1305. External validation of predictive scores for mortality following *Clostridium difficile* infection

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Background. The burden of *Clostridium difficile* infection (CDI) has increased in the last decade, with more adverse outcomes and related mortality. Although many predictive scores were developed, few were validated and their performances were sub-optimal. We conducted an external validation study of predictive scores or models for mortality in CDI.

Methods. Published predictive tools were identified through a systematic review. We included those reporting at least an internal validation approach. A multicenter prospective cohort of 1380 adults with confirmed CDI enrolled in two Canadian provinces was used for external validation. Most cases were elderly (median age 71), had a healthcare facility-associated CDI (90%), and 52% were infected by NAP1/BI/027 strains. All-cause 30-day death occurred in 12% of patients. The performance of each scoring system was analyzed using individual primary outcomes.

Results. We identified two scores which performances (95% CI) are shown in the table. Both had low sensitivity and PPV, moderate specificity and NPV, and similar AUC/ROC (0.66 vs. 0.77 in the derivation cohort, and 0.69 vs. 0.75 respectively). One predictive model for 30 days all-cause mortality (Archbald-Pannone 2015, including Charlson score, WBC, BUN, diagnosis in ICU, and delirium*) was associated with only 5% increase in odds of death (crude OR = 1.05 (1.03–1.06)) with an AUC of 0.74 (0.7–0.8).

Study, outcome (%)	Predictors (assigned points)	Cutoff/ max score	Sen %	Spe %	PPV %	NPV %	LR +	Accuracy %
Kassam 2016 In hospital CDI-related mortality (18%)	Age (2–4) ICU admission (5) Acute renal failure* (3) Diabetes (-1) Cardiopulmonary disease* (1) Liver disease (2) IBD (2) Malignancy (2)	≥6 patients/19	44 (37–51)	79 (77–82)	31 (26–37)	87 (84–89)	2.1 (2–2.2)	73 (70-76)
Butt 2013 30-day all-cause mortality (12%)	Serum albumin ≤ 24.5 g/L (1) CRP > 228 mg/L (1) WBC > 12 and/ or respiratory rate > 17/ minute (1)	≥2 patients/3	56 (46–64)	77 (74–80)	25 (20–30)	93 (90–94)	2.4 (2.3–2.5)	74 (71–77)

*Modified to match available data in validation cohort.

Conclusion. The predictive models of CDI mortality evaluated in our study have limitations in their methods and showed moderate performances in a validation cohort consisting of a majority of CDI caused by NAP1 strains. An accurate predictive tool is needed to guide clinicians in the management of CDI to prevent adverse outcomes.

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1306. Risk factors for healthcare-associated *Clostridium difficile* infection in pediatric hematopoietic stem cell transplant recipients

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Background. Limited published literature exists to identify unique risk factors for *Clostridium difficile* infection (CDI) in pediatric hematopoietic stem cell transplantation (HSCT) recipients. Our objective was to describe the epidemiology of CDI in pediatric patients undergoing HSCT and to identify potential risk factors for CDI.

Methods. This IRB-waived, single-center retrospective review included Duke University Hospital (DUH) patients 12 months of age or older admitted to pediatrics between March 1, 2012 and August 23, 2016 undergoing initial HSCT during the index hospitalization. The primary endpoint (PCR-confirmed CDI within 100 days post-transplantation) was characterized using descriptive statistics. Transplant type, prior CDI history, days of total parenteral nutrition (TPN), and antibiotic use intensity scores were compared between occurrence groups using Pearson's chi-square, Wilcoxon rank-sum or Student's t tests as appropriate.

Results. 207 subjects (most Caucasian [55%] and male [61%]) were included, and 15 (7.2%) died. CDI occurred in 24 (12%) within a median (interquartile range) of 35 (9, 47) days since HSCT, and most (92%) were hospital-onset. All cases were healthcare-associated and mild-moderate in severity. None of the patients experienced CDI-related complications. CDI-positive and CDI-negative patients were similar with regards to demographics. Higher median (adjusted) days of TPN (80.6 vs. 29, $P < 0.0001$) and antibiotic use intensity scores (382.8 vs. 191.0, $P < 0.0001$), respectively, were associated with CDI. No significant differences between these groups were observed with regard to transplant type ($P = 0.28$) and prior CDI history ($P = 0.10$).

