



# Biliary Atresia: From Odyssey To Legacy

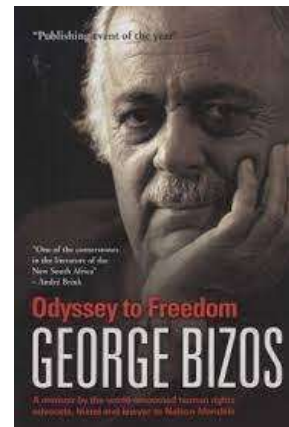
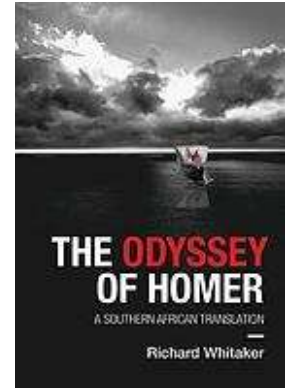
Hope your road is a long one.....

Prof Christina Hajinicolaou  
Paediatric Gastroenterologist

# Iliad and Odyssey

Homer (8<sup>th</sup> century BC)

- Author of the Iliad and the Odyssey.
- Two hugely influential epic poems of ancient Greece.
- Each poem is divided into 24 books.
- Iliad: describes the last days of the great Trojan War. 12<sup>th</sup>/13<sup>th</sup> century BC.
- Odyssey: follows the Greek hero Odysseus, king of Ithaca, and his 10 year journey home after the Trojan War.
- English language meaning: a long and eventful or adventurous journey or experience.





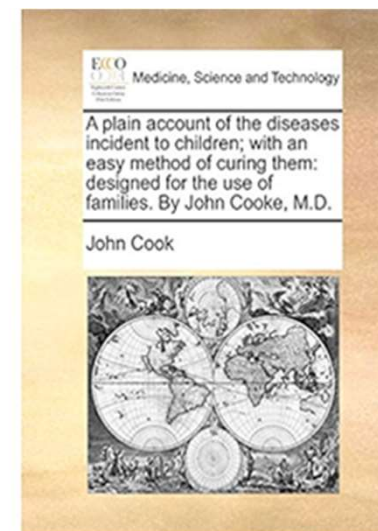
## History of BA

- 1769: Dr. John Cooke

*A Plain Account of the Diseases Instant to Children; with an easy method of curing them; designed for the use of families*

“... many infants are affected by this disease, some are even born with it, but is rarely mentioned, though a great many die of it.”

However, unclear whether conjugated /unconjugated hyperbilirubinaemia



- 1855: Dr Charles West (founded Great Ormond Street hospital, England) : hand written notes

“On November 8, 1855 , I saw a female child aged 13 weeks; the only child of healthy parents. It was born at full term, small, apparently healthy. At 3 days however, it begun, to get yellow and at the end of 3 weeks was very yellow. Her motions at no time after the second day appeared natural but were white, like cream, and her urine was very high coloured”.

- 1891: Dr. John Thomson; thesis: a physician paediatrician in Edinburgh

*On So-called Congenital Obliteration of the Bile Ducts (Clinical and Pathological),*

Reviewed his own cases and those published at that time and came to conclusion about the pathology of extrahepatic bile ducts.

This was not challenged for more than a century.

# Surgery

- 1928: Ladd: operated 11 children . Based on his experience Ladd recommended that surgery be carried out before 4 months of age.
- 1953: Children's Hospital of Boston : Dr Gross: 146 infants with biliary atresia: 27 infants had biliary structure suitable for anastomosis to the duodenum. 12 of these patients became jaundice free. Overall only 8 survived.



- 1959: Willis J. Potts

“Congenital atresia of the bile ducts is the darkest chapter in paediatric surgery.”



- 1950s Professor Kasai, Japan investigated the pathology of BA

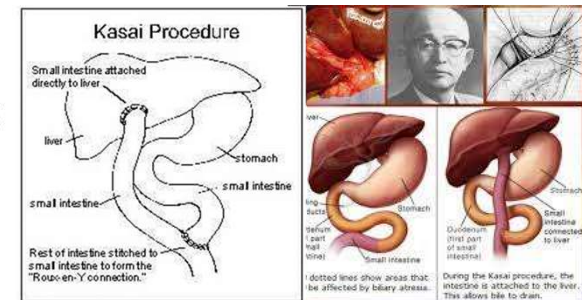
He noted progressive destruction of the bile ducts between 2 and 12 months

Described microscopic bile ducts within the fibrous remnant of the atretic

biliary tree at the porta hepatis.

He made the critical observation that if the extrahepatic bile ducts were removed at a time when there was some continuity between the ductal plate of the porta hepatis and the intrahepatic biliary system, the progression of biliary atresia could be arrested.

