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RESEARCH ARTICLE

Baseline Risk of Treatment Abandonment and Survival of Children With Common and Curable Cancers in the Zero Abandonment Cash Transfer Programme—A Multi-Centre Prospective CANCaRe Africa Study

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ABSTRACT

Background: The WHO Global Initiative for Childhood Cancer (GICC) targets a global survival rate of 60% for childhood cancer, focusing initially on six common and curable cancers. This study assessed the risk of treatment abandonment (TxA) and the impact on survival of five of these cancers in sub-Saharan Africa in preparation for a cash transfer intervention.

Methods: This multi-centre, prospective, observational cohort study included newly diagnosed children (<16 years) with Burkitt lymphoma (BL), acute lymphoblastic leukaemia (ALL), Wilms tumour (WT), retinoblastoma (RB) or Hodgkin disease (HD), enrolled between January 2022 and April 2024 from hospitals in Ethiopia (n = 2) and Uganda. Event-free survival (EFS) was estimated using Kaplan–Meier methods, and the cumulative incidence of TxA was estimated using competing risks methods.

Results: Of 370 patients enrolled (median age 6 years, 62% boys), ALL was the most common diagnosis (30%, 112/370). Median follow-up was 26 months (range 6–35 months). The overall risk of treatment abandonment was 43%, ranging from 20% in Mbarara, Uganda to 54% in Gondar, Ethiopia. It was highest in patients with WT (48%) and RB (49%). Overall, 2-year EFS was 28% (confidence interval [CI] 24%–34%) with TxA as an event and 59% (53%–66%) when TxA cases were censored.

Conclusion: The overall risk of treatment abandonment is high, 43%, in this baseline 'Zero Abandonment' study in participating hospitals in Ethiopia and Uganda. Treatment abandonment significantly affects survival, currently 28%, and potentially to increase to 59% if treatment abandonment was completely prevented.

Abbreviations: ALL, acute lymphoblastic leukaemia; BL, Burkitt lymphoma; CANCaRe Africa, Collaborative African Network for Childhood Cancer Care and Research; CI, confidence interval; EFS, event-free survival; GFAOP, French–African Paediatric Oncology Group; GICC, Global Initiative for Childhood Cancer; HD, Hodgkin disease; HIC, high-income country; LMIC, low- and middle-income country; RB, retinoblastoma; SIOP, International Society of Paediatric Oncology; TxA, treatment abandonment; WHO, World Health Organization; WT, Wilms tumour.

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1 | Introduction

Survival for children with cancer exceeds 80% in high-income countries (HICs), owing to early diagnosis, comprehensive care and high treatment adherence [1]. In contrast, survival in low- and middle-income countries (LMICs)—particularly in sub-Saharan Africa—is markedly lower, often estimated at less than 20% [2]. Notably, nearly 28% of the global burden of childhood cancer occurs in Africa, with a substantial share in sub-Saharan regions where health systems face significant resource and capacity constraints [3, 4].

To address these stark global inequities, the World Health Organization (WHO) launched the Global Initiative for Childhood Cancer (GICC) in 2018. The GICC aims to increase global survival to at least 60% by 2030 by focusing initially on six common and highly curable 'index' cancers: acute lymphoblastic leukaemia (ALL), Burkitt lymphoma (BL), Wilms tumour (WT), retinoblastoma (RB), low-grade glioma and Hodgkin disease (HD). In HICs, these cancers typically have cure rates exceeding 90% [5]. However, the applicability of this benchmark to sub-Saharan Africa remains uncertain due to critical gaps in data, infrastructure, and follow-up systems and the whole continuum of care from diagnosis to follow-up. Hospital-based cancer registries are limited in number and scope, and population-based registries are rare. Long-term outcome data are often incomplete, and loss to follow-up remains a major barrier to estimating survival with confidence [6, 7].

