Purpose or Objective
Brachytherapy (BT) is an appealing option in the treatment of children as it delivers a localised radiation dose with rapid drop off. Due to the potential long term effects on growth, development and the risk of second malignancies, external beam radiation is not ideal in infants and extensive surgery may be an unacceptable option.

In 2012 a paediatric BT program began between Westmead Hospital and The Children's Hospital at Westmead (CHW). This is an intensive treatment requiring extensive planning and collaboration and presents both technical and practical challenges. We describe our experience using BT in children with pelvic tumours.

Materials and Methods
Between 2012 and 2020 referrals from CHW or from elsewhere in Australia and New Zealand were assessed and pre-plans created to determine the likely implant or mould to deliver treatment to the target area and whether surgical resection would be a component of local therapy.

All BT implants were performed under general anaesthetic with both surgical and BT teams present. Assessment of the primary tumour was performed via cystoscopy and/or directly via Pfannenstiel incision. BT implants and surgical resection were performed in complimentary fashion to ensure optimal tumour coverage.

Post-operative imaging was used to create individual BT treatment plans. Organ at risk planning dose aims were adjusted from paediatric protocols and adult BT literature with attention to bones, growth plates, bladder, urethra, rectum and bowel. Quality assurance, safety protocols and workflow were adapted depending on the implant used.

Children remained sedated and ventilated for duration of BT treatments and were transferred from CHW paediatric intensive care unit for BT twice daily.

Results
Eleven children were treated with BT for pelvic tumours comprising 7 boys and 4 girls with a median age at time of BT of 17 months (range 11m – 16yrs). Six were rhabdomyosarcoma of the prostate and/or bladder, 3 undifferentiated sarcoma, 1 Ewings-like sarcoma and 1 pelvic recurrence of Wilms tumour. All had prior chemotherapy and one prior external beam radiation therapy. BT techniques included trans perineal interstitial implants performed with ultrasound guidance (9 patients), trans abdominal implants (5) and customised 3-dimensional applicators (2). Surgical interventions included organ-preserving tumour resection (7 patients), ureteric transposition (5) and relocation of other structures away from the treatment area (2). Ten received HDR BT with doses of 5-6.5Gy over 5 fractions delivered to 95% of the CTV. One child received LDR BT. 9 of 11 children are alive and without disease at median follow up 48 months (range 15-98 months). Two died from distant metastatic disease without local recurrence.

Conclusion
BT both with and without surgical resection is a treatment option in paediatric patients with pelvic tumours that may preserve function and minimise side effects. It requires a collaborative approach between surgical and radiation therapy colleagues.

PO-0263 A Matlab toolkit for Ru-106 eye plaque QA, dose calculation, reference table and report generation

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Purpose or Objective
Ru-106 eye applicators are the standard of care for the conservative treatment of uveal melanomas of smaller thickness. As treatment requires collaboration of different specialties in different departments, efficient communication and reporting on delivered dose is required. Tools to bundle both acceptance of new sources, treatment planning and communication to ophthalmologists are however lacking. Our aim was to develop an 'all-in-one' toolkit to perform depth-dose rate fits during acceptance of new plaques, pre- and post-treatment planning, including generating reports for efficient documenting, and generate reference tables used for operating room time planning. The provisional treatment times in these tables serve as a guide for ophthalmologists to estimate expected treatment times for newly presenting patients.

Materials and Methods
A GUI toolkit was developed in Matlab (2017b) consisting of 3 modules: quality assurance (QA) reporting, treatment planning and reference treatment time calculation.

QA reporting Depth-dose rates along the central axis are measured during acceptance of new eye plaques (BEBIG). The program performs a cubic polynomial fit (per vendor recommendations) of the discrete point measurements and checks this against the certificate fit. The fit is stored for later retrieval by the other modules, such as treatment planning.

