Canadian *Burkholderia cepacia* complex research and referral repository

2024/2025 Annual Report: April 1st 2024 to March 31st 2025

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THE UNIVERSITY OF BRITISH COLUMBIA

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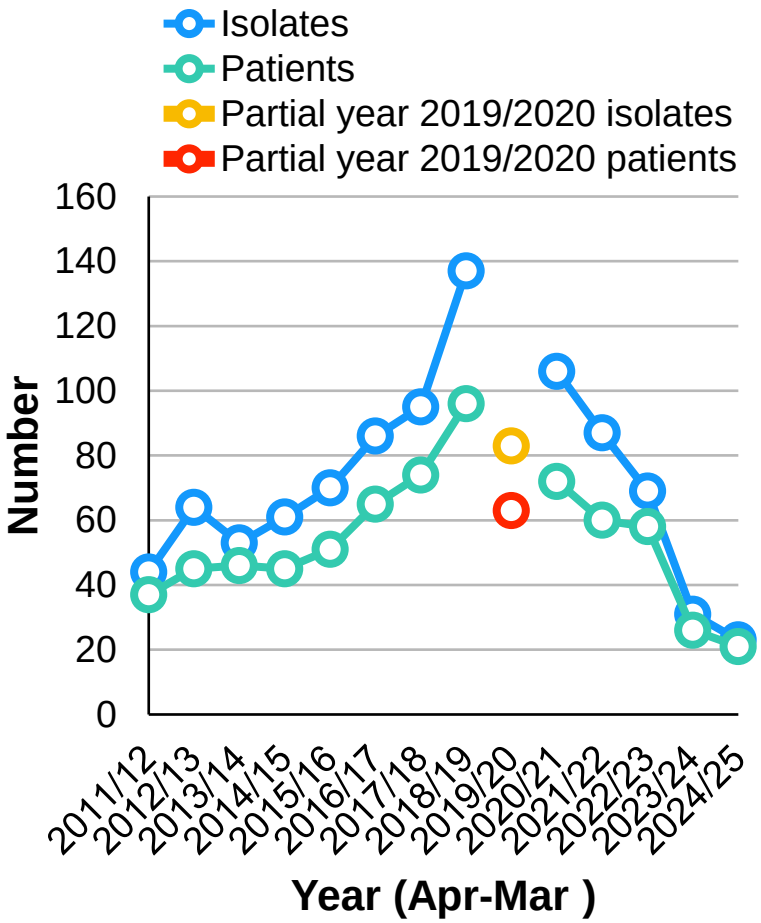
Report Summary

We are delighted to present the 2024-2025 end-of-grant report for the Canadian *Burkholderia cepacia* complex research and referral repository. This report covers the period 1st April 2024 to 31st March 2025.

We would like to acknowledge and thank Cystic Fibrosis Canada for their support during this period. Since early 2000, we have provided the *Burkholderia* identification service free of charge and without interruption to hospitals serving CF patients in Canada.

In this period, we received 23 isolates from referring hospitals of which there were 23 isolates from 21 people with CF.

We received 7 isolates from patients for whom we had not been sent isolates before. For the new isolates from CF patients (those from patients not previously received by the CBCCRRR) the median age was 6 years, with the youngest being 2 and the oldest being 54.



Isolate Summary 2024/25

Numbers of BCC Identification Requisition to the CBCCRRR during 2024/25

Province	# isolates	#patients [#w.CF] (# new w.CF)	Isolates ID'd as *B. cenocepacia* [# pt w.CF] (# new CF cases)	Isolates ID'd as *B. multivorans* [# pt w.CF] (# new CF cases)	Other Isolates ID's [# pt w.CF] (# new CF cases)
Alberta	5	5[5](2)	2[2](1)	0[0](0)	2 x *B. gladioli* [2](0) 1 x *P. pnomenusa* [1](1)
BC	3	3[3](1)	1[1](0)	1[1](0)	1 x *B. vietnamiensis* [1](1)
Manitoba	3	1[1](0)	0[0](0)	2[1](0)	1 x B. contaminans [1](0)
Maritimes	7	7[7](0)	7[7](0)	0[0](0)	[0](0)
Ontario	3	3[3](3)	1[1](1)	2[2](2)	[0](0)
Quebec	2	2[2](1)	0[0](0)	2[2](1)	[0](0)
Total	23	21[21](7)	11[11](2)	7[6](3)	5[5](2)