Kasai hepato-portoenterostomy still the current surgery of choice





- KPE adopted in the West in the 1970s.
- Without KPE majority death within first 2 years of life
- Surgery <60 days of age, over 70% jaundice-free, 75% of these 10-yr native liver survival
- Surgery >90 days of age has a worse prognosis, < 25% of these 4- to 5-year native liver survival
  
- The largest series reported: 1428 patients  
25-year native liver survival after KPE
  - 38%, 1<sup>st</sup> mth
  - 27%, 2<sup>nd</sup> mth
  - 22%, 3<sup>rd</sup> mth
  - 19% > 3<sup>rd</sup> mth

- Identification of cases and early diagnosis are of paramount importance particularly in South Africa where liver transplantation is not easily accessible to all patients.
- “Looking at the problem of biliary atresia from the vantage point of 30 years’ experience with the lesion, we can say with certainty that the jaundiced baby who has had no extrahepatic bile duct has been the most disappointing patient for the surgeon in the whole realm of lesions theoretically correctable by a surgical procedure”.

C. Everett Koop, M.D., Sc.D. (1976)

Is it true?....

## BA management 1993/4 – 2021: CHB experience

BA Patients	1993/4	2011	2021
Died pre-op	1	0	0
Refused surgery	1	1	2
Clinically inoperable	15	6	9
Inoperable at lap	6	3	0
LATE PRESENTATION	21/54 ( 39 %)	9/29 (31 %)	9/30 ( 30 %)
KPE:Hepatoportoenterostomy (total number)	31	19	19
Non-functioning	12	8	
Partially functioning	11	4	
Functioning	8 (26%)	7 ( 37%)	12 (57%)
TOTAL	54	29	30
Overall success	8/54 (14.8%)	7/29 ( 24.1%)	12/30 ( 40%)

### Outcomes of Kasai hepatoportoenterostomy in children with biliary atresia in Johannesburg, South Africa. De

Maayer T, Lala SG, Loveland J, Okudo G, Mohanlal R, Hajinicolaou C. S Afr Med J. 2017;107(10):

70 children with BA: KPE between January 2009 and June 2012

43 (61.4%) underwent KPE, but only 12 (27.9%) achieved resolution of jaundice. Overall (12/70) success 17% ☹️



- We have reason to congratulate ourselves as a profession. Advances:
  - Introduction of peri-operative protocol KPE (steroids, antibiotics, choleretics)
  - Transplantation,
  - Cholestasis,
  - Ascending cholangitis prophylaxis etc

**Biliary atresia splenic malformation syndrome presenting with hepatic abscesses.** Stavrou S, Hassan IEI, Okudo G, Walabh P, [Hajinicolaou C](#). SAJCH 2022; 16(2): 122-124

We describe an 8.5-year-old boy with known BASM syndrome (polysplenia, intestinal malrotation, interrupted inferior vena cava, shortened pancreas, centralised liver and left atrial isomerism) who underwent a successful KPE at the age of 3 months. He presented with features suggestive of a late onset ascending cholangitis (AC) complicated by cholangitic liver abscesses. Resolution of the abscesses with prolonged antibiotic therapy avoided the need for percutaneous drainage. Once the abscesses resolved, the child underwent a successful cadaveric liver transplantation.

However, important as these advances are,

- the diagnosis of biliary atresia and its consequences are devastating to a family who have, for the first few weeks of their infant's life believed they had a normal child.
- They are angry, depressed, and frustrated when they find out that we have no idea what causes the condition and very little understanding of the pathogenesis and end up providing them with a grim diagnosis if their baby does not undergo early surgery.
- Can we help them in some way?

# Launching a Medical Campaign

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Involves

- careful planning,
- ethical considerations, and
- effective communication

## BA Awareness Campaign

First need to thoroughly assess the

-extent of the medical problem,

-to enable development of an awareness campaign that addresses the specific **needs** and **challenges** associated with diagnosis and management of biliary atresia in our country .

RECOGNISE THERE IS A PROBLEM

IDENTIFY FACTORS THAT CONTRIBUTE TO THE PROBLEM

ASSESS THE IMPACT OF THE HEALTH PROBLEM ON INDIVIDUALS AND COMMUNITIES; Physical/emotional/economic

Data collection to understand the prevalence and incidence of this health issue locally

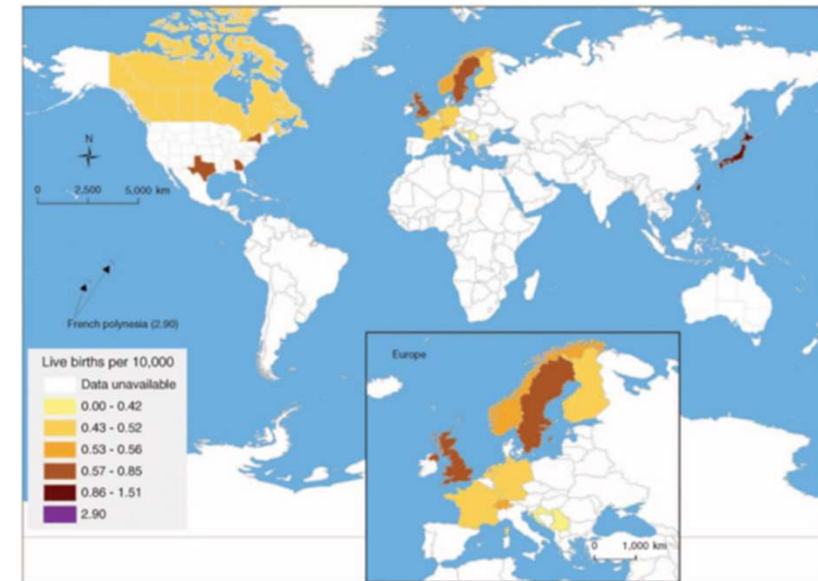
YEAR		NO	COU NTRY	BA (%)
2020		-	KOR	28
2020		-	POR	24
2014		82	GER	41
2010		146	MAL	29
2005		252	THA	22
2005		62	BAN	26
2001		205	AUS	20
1996		60	IND	55
1989		147	ENG	35