Treatment abandonment—defined as the failure to initiate or continue curative treatment for more than 4 weeks for non-medical reasons—is a leading and preventable cause of treatment failure in sub-Saharan Africa [8, 9]. Abandonment rates vary widely across countries and cancers, ranging from as high as 89% for WT in Sudan to below 10% in settings where family support interventions have been implemented, such as in Rwanda and Malawi [10–13].

In this multi-centre, prospective study, we aimed to generate robust baseline data on treatment abandonment for five of the six GICC index cancers in three hospitals in Ethiopia and Uganda. These hospitals are participating in the 'Zero Abandonment' programme where cash transfers to families to support with out-of-pocket costs will be implemented as an intervention aiming to reduce treatment abandonment.

2 | Methods

We conducted a prospective, multi-centre clinical observational study at two hospitals in Ethiopia (Gondar and Jimma) and one in Uganda (Mbarara). Ethical approval was obtained from each participating institution. Written informed consent or assent was provided by a parent, guardian or patient after explanation of the study.

Eligible participants were children under 16 years with a first diagnosis of BL, ALL, WT (WT), RB or HD, diagnosed according to local institutional guidelines. Low-grade glioma, another common and curable cancer in other settings, and one of the GICC index cancers, was not included as it is rarely diagnosed and cured in sub-Saharan Africa due to limited diagnostic resources. Enrolment occurred between 1 January 2022 and 1 April 2024.

Data were collected using an electronic database and standardized case report forms by trained local data managers. Case report forms included anonymized identifiers and were uploaded to secure, site-specific cloud folders accessible only to the local data manager, local principal investigator, central data manager and international principal investigator. Collected data included demographic, socio-economic and clinical outcome information, including causes of treatment failure and treatment abandonment. Caregivers were asked before the start of treatment if they had been counselled on the diagnosis and need to complete treatment. The central study team reviewed data quality and completeness every month and had weekly meetings with the data managers to discuss any challenges. Dedicated funding supported data entry, supervision by the site paediatric oncologist and patient follow-up.

All sites provided a place to stay during the night for patients and caregivers and some hospital meals or additional food. In all sites, families had to pay for some of the treatment costs. It was documented whether families had to borrow money to reach the hospital for diagnosis and treatment and to continue treatment and whether the father had formal employment.

Baseline characteristics of the cohort were described using summary statistics as appropriate. Event-free survival (EFS) time was defined from the date of diagnosis to the date of any event (death, treatment abandonment, relapse or persistent disease) or time of last follow-up for patients who remained event-free. A modified EFS that censored treatment abandonment was used to estimate potential survival if abandonment were successfully prevented and censoring was otherwise uninformative. Kaplan–Meier methods were used to estimate EFS probabilities. The cumulative incidence of treatment abandonment was estimated using competing risks methods, with death, relapse and persistent disease treated as competing events. Two-year EFS estimates were reported by diagnosis and site. Analyses were conducted in R (version 4.4.0) using the survival, survminer, tidycmprsk and ggsurvfit packages [14].

3 | Results

We enrolled 370 patients; no patients or caregivers declined participation. Data completeness was high, with no missing data. Median follow-up was 26 months (range, 6—35 months).

Baseline demographic and socioeconomic characteristics are summarized in Table 1. The median age was 6 years, and 62% (228/370) were male. Diagnostic delay exceeding 2 months was common (74%, 274/370). Socioeconomic vulnerability was substantial: 85% (316/370) of fathers had no formal employment, and 76% (282/370) of families reported borrowing money to reach the hospital.

The distribution of diagnoses by site is shown in Table 2. ALL was the most common diagnosis (30%, 112/370), followed by WT (26%, 95/370), BL (18%, 67/370), HD (15%, 54/370) and RB (11%, 42/370).

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TABLE 1 | Demographic and other patient characteristics at diagnosis ($n = 370$).