Isolates from the Vancouver clinics

As a matter of routine, we have been collecting all BCC isolates from the Vancouver clinics since 1981. We now save all isolates sent to us - which could be up to four times a year if a patient routinely attends clinic. During the period of this report we saved **19 isolates** from **10** CF patients from BC Children's Hospital and St. Paul's Hospital. 2 isolates from 2 CF patients listed on the table on p.4 are part of the 19 isolates from 10 CF patients. In total the Vancouver collection comprises over **1,731** isolates from **217** people with CF.

Report Discussion

This year we would like to make the following noteworthy observations:

- 'New' isolates continue to be received, suggesting that new infections by *Burkholderia cepacia complex* continues to be a risk in people with CF.

- The decline of BCC identification requisitions overtime coincides with the introduction and usage of Trikafta (elexacaftor/tezacaftor/ivacaftor) and decrease in BCC species prevalence in CF patients in Canada as reported in the 2023 Canadian CF registry report.

- The number of isolates from patients received in this period, is considerably lower than the number patients listed (86) in the CF Registry report as culturing at least one BCC. We would like to remind clinics that it is recommended to submit at least one isolate per infected patient per year in order to monitor for strain and species replacement.

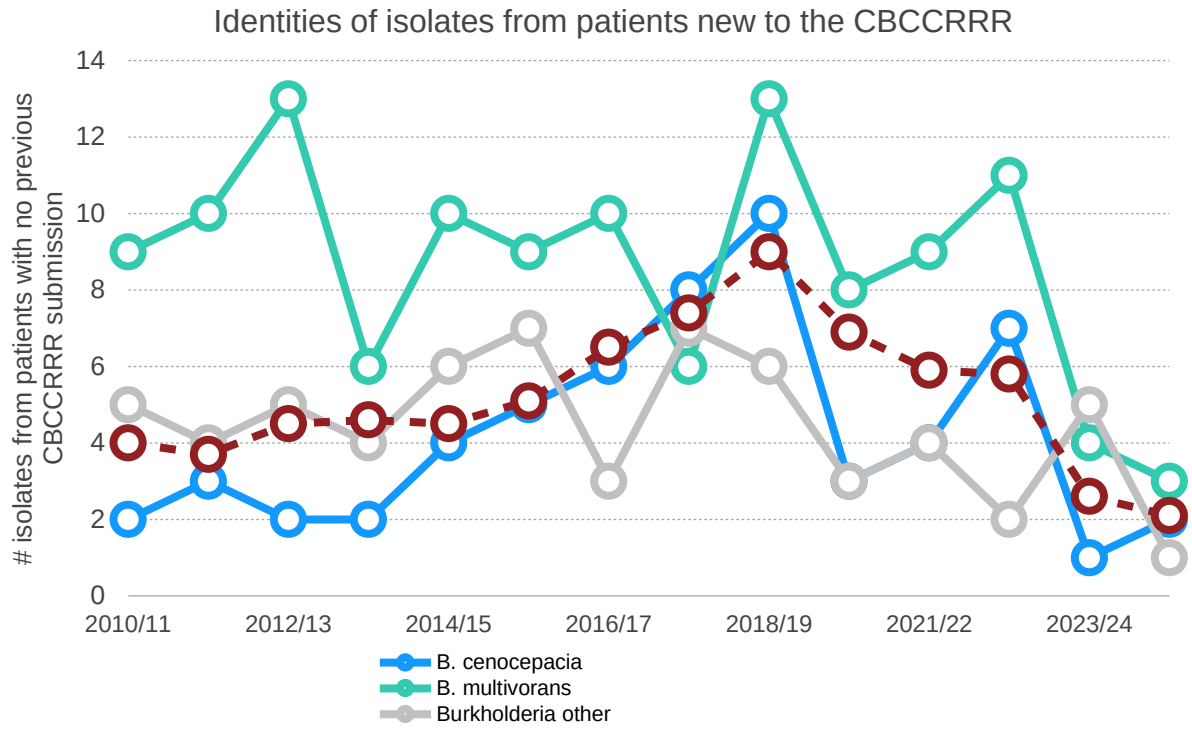
- *B. cenocepacia* and *B. multivorans* were the leading identifications in both the total number of isolates and in isolates that were new to us. And this is the same prevalence of *Burkholderia cepacian complex species* reported in the 2023 Canadian CF registry report. This, again, underscores our previous observation that *B. cenocepacia* has not gone away in the CF population and still remains a leading cause of BCC infections in people with CF. The well described epidemic potential of at least some strains of these species merits continued caution in regard of infection control.