CHOLESTASIS IN INFANCY/CHILDHOOD AETIOLOGY 1993-2022.....															
	93	94	9	99	00	06	07	11	12	17	18	19	20	21	22
BA	24	22	16	10	10	15	20	29	20	21	15	12	15	30	22
INH	10	11	8	24	19	6	10	15	16						-
CC	2	7	2	3	2	1	1	2	5	4	3	5	2	3	3
CONG INF	4	5	3	0	1	1	1	0	0	3					1 SF 1 CV
HEPBLA															2
DILI															3
GALT	0	1	4	1	3	5	4	3	1	1	2	3	2		3
ALAG	2	1	0	0	2	2	3	2	2	1	0	0	1		1
HLH															2
PANCR															4
ALF															6+2
TOTAL	42	51	34	48	40	52	52	55	68						

## Incidence

- Taiwan: 1 in 5000
- East Asia: 1 in 5000 -8000.
- USA: 1 in 10000-15000
- Europe: 1 in 12000
- ? Africa: -South Africa



Zuckerman M, Hajinicolaou C. **Incidence and Outcome of Biliary Atresia in Black Infants in Soweto (South Africa): Review of cases from 1993 – 1996.** J Pediatr. Gastroenterol. Nutr. 1998;26(5):587. <https://doi.org/10.1097%2F00005176-199805000-00212>

- We hypothesized that biliary atresia (BA) in SA, occurs as frequently as in the East
- 1993-1996: 71 cases: incidence based on annual Soweto birth rates
- **1 in 2500** live births for 1993/4/6 and **1 in 8000** in 1995
- Dismal results: of 71 infants, only 10 (14%) were jaundice free.

# Delayed presentation not just a SA issue

- Delayed disease recognition, late patient referral, and untimely surgery remains a worldwide problem.
- The age of KPE has not improved over the last several decades
- In the West: median age of KPE around 60 days, which implies that some 50% of cases do not have the KPE before that age and fail to meet the international quality criterium of <60 days of age.
- Age at KPE older in regions of Africa, and South America; comprehensive data lacking.

There are several major obstacles to early disease recognition.

- neonatal jaundice falsely considered a benign process
- “breast milk jaundice”/breast feeding jaundice
- monitoring for pale stools by HCW or parents not routine at local clinics
- routine well-baby visits may miss the “window of opportunity”

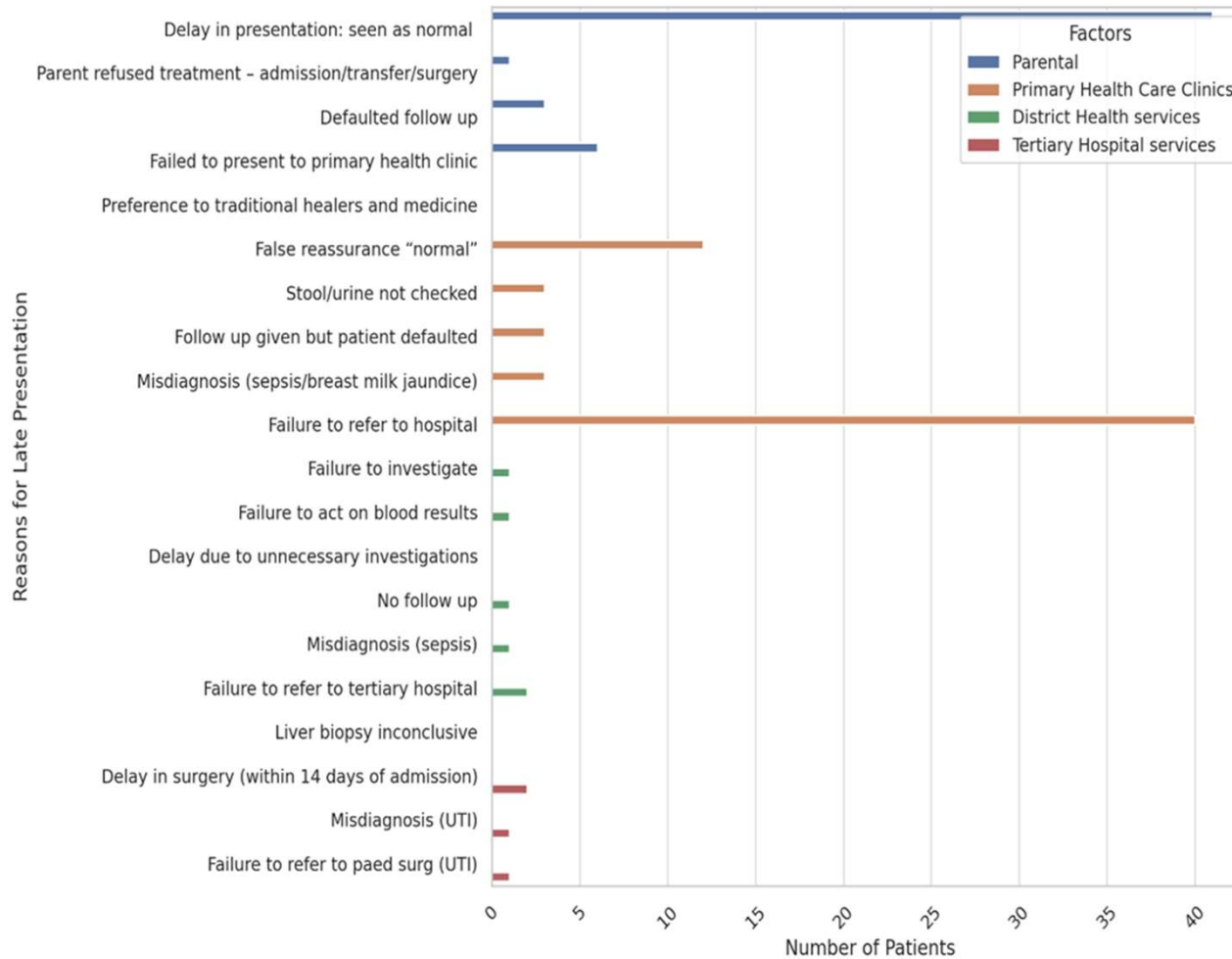
# Late presentation biliary atresia at the Chris Hani Baragwanath Academic Hospital. R Moreke, C Hajnicolaou: MMed: 49/102 = 48% > 90 days