Characteristic	Value
Median age in years (range)	6 (0.5–16)
Male	228 (62%)
Duration of symptoms >2 months	274 (74%)
Median travel time to hospital in hours (range)	5.5 (0.1–24)
Median distance to hospital in km (range)	155 (1–1000)
Father has no formal employment (%)	316 (85)
Family borrowed money to come to the hospital (%)	282 (76)

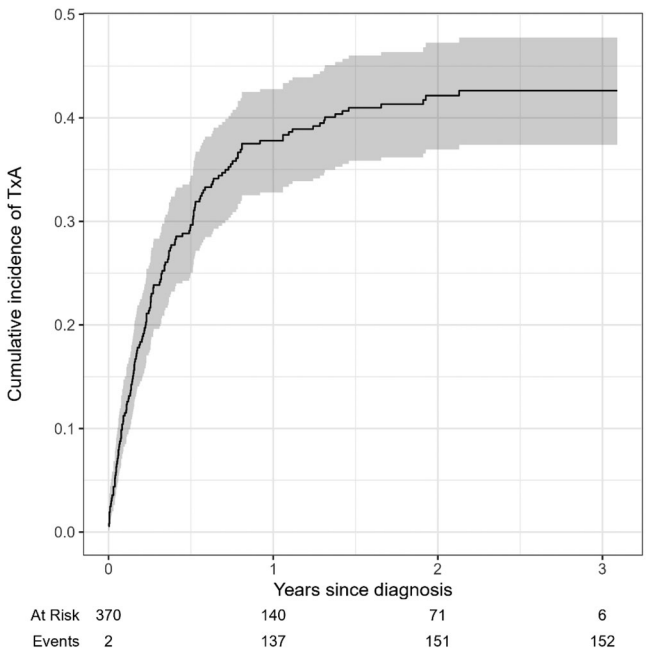


FIGURE 1 | Treatment abandonment time to event figure for all patients ($n = 370$). TxA, treatment abandonment.

End-of-treatment outcomes by diagnosis are presented in Table 3. Treatment abandonment was the most frequent cause of treatment failure across all diagnoses, occurring in 42% (157/370) of patients. Death during treatment occurred in 16% (61/370), most commonly among patients with ALL (27%, 30/112). Disease-related mortality was 12% (44/370), including 2% (8/370) who died before initiation of treatment. Overall, 25% (92/370) of patients were alive with no evidence of disease at the end of treatment, and 4% (16/370) were still on treatment.

The risk of treatment abandonment is detailed in Table 4 and Figure 1. Overall, 43% (95% CI, 37–48) of patients abandoned treatment, with marked variation by site, ranging from 20% in Mbarara to 54% in Gondar. By diagnosis, abandonment risk was highest in RB (49%) and WT (48%). Notably, abandonment occurred early, with the cumulative incidence approaching 30% within 6 months of diagnosis (Figure 1).

Two-year EFS is shown in Table 5 and Figure 2. When treatment abandonment was included as an event, overall EFS was 28% (95% CI, 24—34), ranging from 13% in RB to 47% in HD. When treatment abandonment was censored, estimated EFS increased to 59% (95% CI, 53—66), with corresponding improvements across all diagnoses (range, 35%—78%).

4 | Discussion

This prospective, multi-centre study provides contemporary baseline data on treatment abandonment and survival among children with five common and potentially curable WHO GICC index cancers in Ethiopia and Uganda. To our knowledge, this is among the few prospective hospital-based studies in sub-Saharan Africa evaluating both the risk of treatment abandonment and its contribution to poor survival outcomes across multiple diagnoses. These data were collected in hospitals selected for participation in the Zero Abandonment programme, a cash transfer intervention designed to reduce treatment abandonment by addressing financial barriers to care.

A major strength of this study is the completeness and quality of the data. No patients or caregivers declined participation, there were no missing data, and follow-up was sufficiently long (median 26 months) to estimate 2-year EFS. These results reflect substantial investment in data systems, including dedicated local data managers, streamlined case report forms, regular quality review and close supervision. High-quality prospective outcome data remain uncommon in childhood cancer programmes in sub-Saharan Africa, where incomplete follow-up and loss to follow-up frequently limit interpretation of survival estimates.