Conclusion. CDI occurred in 12% of pediatric patients within 100 days of undergoing initial HSCT. Onset of this mild-moderate, uncomplicated disease occurred within a median of 35 days and commonly during hospitalization. Patients with CDI were more likely to have increased use of TPN and a higher antibiotic use intensity score.

Disclosures. **All authors:** No reported disclosures.

1307. Derivation and Validation of a Clinical Prediction Rule for Complications of *Clostridium difficile* Infection Using a Multicenter Prospective Cohort

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Background. *Clostridium difficile*infection (CDI) outbreaks were associated with increase in unfavorable outcomes. Identifying and predicting risk of developing complications (cCDI) early in the course of illness could improve clinical decision-making. We developed and validated a prediction rule for cCDI.

Methods. Adult inpatients with confirmed CDI in 10 Canadian hospitals were enrolled and followed for 90 days. Data within 48h of CDI diagnosis were collected: demographics, underlying illnesses, past medical and drug history, clinical signs, blood tests, and strain ribotype. cCDI was defined as one or more of: colonic perforation, toxic megacolon, colectomy, need of vasopressors, ICU admission due to CDI, or if CDI contributed to 30-day death. Predictors' selection was supported by experts' opinion suggesting 17 clinical criteria. Cross-validation technique was used (2:1 ratio) and multivariable logistic regression for predictive modeling in the derivation subset. The optimal model was assessed by area under ROC curve (AUC) and prediction error (PE). A predictive score was built by assigning points proportional to adjusted risk estimates.

Results. Among 1380 patients enrolled, 1050 were used for predictive modeling (median age 70 years and one-third infected by ribotype 027 strains). Cases were split into training ($n = 700$) and validation sets ($n = 350$). A cCDI occured in 8% and 6.6% respectively. The optimal model with a PE of 5% and an AUC of 0.84 in the validation

set included WCC (< 4, 12–19.9, or ≥20 × 10^9/L), BUN≥11 mmol/L, serum albumin <25 g/L, heart rate > 90/minute, and respiratory rate >20/minute. A predictive score of min 0 and max 13 points was derived. A score ≥7 points was associated with 70% cases of cCDI, showed 68% sensitivity (95% CI, 55–80) in the derivation set and 70% (51–88) in the validation set, a specificity of 73% (69–76) and 76% (72–81) respectively, 17% PPV (9–25), and 97% NPV (95–99) in both sets.

Conclusion. Using a large multicenter prospective cohort and robust modeling approach, we derived a predictive score that included easily available measures at the bedside. The score showed acceptable performance. Further validation is needed on cohorts with different characterstics (non-outbreak setting, higher rate of cCDI). Other approaches such as combination of biomarkers could be more predictive of cCDI.

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1308. Are Patients with Prior *Clostridium difficile* Infection (CDI) a Potential Source of Transmission during Hospital Admissions?

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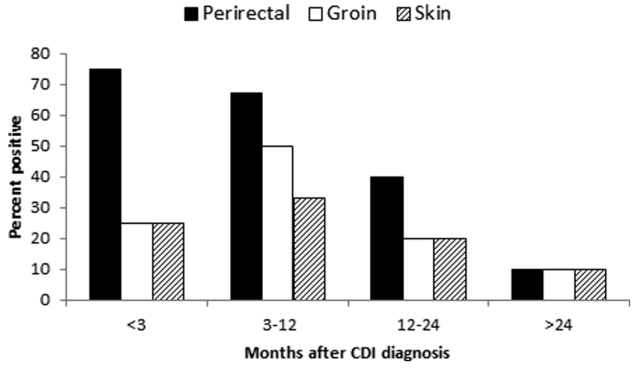
Background. Many patients with *Clostridium difficile* infection (CDI) continue to shed spores asymptomatically after completion of CDI therapy. However, the duration of shedding and the potential for transmission during subsequent healthcare exposures is unknown.

