our facility distributes an antibiogram to prescribers, at least annually	<i>antibDist</i>	Not a question before CDC: "This new item is a reflection of the updated Core Elements assessment tool."	0.2 points if Y 0 points if N
	*Q48. Information on antibiotic use, antibiotic resistance, and stewardship efforts is reported to hospital staff, at least annually.	<i>absInfoRpt</i>	Formerly <i>abxUpdateStaff</i> CDC: "This was reformatted as a result of the revision of part of 2019's Q39 to 2020's Q37(4), and language broadened based on the updated Core Elements (updated in 2019)."	0.2 points if Y 0 points if N
<b>Education</b> (5 variables for CE adherence & scoring)				
	*Q41 (specific response): Our facility has the following priority antibiotic stewardship interventions: - Prospective audit and feedback for specific antibiotic agents	<i>absIntervAudFB</i>	Formerly <i>absFormalProcStwrdTeam</i> CDC: "Updated Core Elements (updated in 2019) indicate many options for providing education on antibiotic use, including case-based education and preauthorizaion. This question serves as criteria for meeting Action, Reporting, and Education core elements."	0 points duplicated in Action, Reporting, & Education; points given in Action (not here)
	Q41 (specific response): Our facility has the following priority antibiotic stewardship interventions:  - Preauthorization for specific antibiotic agents.	<i>absIntervPreauth</i>	Formerly <i>abxPriorAuth</i> CDC: "Updated Core Elements (updated in 2019) indicate many options for providing education on antibiotic use, including case-based education and preauthorizaion. This question serves as criteria for meeting both the Action and Education core elements."	0 points duplicated in Action & Education; points given in Action (not here)
	*Q46 (second and third response). If 'Individual, prescriber-level reports' or 'Unit- or service-specific reports' is selected: Our stewardship program uses these reports to target feedback to prescribers about how they can improve their antibiotic prescribing, at least annually	<i>abxUsageRptFeedback</i>	No change to variable name/question (but now is used for CE adherence for Education); In my 2018 & 2019 scoring this was not used for adherence but I included as part of my scoring for Reporting CDC: "Updated Core Elements (updated in 2019) indicate many options for providing education on antibiotic use. This question previously was not used as criteria for meeting a core element, but now meets the Education core element."	0.2 points if Y 0 points if N or blank



	<p>*Q49: Which of the following groups receive education on optimal prescribing, adverse reactions from antibiotics, and antibiotic resistance at least annually?</p> <ul style="list-style-type: none"> <li>- Prescribers</li> <li>- Nursing staff</li> <li>- Pharmacists</li> </ul>	<p><i>abxEdPrescribe</i> <i>abxEdNurse</i> <i>abxEdPhar</i></p>	<p>No change to variable name CDC: "Clarified language on type of education."</p>	<p>For each variable: 0.2 points if Y 0 points if N</p>
	<p>*Q50. Are patients provided education on important side effects of prescribed antibiotics?</p>	<p><i>abxEdPat</i></p>	<p>Not a question before CDC: "This item reflects the importance of patient education, as stated in the updated Core Elements (updated in 2019)."</p>	<p>0.2 points if Y 0 points if N</p>