We found an overall treatment abandonment risk of 43%, ranging from 20% in Mbarara to 54% in Gondar, confirming that abandonment remains a major barrier to cure in these settings. These rates are substantially higher than the 24% previously reported across the broader CANCaRe Africa network, reflecting the intentional selection of hospitals with high abandonment rates for the current intervention programme [15]. Nevertheless, our findings are consistent with other reports from sub-Saharan Africa, including treatment abandonment rates of 46% among children newly diagnosed with cancer in Zambia and 26.5% among children with WT in Malawi [16, 17]. The particularly high rates observed in Gondar and Jimma may partly reflect the challenges faced by relatively new treatment centres serving populations affected by extreme poverty, long travel distances and regional instability.

Methodologically, this study extends prior CANCaRe Africa work by estimating treatment abandonment using competing risks methods rather than simple proportions. This approach provides a more accurate estimate of abandonment risk in the presence of competing events, such as death and relapse, and allows analysis before all patients have completed treatment. In addition, the cumulative incidence curves demonstrate that abandonment occurs early, with nearly one-third of events occurring within the first 6 months after diagnosis. This finding suggests that interventions to prevent abandonment should begin immediately at diagnosis and focus particularly on the early treatment period.

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TABLE 2 | Patients' diagnoses per site ($n = 370$).

Diagnosis	Jimma	Gondar	Mbarara	All sites
Acute lymphoblastic leukaemia	42 (27%)	50 (36%)	20 (26%)	**112 (30%)**
Burkitt Lymphoma	32 (20%)	15 (11%)	20 (26%)	**67 (18%)**
Wilms tumour	40 (26%)	31 (23%)	24 (31%)	**95 (26%)**
Hodgkin disease	22 (14%)	19 (14%)	13 (17%)	**54 (15%)**
Retinoblastoma	20 (13%)	22 (16%)	—	**42 (11%)**
TOTAL	**156 (100%)**	**137 (100%)**	**77 (100%)**	**370 (100%)**

TABLE 3 | Patients' end-of-treatment outcome per diagnosis ($n = 370$).

Outcome	ALL	BL	HD	WT	RB	Total
Treatment abandonment	50 (45%)	20 (30%)	20 (37%)	47 (49%)	20 (47%)	157 (42%)
Death during treatment	30 (27%)	14 (21%)	3 (6%)	6 (6%)	8 (19%)	61 (16%)
Disease related mortality	8 (7%)[a]	13 (19%)[b]	5 (9%)[c]	11 (12%)[d]	7 (17%)[e]	44 (12%)
Still on treatment	16 (14%)	—	—	—	—	16 (4%)
Alive, no evidence of disease	8 (7%)	20 (30%)	26 (48%)	31 (33%)	7 (17%)	92 (25%)
TOTAL	**112 (100%)**	**67 (100%)**	**54 (100%)**	**95 (100%)**	**42 (100%)**	**370 (100%)**

Abbreviations: ALL, acute lymphoblastic leukaemia; BL, Burkitt lymphoma; HD, Hodgkin disease; RB, retinoblastoma; WT, Wilms tumour.
[a]Persistent disease ($n = 4$), death before the start of treatment ($n = 2$), relapse ($n = 2$).
[b]Persistent disease ($n = 10$), death before the start of treatment ($n = 2$), relapse ($n = 1$).
[c]Persistent disease ($n = 3$), relapse ($n = 2$).
[d]Persistent disease ($n = 5$), death before the start of treatment ($n = 2$), relapse ($n = 4$).
[e]Persistent disease ($n = 4$), death before the start of treatment ($n = 2$) and relapse ($n = 1$).

TABLE 4 | Risk of treatment abandonment per diagnosis and site, expressed as cumulative incidence with 95% confidence interval.