Factors	Reasons for late presentation	Number of patients		Failure to investigate/act on results	2
Parental	Delay in presentation :normal	41	District hospital services	Unnecessary investigations	0
	RHT	0		No FU	1
	No FU	2 (defaulted appointments)		Misdiagnosis	0
	Failure to present to PHC	6		Failure to refer to a tertiary hospital	2
Primary Health Care Clinics	False reassurance	12	Tertiary hospital services	Liver biopsy inconclusive	0
	Stool/urine not checked	3		Delay in surgery	0
	No FU	3 (defaulted appointments clinic and district hospital)		No FU	0
	Misdiagnosis	3 (sepsis, physiological jaundice)		Misdiagnosis	1 (UTI)
	Failure to refer to hospital	28		Failure to refer for surgery	1

- **EMPHASIS**

- Educating parents
- Educating staff at PHC clinics- lectures, disease awareness posters, management algorithms
- RTHB: Stool colour charts/posters/Red Alert signs(jaundice+ white stool)
- We hoped our study improved awareness of BA and encourage screening for BA

# Factors for late presentation of patients with biliary atresia





# Able to define our objectives:

Clearly outline the goals of our campaign.

- **Increased Awareness:** An increased awareness about biliary atresia among the general public, healthcare professionals, and policymakers. This heightened awareness would then lead to....
- **Early Detection and Diagnosis:** One of the primary goals of a biliary atresia campaign the prompt surgical intervention.
- **Measurable Impact:** The success of a campaign can be measured through statistics, such as the number of infants screened, the percentage of cases diagnosed early, the number of successful surgeries, and improvements in overall patient outcomes

MSc in progress related to BA campaign poster.

# To successfully achieve this we needed:

- Medical Professional Engagement: Collaboration with healthcare professionals is crucial.

A successful campaign involves educating healthcare providers about the signs and symptoms of BA, to ensure timely referrals for diagnosis and treatment

- Government Engagement:

Gauteng Department of Health support and ultimately NDoH support.

NDoH deputy Director of Transplant and Dialysis Mr Lindsey Jacobs, member of our BA committee.

He engaged with Child Health on a National level to vote in favor of

- ❖ rolling out campaign on a national level,
- ❖ endorsing the poster ,
- ❖ endorse the 16 Oct as a BA day on the Health Calendar.

- **University Engagement:**

Department of Paediatrics and University of the Witwatersrand support;  
Media dissemination of information

- **Community Engagement:** Engaging the community is vital for the success of a campaign.

Support groups,

Online forums,

Community events

Provide a platform for affected families to share experiences and offer support to one another.  
Something for the future.....

- **Media Coverage:** Positive media coverage can significantly contribute to the success of a campaign by reaching a broader audience.