Treatment planning Patient and applicator details are entered into a form after which the system performs a 1D treatment time calculation. The user can opt to use a radiobiological dose rate correction factor. The module consists of two parts: pre-treatment treatment time calculation based on the prescribed dose, and post-treatment calculation of the administered dose based on the actual insertion and removal time of the plaque (fig 1).

Reference tables For each applicator the program generates an overview table with treatment times for our standard prescribed dose, at variable depths and for 12 months following acceptance.

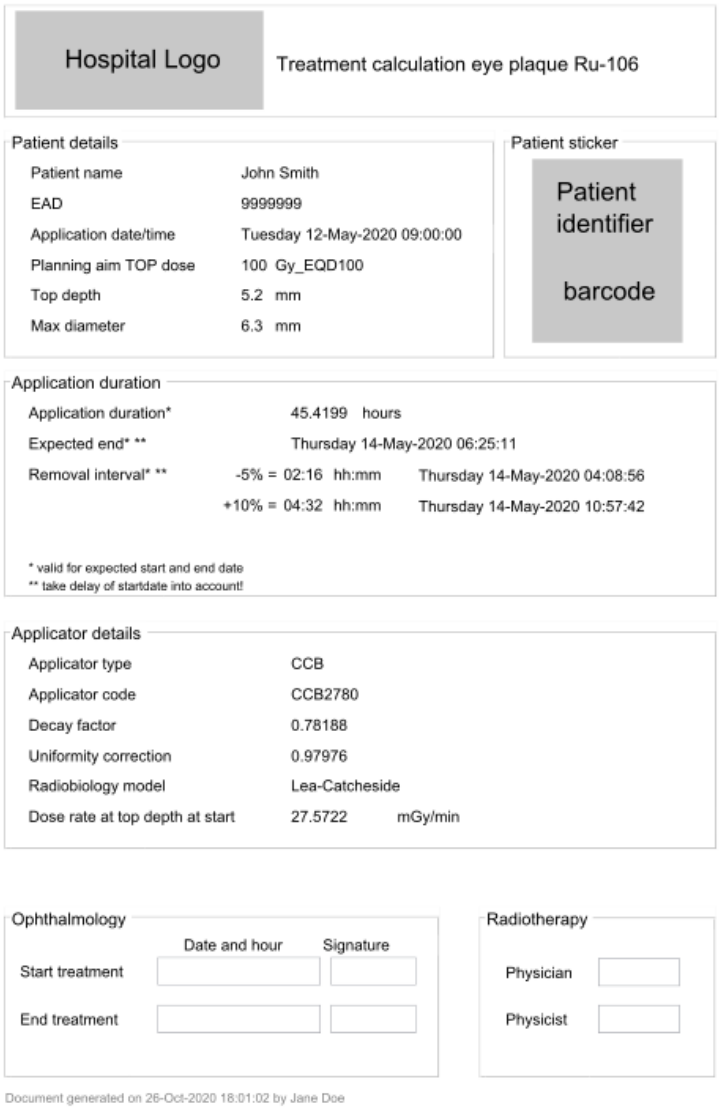


Figure 1: Treatment calculated report. The hospital logo has been censored. A patient identifier can be added on the printed report for unique identification. Prior to distribution to the ophthalmologist, a radiation oncologist and medical physicist sign off on the treatment. The true insertion and removal date/time is manually entered by the ophthalmologist.

Results

QA reporting For each plaque a report in pdf-format is automatically generated summarizing the acceptance measurements, including the in-house diode measurements of depth dose curve, fit details, uniformity measurements and comparison to the vendor's certificate.

Treatment planning A single page pre-treatment report with the prescribed dose and planned treatment time is generated for easy communication to the ophthalmology department. In addition, a comprehensive post treatment report, including all patient and source details, is generated for storage in the hospital information system (HIS).

Reference tables After acceptance of the sources, overview reference tables are created for each plaque. The table cells with treatment times exceeding an adjustable, predefined limit are shown in a different color (fig 2).