	ALL	BL	WT	HD	RB	All diagnoses
Mbarara	16% (4%–36%)	16% (4%–36%)	30% (13%–50%)	15% (2%–40%)	—	20% (12%–30%)
Jimma	43% (27%–57%)	31% (16%–48%)	53% (36%–67%)	32% (14%–52%)	48% (22%–69%)	43% (35%–52%)
Gondar	55% (39%–68%)	41% (16%–66%)	55% (35%–71%)	61% (34%–80%)	52% (29%–72%)	54% (45%–63%)
All sites	45% (35%–54%)	29% (19%–41%)	48% (38%–58%)	38% (25%–51%)	49% (33%–64%)	43% (37%–48%)

Abbreviations: ALL, acute lymphoblastic leukaemia; BL, Burkitt lymphoma; HD, Hodgkin disease; RB, retinoblastoma; WT, Wilms tumour.

TABLE 5 | Two-year event-free survival (EFS) estimates with treatment abandonment (TxA) as an event and with TxA censored, presented with 95% confidence intervals.

Diagnosis	2-Year EFS (%) (TxA as event [%])	2-Year EFS (%) (TxA censored [%])
ALL	21 (15–31)	55 (44–68)
BL	29 (19–42)	46 (33–63)
WT	33 (24–44)	70 (58–84)
HD	47 (35–63)	78 (65–93)
RB	13 (4.5–35)	35 (15–86)
All diagnoses	28 (24–34)	59 (53–66)

Abbreviations: ALL, acute lymphoblastic leukaemia; BL, Burkitt lymphoma; HD, Hodgkin disease; RB, retinoblastoma; WT, Wilms tumour.

Treatment abandonment varied by diagnosis and was lowest in BL (29%) and highest in WT (48%) and RB (49%). This pattern differs somewhat from our previous multi-centre study, in which ALL and RB showed the highest risk [15]. The high abandonment rates observed in WT and RB may reflect the complexity and duration of treatment, the need for surgery and multidisciplinary care and caregiver reluctance regarding procedures such as nephrectomy or enucleation.

Importantly, treatment abandonment was the most frequent cause of treatment failure, exceeding treatment-related and disease-related mortality. Overall, 2-year EFS was only 28% when abandonment was included as an event. When treatment abandonment was censored, estimated 2-year EFS increased to 59%. Although this analysis assumes that censoring is otherwise non-informative and therefore does not represent a guaranteed achievable survival, it illustrates the magnitude by which abandonment contributes to poor outcomes in these settings.