- Clinics are encouraged to contact us (cbccrrr@bcchr.ca) if they would like a summary of the strain-types identified from their clinics.

Species identification in 'new' isolates

We cannot be sure that when we receive a sample for the first time for a patient that this always represents a new infection. In many cases this will be the case, particularly for the many centers that routinely submit samples. Nonetheless, we report the species for patients for whom we have not had samples before as an aggregate indicator of the organisms causing 'new' infections in people with CF. In the 2017/2018 annual report we noted that, for the first time in many years, B. *cenocepacia,* had become the most common cause of new samples. This does now appear to have been a 'blip'. In 2018/19, 2020/21, 2021/22, 2022/23 and 2023/24 and now for 2024/25, *B. multivorans* again returns to predominance (see Figure below). It is important to note that *B. cenocepacia* continues to cause new infections in people with CF.

For 2024/2025 there were isolates from 7 people sent to us that were new, of these 3 were *B. multivorans,* 2 were *B. cenocepacia*, 1 was *B. vietnamiensis* and 1 was *P. pnomenusa*. This report, therefore, continues the pre-existing overall picture of *B. multivorans* as the predominant cause of new infections, while *B. cenocepacia* and *B. vietnamiensis* continue to cause new infections.



Note in clarification: unfortunately, we are unable to be certain when we receive isolates from patients for whom we have not had a prior isolate, whether or not the isolate is the first from the patient - and hence a new infection. Our requisition form asks for this information; however, this is not always filled out correctly and so the data provided 'new' is defined as a patient 'new' to the CBCCRRR. In the above graph we have excluded from 'new' isolates of *B. cenocepacia* from a clinic who started to send us isolates for the first time in 2013/14 and 2014/15 and for whom we contacted the clinic to find their *B. cenocepacia* isolates were all from long term infections.