News stories, articles, and features can help spread awareness, promote understanding, and encourage support for affected individuals and their families

# Which method would be best to improve awareness

## **Dried blood spot cards: screening**

It is not possible to measure direct or conjugated bilirubin from the dried blood spot cards

**1993: UK “Yellow Alert” Educational Campaign:** KCH + UK Children’s Liver Disease Foundation, Department of Health. Integrate lab testing

- Extend teaching to health visitors, midwives, and parents. Any infant who was jaundiced > 14 days of age should be assessed for conjugated hyperbilirubinemia.
- Cost effective even if only 10% of affected infants were found to be jaundiced in the third week of life.
- However not well integrated into standard care practices

## **Stool Colour Chart**

- Japan 1994: SCC: stool chart to MCHH (RTHC) – pregnant women. Complete < 1 month.  
1994 – 2011: Mean age 60 days vs 70 (1987-1992)
- At 5 years post introduction, >90 days KPE virtually eliminated

2012-2016: Beijing China, Canada

National screening : Switzerland, Japan, Taiwan. Pilot studies: Brazil, Egypt, China, Portugal, Germany.

## **Stool Colour Smartphone App**

PoopMD (US), BabyPoop (Japan), PopoApp(Italy)

## **Which method would be best to improve awareness**

Short term: Educational poster

Long Term: Inclusion in RTHB (jaundice and white stool) or stool colour chart

Creation of a South African BA registry... in progress

email address: [biliaryatresia.sa@gmail.com](mailto:biliaryatresia.sa@gmail.com) (Queries, Campaign bookings etc )

Creation of website..... in progress (education, community and health professionals)

(2018: Advocacy RTHB inclusion: the Cape (Stellenbosch: E Nel Cape Town: L Goddard Gauteng: C Hajnicolaou)

Jaundice and pale stool as a Danger/Red Flag sign: Unsuccessful)

## **Launching a campaign**

- 30<sup>th</sup> August 2023: BA Awareness Campaign
- 16<sup>th</sup> October 2023: Unveiling the BA Awareness Campaign Poster

# BA Awareness Poster



## WHAT IS BILIARY ATRESIA?

Biliary Atresia or BA is a rare liver disease that needs immediate medical care.

If you see these signs in a baby, please tell the healthcare professional immediately!

- YELLOW EYES**
- JAUNDICE LONGER THAN 14-21 DAYS AFTER BIRTH**
- WHITE STOOL FROM BIRTH**
- YELLOW OR DARKER SKIN**
- DARK URINE**

**Check your baby's stool (poop) colour every day for the first month after birth to screen for Biliary Atresia.**

If your baby has an abnormal stool colour (colours 1,2,3,4,5,6), please seek medical help immediately.

ABNORMAL STOOL COLOURS		NORMAL STOOL COLOURS	
1	4	7	9
2	5	8	
3	6		

Babies with Biliary Atresia need surgery within the 1st three months of life to survive. Don't wait – ask for help urgently if you see signs.

Unlocking Hope, Together We Can Cope.

# Slogan/Logo?

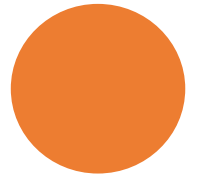
## Logo:

- The green ribbon: internationally represents support of liver awareness campaigns
- Sunflower */Helianthus* : Greek etymology meaning flower of the sun.
- The colour ( jaundice /yellow stool)
- The meaning: Positivity, strength, joy. Symbol of optimism and beauty.
- Used flower to represent our progression from a small seed to towering flower

## Slogan:

“Unlocking Hope Together We Can Cope”

PAWS



- The journey from a small seed to a towering flower/tree serves as a powerful analogy for the transformative process of starting with humble beginnings and achieving significant success over time.

### BA Awareness Committee

A small group of healthcare professionals, transplant coordinators and government officials committed to:

- Raising awareness
- Supporting families
- Advancing research
- Fostering international and local collaboration

A small team with great aspirations 😊. Ambitious and impatient!

“We rally healthcare professionals and communities to converge in efforts towards early detection and adept management of BA, ensuring a more promising future for our children” .. C Hajinicolaou





**1.Seed (Small Beginning):** A seed is small and insignificant, but holds the blueprint for a mighty shrub or tree. Similarly, our project/initiative was modest at the start, but we knew it carried the potential for significant achievements and success in terms of outcomes in BA.



**2.Planting (Initiation):** The process begins by planting the seed in fertile soil. Similarly, we laid the groundwork for The BA Campaign under the auspices of Gauteng Provincial Solid Organ Transplant Division and the University of the Witwatersrand. We planned, researched, and took the first steps toward implementation.

Developed:

Logo,  
Slogan,  
Poster,  
T-shirts,  
Catering.....





**3.Nurturing (Development and Growth):** Like a seed requiring water, sunlight, and care to grow, a Campaign needs nurturing. This involves dedication, hard work, and ongoing efforts to foster progress. We learned, adapted designs and overcame challenges whether financial or other.

**4.Roots (Foundation):** As the plant grows, it develops strong roots. We build the Campaign's foundation through personal experience, research and the establishment of clear objectives providing stability for future growth.

**5.Sprouting (Early Success):** The plant begins to sprout, indicating early signs of success. Similarly, we experienced initial achievements, with the launch of the campaign in August gaining recognition and making a positive impact. This encouraged further progress which culminated in the poster launch in October 2023.



# Campaign Launch: 30<sup>th</sup> August



**You are cordially invited...**

Dear colleague,  
**Biliary Atresia (BA)** is rare and incurable disease affecting newborn babies.

Please join us at our workshop on the presentation, diagnosis and treatment of BA.