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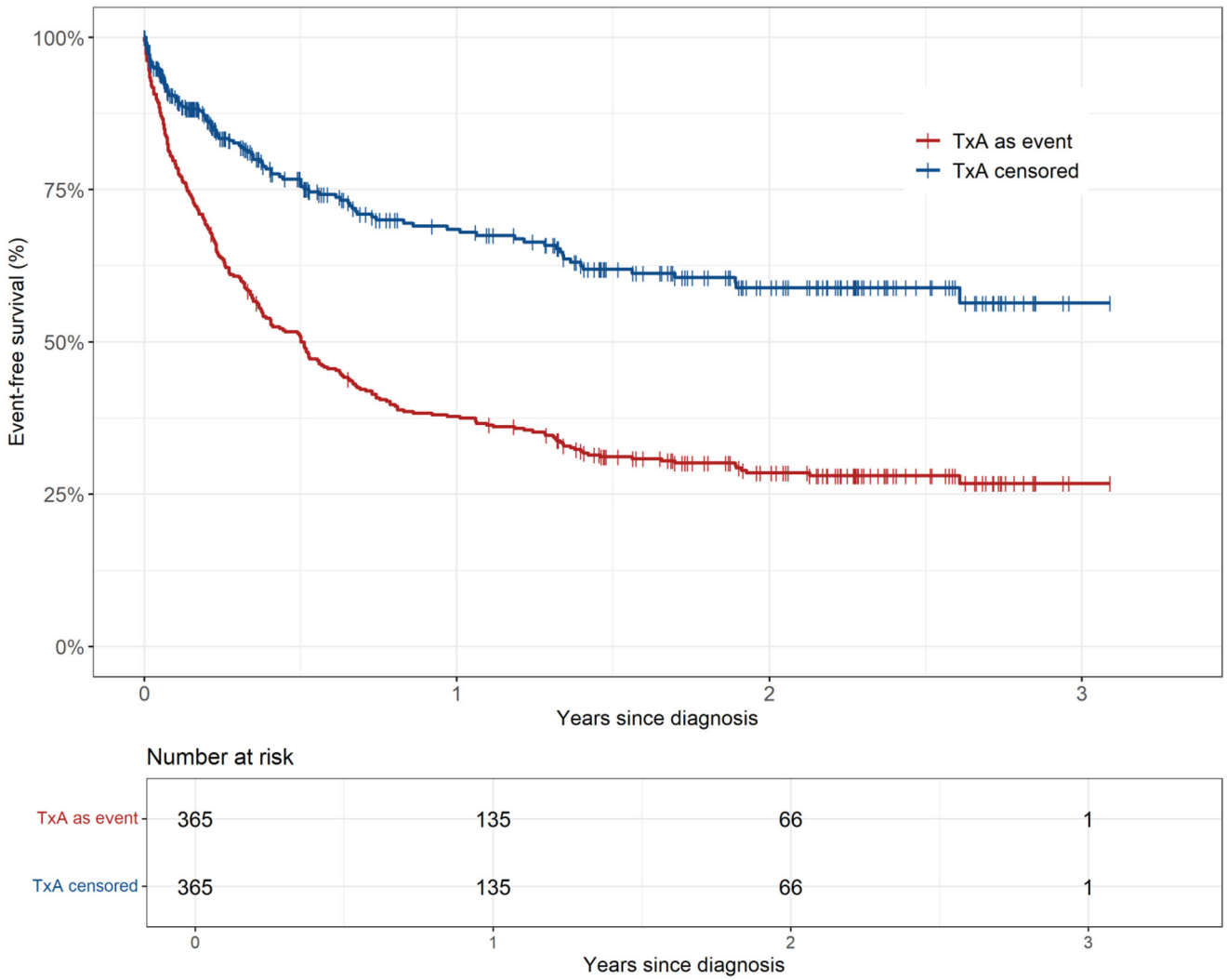


FIGURE 2 | Kaplan Meier curve showing the EFS curve for all patients ($n = 370$), TxA as event (in red) and TxA censored (in blue). TxA, treatment abandonment.

Even under this more optimistic scenario, survival remains substantially lower than the >90% survival reported for these same cancers in HICs, highlighting that reducing abandonment, while essential, is only one component of improving childhood cancer outcomes.

Evidence from other African settings demonstrates that treatment abandonment is modifiable. Reported abandonment rates as low as 5.9% among children with Wilms tumour in Rwanda and 7% among children with common and curable cancers in Malawi suggest that major improvements are achievable when targeted family support systems are implemented [13, 18]. Financial hardship is likely a key driver in our cohort, where most families reported borrowing money to reach the hospital, and the majority of fathers lacked formal employment. These findings provide strong rationale for evaluating cash transfer interventions as part of a broader strategy to reduce abandonment and improve survival.

This study has several limitations. First, outcomes are derived from hospital-based rather than population-based data and may not fully capture children who never reach care. Second, relapse ascertainment may be incomplete, particularly among patients lost to follow-up after treatment completion. Finally, the survival estimates obtained by censoring treatment abandonment should be interpreted as modelling potential improvement rather than directly estimating outcomes achievable through abandonment prevention alone.

In conclusion, treatment abandonment remains the dominant cause of treatment failure among children with common and curable childhood cancers in these participating hospitals in Ethiopia and Uganda. These prospective baseline data provide an important benchmark for the Zero Abandonment programme and highlight the critical importance of addressing financial and structural barriers to care to achieve the goals of the WHO GICC.

5 | Conclusion

The risk of treatment abandonment is high at 43% in these three hospitals in Ethiopia and Uganda and significantly impacts the chance of survival, which is overall currently around 28%. If the planned cash transfer programme, in addition to existing

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strategies to prevent treatment abandonment, would prevent treatment abandonment completely, survival could potentially increase to around 60%.

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Disclosure

These funders had no role in the design of the study or the writing of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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