Source CCB2780

without radiobiological correction

Depth (mm)

	Feb-2020	Mar-2020	Apr-2020	May-2020	Jun-2020	Jul-2020	Aug-2020	Sep-2020	Oct-2020	Nov-2020	Dec-2020	Jan-2021
0.5	0d13h	0d14h	0d15h	0d15h	0d16h	0d17h	0d18h	0d19h	0d20h	0d22h	0d23h	1d0h
1	0d15h	0d16h	0d16h	0d17h	0d18h	0d19h	0d21h	0d22h	0d23h	1d0h	1d2h	1d3h
1.5	0d17h	0d18h	0d19h	0d20h	0d21h	0d22h	0d23h	1d1h	1d2h	1d4h	1d5h	1d7h
2	0d19h	0d20h	0d21h	0d22h	0d24h	1d1h	1d3h	1d4h	1d6h	1d7h	1d9h	1d11h
2.5	0d22h	0d23h	1d0h	1d2h	1d3h	1d5h	1d6h	1d8h	1d10h	1d12h	1d14h	1d16h
3	1d1h	1d2h	1d4h	1d5h	1d7h	1d9h	1d11h	1d13h	1d15h	1d18h	1d20h	1d23h
3.5	1d5h	1d6h	1d8h	1d10h	1d12h	1d14h	1d17h	1d19h	1d21h	2d0h	2d3h	2d6h
4	1d10h	1d12h	1d14h	1d16h	1d18h	1d21h	1d23h	2d2h	2d5h	2d8h	2d11h	2d15h
4.5	1d16h	1d18h	1d20h	1d23h	2d2h	2d5h	2d8h	2d11h	2d14h	2d18h	2d22h	3d2h
5	1d23h	2d2h	2d5h	2d8h	2d11h	2d14h	2d18h	2d22h	3d2h	3d6h	3d11h	3d16h
5.5	2d8h	2d11h	2d15h	2d18h	2d22h	3d2h	3d7h	3d11h	3d16h	3d22h	4d3h	4d9h
6	2d20h	2d23h	3d4h	3d8h	3d13h	3d18h	3d23h	4d5h	4d10h	4d17h	4d23h	5d6h
6.5	3d10h	3d15h	3d20h	4d1h	4d7h	4d13h	4d20h	5d2h	5d9h	5d17h	6d1h	6d10h
7	4d5h	4d11h	4d17h	4d23h	5d6h	5d14h	5d22h	6d6h	6d15h	7d0h	7d10h	7d21h
7.5	5d5h	5d12h	5d20h	6d4h	6d13h	6d22h	7d8h	7d18h	8d5h	8d17h	9d5h	9d16h
8	6d13h	6d21h	7d7h	7d17h	8d4h	8d16h	9d4h	9d17h	10d7h	10d21h	11d12h	12d5h

Figure 2: Part of a reference table for a specific source without radiobiological dose rate correction as distributed to OR planning. Expected treatment times are displayed for the 15th of every month. The duration is color coded according to the American Brachytherapy Society guidelines. If treatment times become prohibitively long, such as for large tumors at the end-of-life of the source, patients can be excluded from Ru-106 eye plaque treatment, prior to detailed treatment planning and operating room booking.

Conclusion
We have presented a Matlab tool which can be used in any step in the preparation and treatment of ocular melanomas with Ru-106 plaques. The software generates pdf-documents for storage in the HIS.

PO-0264 orbital mold brachytherapy for recurrent orbital mesenchymal sarcoma: a contemporary approach

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Purpose or Objective
To report the technical details of a contemporary approach for orbital brachytherapy that can be used in low-resource settings

Materials and Methods
A 43-year old female diagnosed with recurrent orbital mesenchymal chondrosarcoma of the left orbit presented with her third local recurrence. The patient proceeded with conservative surgery with planned adjuvant high dose rate brachytherapy 2 weeks post-surgery. Brachytherapy mold applicator was fabricated through the use of thermoplastic mask, ProGuide catheter needles, catheter fixation buttons, and a strip of gauze. Optimal catheter placement was done through the use of CT simulation planning.