**30 August from 09h00 to 14h00**

**Auditorium at Admin Block  
Charlotte Maxeke  
Johannesburg Academic Hospital**

Please RSVP to Anja by 23 August 2023  
anjameyer85@yahoo.com or  
076 729 2801

**Programme**

- Welcome
- What do we know about BA?
- Symptoms of BA
- Kasai procedure
- Why a liver transplant?
- Transplant saved my baby* – A testimony
- BA campaign implementation at hospitals, clinics and in the community

**TRANSPLANT SAVED MY BABY** We are because of you.



**6.Branches and Leaves (Expansion):** A healthy plant develops branches and leaves, expanding its reach. Likewise, we branched out—with multimedia involvement, attracting a larger audience, and increasing awareness.



Sunflower growing in a nice field.

The results of doing things correct.



**BA Awareness campaign Poster Reveal: 16 October 2023**

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Unlocking Hope, Together We Can Cope.



### 5 ways YOU can help!

- 1 Watch out for and report jaundice and white stool in your patients. Early detection saves lives.
- 2 Join the BA campaign committees in your cluster, district, or region.
- 3 Collaborate with central hospitals regarding training.
- 4 Involve all facilities and implement the module nationally.
- 5 SPREAD THE WORD! Tell your colleagues, friends, family and community about BA.

For more information please call +27 11 488 3863 or email [biliaryatresia.sa@gmail.com](mailto:biliaryatresia.sa@gmail.com)

Unlocking Hope, Together We Can Cope.



# Official Newsletter of the Gauteng Department of Health



Tabudi Madisha

Charlotte Maxeke Johannesburg Academic Hospital (CMAJAH) in partnership with the University of the Witwatersrand has once again led a ground-breaking initiative in South Africa. For the first time in the history of public health a Biliary Atresia Awareness Campaign was launched by the hospital on 16 October 2023.

Biliary atresia is a condition in infants in which the bile ducts outside and inside the liver are scarred and blocked. This results in bile not flowing into the intestine, builds up in the liver and damages it. The damage leads to scarring, loss of liver tissue, function and cirrhosis.

The awareness campaign which will now be observed on 16 October every year aims to

raise vital awareness and provide robust support for children affected by Biliary Atresia across the country.

As this initiative is the first of its kind in the country, representatives from both the National and Provincial Department of Health were present to endorse the launch.

During the event, a National poster for Biliary Atresia Awareness was unveiled and it will now be used nationwide to raise awareness about Biliary Atresia and improve the health condition of children impacted by the condition.

According to Dr Christina Hajinicolaou, Paediatric Gastroenterologist and Head of the Division of Paediatric Gastroenterology at Wits University,

In 2021 there was a 40% overall success in treating Biliary Atresia.

"One of the reasons which led to Biliary Atresia not being properly treated is a lack of information and knowledge. Some parents do not seek medical advice immediately when they see the signs and hope it is just a normal illness which will go away.

"It is important that parents of infants immediately seek medical advice when they see symptoms such as yellow eyes, jaundice longer than 14-21 days after birth, white stool from birth, yellow or darker skin and dark urine", explained Dr Hajinicolaou.

CMAJAH CEO, Gladys Bogoshi, expressed gratitude to all stakeholders involved in ensuring that this ground-breaking initiative is a success.

"Alone we can do very little, but together we can move mountains. Today is proof that by working together we can do so much. This success is a result of a team effort from all stakeholders involved. As the CEO, I would like to appreciate and thank all of you for a job well done," said Bogoshi.

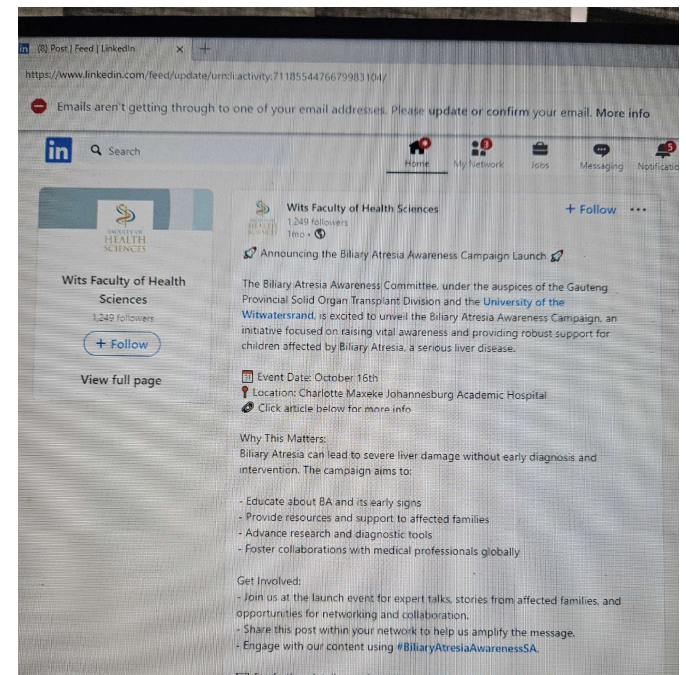
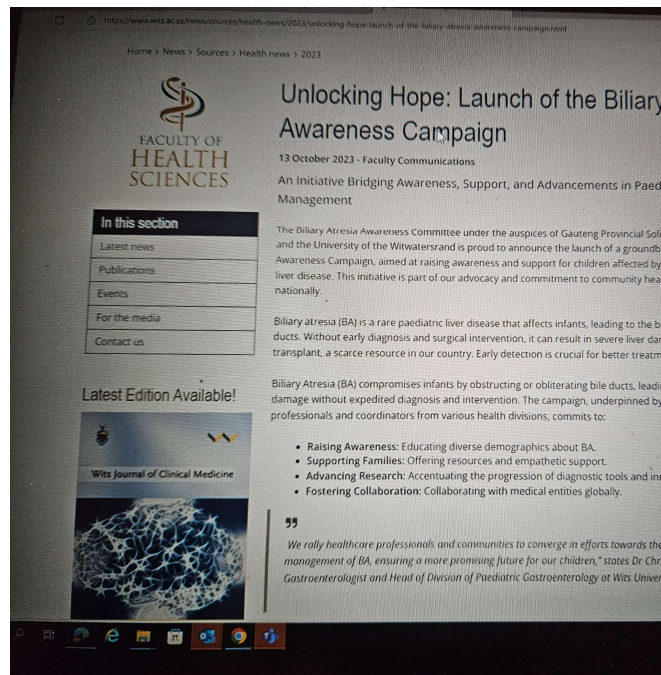
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-Dr Hajinicolaou.