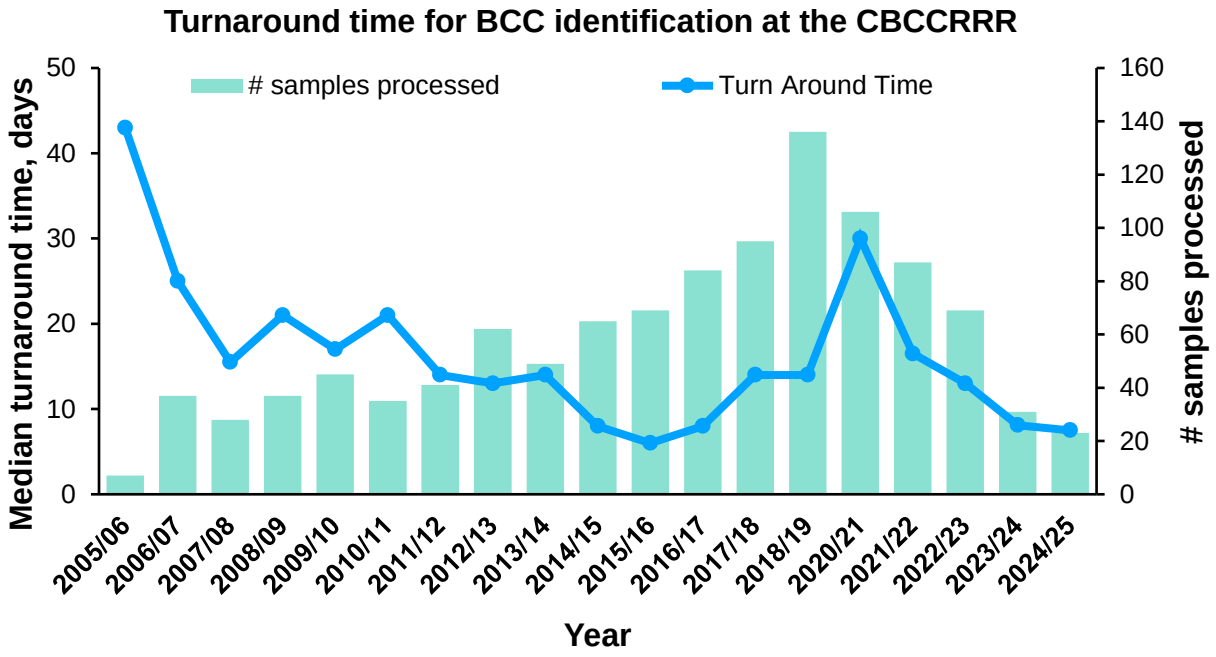
CBCCRRR Operations

We have improved the turn-around-times in 2024/2025. It will continue to be a focus going forward as we understand that the timeliness of results is important to the CF community

Of note, we saw a reduction for the numbers of isolates submitted after 2019. We are also encouraged that we recently received some isolates from patients at the adult hospital in Toronto - which we have previously noted as missing from our list of submitting hospitals (and has the largest population of *Burkholderia* infections in Canada).

Staffing

The technician has been responsible for reviewing the identification reports before sent out, while the PIs oversee the finances and the annual report.



Our focus over the next period of funding will include:

- Maintaining a <14-day turnaround time
- Providing the BCC 7-gene MLST sequence typing for CF clinic across Canada
- Reach out to hospital and CF clinics to increase isolates submission

Leveraged Additional funding

The funds provided by CF Canada and the Cystic Fibrosis Foundation for the operation of the CBCCRRR during this period have permitted other synergies for CF. In the year 2024/25 these have included:

Salary matches for CBCCRRR technologist:

The current operating grant for the CBCCRRR paid 30% of the CBCCRR repository technologists (now Mr. Harn) time. Additional funds for the remaining 70% the salaries came from:

CBCCRRR technologist: *Dr. Sadarangani's research funds.*

We would also like to acknowledge that the joint CF Canada/CFF grant for 2022/2023 provided essential bridge that has permitted 2 further years of funding to be committed for the repository for 2023/2025. This period of stability will allow us to continue to evolve and develop the CBCCRRR for the benefit of the CF community.

Collaborations

Additionally, CBCCRRR continued to collaborate with a range of other investigators across Canada and the world to contribute to our understanding of BCC infections in CF. Recent active collaborations, at various stages of completion, include:

- Dr. Peter Jorth - evaluation of antimicrobial susceptibility testing method in *Burkholderia*
- Dr. Silvia Cardona - antibiotic resistance in *Burkholderia*
- Dr. Jane Hill and Dr. Shekooh Behroozian - Volatile Organic Compounds
- Dr. Jason Gill - locus typing system in *Burkholderia*
- Dr. Michael Murphy - broad antibiotic resistance mechanism in *Burkholderia*