Methods. During a 6-month period, we collected perirectal, groin, and skin (chest/abdomen and hands) cultures for toxigenic *C. difficile* from patients with a prior history of CDI who were admitted to the hospital. We calculated the frequencies of perirectal and skin shedding of *C. difficile* at the time of admission, stratified by the time since the prior CDI diagnosis.

Results. Of 28 patients with a prior history of CDI enrolled in the study, 10 (36%) had positive perirectal cultures for toxigenic *C. difficile* upon admission, and 6 of 10 (60%) had positive skin cultures. The figure shows the percentages of CDI cases with positive perirectal, groin, or skin cultures, stratified by the time since the prior CDI diagnosis.

Conclusion. Patients with prior CDI often shed spores asymptomatically during hospital admissions. Further studies are needed to determine whether these carriers contribute significantly to transmission.

Figure. Percentages of CDI cases with positive perirectal, groin, or skin cultures, stratified by the time since the prior CDI diagnosis



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1309. External validation of clinical scores to predict complications of *Clostridium difficile* infection

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Background. *Clostridium difficile* infection (CDI) is the most common cause of nosocomial diarrhea. About one in 5 patients with CDI (median 18%) develop a complication (cCDI), including mortality. Many predictive scores have been published to identify patients at risk of cCDI but none is currently recommended for clinical use and few were validated. We conducted an external validation study of predictive tools for cCDI.

Methods. Predictive tools were identified through a systematic review. We included those reporting at least an internal validation process. We performed the external validation on a multicenter prospective cohort of 1380 Canadian adults with confirmed CDI. Most cases were elderly (median age 71), had a healthcare facility-associated CDI (90%), and cCDI occurred in 8%. NAP1 strain was found in 52%. The performance of each scoring system was analyzed using individual outcomes. Modifications in predictors were made to match available data in the validation cohort.

Results. We assessed 3 predictive scores and one predictive model. The performance (95% CI) of higher thresholds are shown in the Table. All scores had a low sensitivity and PPV, and moderate specificity and NPV. The model of Shivashankar 2013 (age, WBC> 15, narcotic use, antacids use, creatinine ratio > 1.5) predicted 25% probability of cCDI. All showed similar AUC (0.63–0.67).

Study, outcome (%)	Predictors (points)	Sen %	Spe %	PPV %	NPV %	LR+	Accuracy (%)
Na 2015 (2–3 patients) ICU admission, megacolon, colectomy, attributable 30-day death (8%).	Age ≥ 65 (1) WBC ≥ 20 (1) Creatinine ≥ 2 mg/dL (1)	46 (36–55)	87 (85–89)	23 (17–29)	95 (94–96)	3.5 (3–4)	84 (82–86)
van der Wilden 2013 (≥ 6 patients) ICU, colectomy, attributable 30-day death (7%).	Age >70 (2) WBC ≥20 or ≤2 (1) Cardiorespiratory failure (7) Abdominal pain (6)*	61 (51–57)	55 (52–58)	9 (7–11)	95 (93–97)	1.35 (1.3–1.4)	55 (53–58)
Hensgens 2013 (≥ 4 patients) ICU, colectomy, all-cause 30-day death (15%).	Age (50–84, ≥ 85) (1, 3) Diagnosis in ICU (3) Abdominal surgery (-3) MAP ≤65mmHg (2)* Diarrhea (2)	26 (19–32)	90 88–92)	30 24–37)	87 85–89)	2.5 2–3)	80 (78–82)

*Modified

Conclusion. The predictive tools included in our study showed moderate performance in a validation cohort with a low rate of cCDI and high proportion of NAP1 strains. Further research is needed to develop an accurate predictive tool to guide clinicians in the management of CDI.

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1310. Hospital-Nursing Home Transfer Patterns and Influence on Nursing Home *Clostridium difficile* Infection Rates

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