# Rosebank Killarney Gazette: News Feature

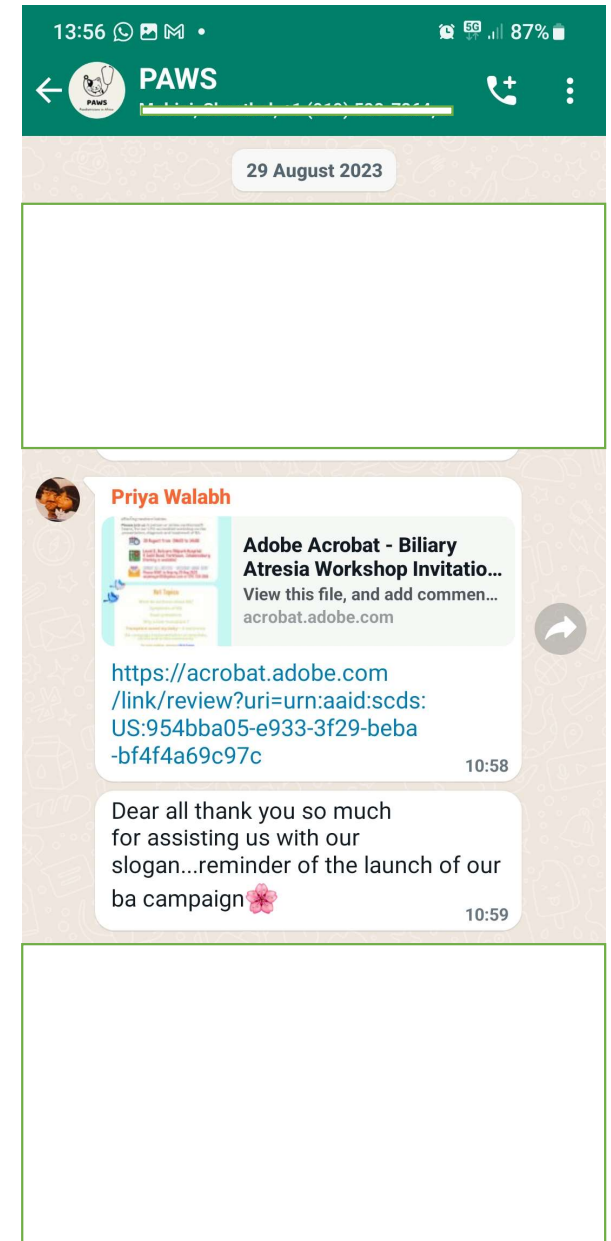
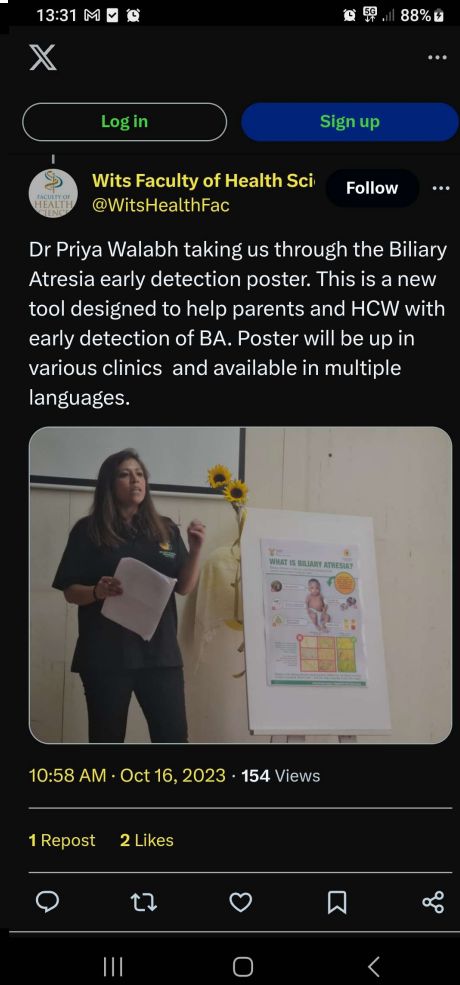
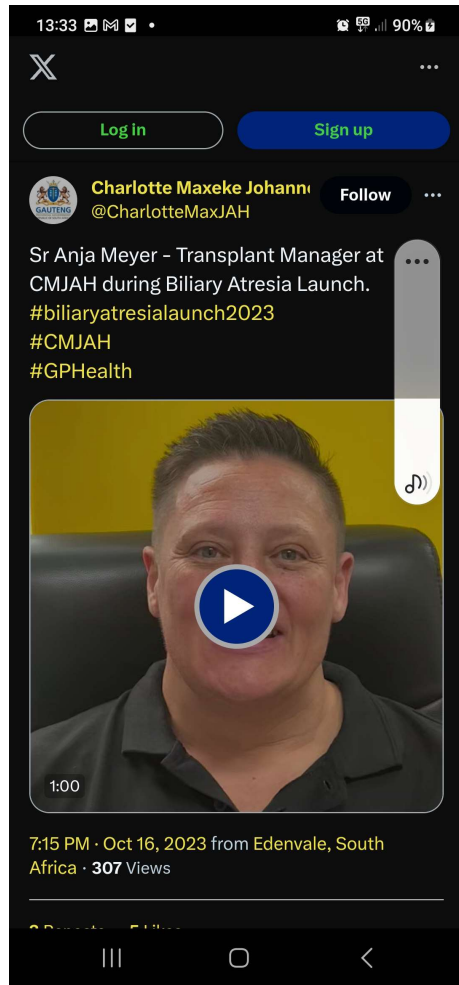
## University of the Witwatersrand