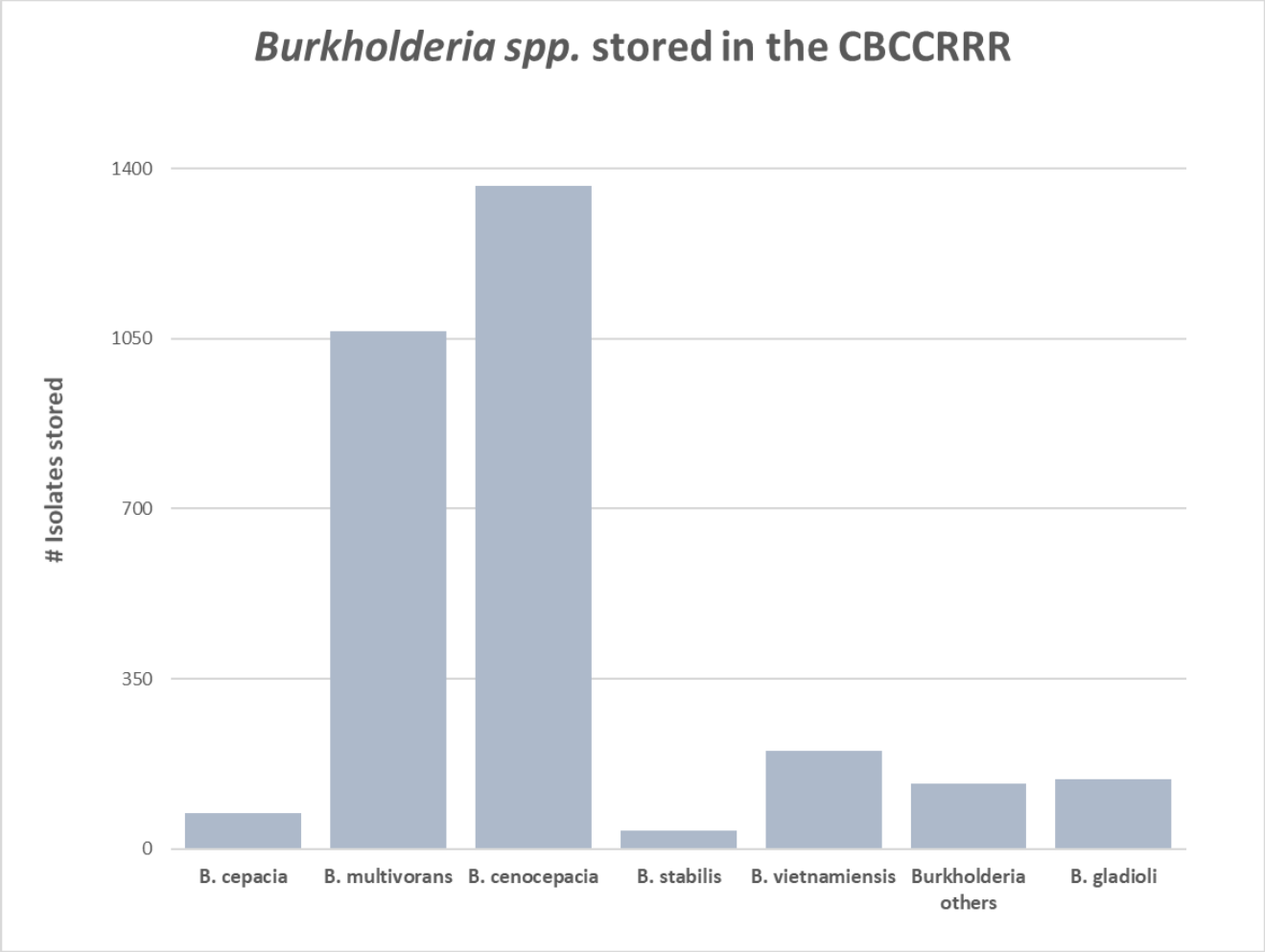
The following publications have resulted from these collaborations:

- Jorth P. et al. Evaluation of antimicrobial susceptibility testing methods for *Burkholderia cepacia* complex isolates from people with and without cystic fibrosis. Journal of Clinical Microbiology 2025; 63: e0148024. doi: 10.1128/jcm.01480-24
- Behroozian S. et al. Antibacterial Activity of a Natural Clay Mineral against *Burkholderia cepacia* Complex and Other Bacterial Pathogens Isolated from People with Cystic Fibrosis. Microorganisms 2023; 11: 150. doi: 10.3390/microorganisms11010150

The CBCCRRR for Researchers

The CBCCRRR is a resource for researchers as well as clinics and we welcome contact from researchers who wish to discuss their needs. All the isolates sent to us for identification are frozen and stored indefinitely and most are available to researchers de-linked from their clinical identifiers. Isolates are available either as part of a collaboration (to academic researchers - requiring minimal shipping charges) or on a cost recovery basis to both academic researchers and industry.

In addition to *Burkholderia*, researchers might like to note that we house a large collection of CF clinical isolates of other bacteria. This includes:



- More than 13,000 isolates of *Pseudomonas aeruginosa* from CF infections (including many sequential clonal isolates)
- Many other species of Gram-negative bacteria isolated from CF: *Achromobacter spp., Acinetobacter spp., Pandoraea spp., Ralstonia spp., Stenotrophomonas maltophilia* among others.