- Faculty of Health Sciences Newsletter
- Wits Faculty of Health sciences: LinkedIn
- SOCM newsletter





# Media: Twitter



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**7. Maturity (Full Potential):** Over time, the plant reaches maturity, fully realizing its potential. We have not reached this stage yet. We look forward to the fulfillment of the campaign's intended purpose, and documentation of its successful impact. Broaden campaign beyond Gauteng beyond South Africa.

**8. Fruits (Benefits and Rewards):** The mature tree bears fruits, providing tangible benefits. Likewise, a successful Campaign yields rewards e.g. personal gratification, and positive contributions to the community. Earlier diagnosis, more successful KPE, later transplantation....



**9.Forest/Field (Impact and Influence):** Just as a single tree contributes to a larger forest ecosystem, a successful project can have a broader impact. It may inspire others, it will hopefully assist in implementing inclusion in RTHB, creation of a BA Registry , earlier recognition of other causes of cholestasis.....

**9.Legacy (Long-lasting Impact):** Trees leave a lasting legacy, shaping landscapes. Similarly, we hope our BA Awareness campaign that started small will continue to grow and leave a lasting impact on the or the lives of those it has touched specifically our children with BA.



# Long term sustainability

**DOES YOUR BABY HAVE BILIARY ATRESIA?**

Biliary atresia or BA is a rare disease that could mean your child needs urgent medical care.

**Screening**

- Stool colour charts
- Bilirubin monitoring

Check for visible symptoms of Biliary Atresia. Don't wait – ask for help immediately.

GGT

- A successful campaign lays the groundwork for long-term sustainability.
- Ultimately, the success of a biliary atresia campaign is a multifaceted achievement that requires a combination of public awareness, community engagement, medical collaboration, and sustained efforts to improve outcomes for those affected by the disease.
- Establishing contacts in the rest of SA that will move campaign forward in their provinces.
- Being positive and persevering despite constraints.

# Outreach so far: LG/CMJ/Discoverers



## Immediate Plans:

- Hillbrow PHC Clinic: 31<sup>st</sup> July
- CHBAH BA Campaign and roll out of posters: 8<sup>th</sup> August
- Radio discussions: Eldos ( Eldorado Park) : mid August, then KasiFM etc

## Future plans:

- South African BA registry
- RTHB inclusion SCC
- International collaboration BA registry (EBAR)
- Promote and develop funding opportunities
- Develop a more structured roll out programme .....in progress beyond Gauteng, beyond SA. Need support of colleagues for success.



Lest we forget, who we are doing it for.....  
Part of our advocacy and commitment to  
community health

“No mom to be is ever prepared to have a child ill of any  
disease even with Biliary Atresia. BA is a very serious liver  
disease. With campaigns as such will help get more people  
aware”. .....TPR

“ As you set out for Ithaka  
Hope your journey is a long one  
Full of adventure , full of discovery...  
So you are old by the time you reach the island  
Wealthy with all you’ve gained on the way...”

And yes, I have enjoyed the journey, and along with the BA  
Awareness Committee members the Odyssey has now  
become the Legacy

