Knife to Skin: Management of Cholecystitis and Appendicitis

Darling Downs Hospital and Health Service

Presented by: Amy York, Angus Caulton & Eiryn Twidale

Background

APPENDICITS

- Acute inflammation of the appendix. It is the most common cause of abdominal pain requiring surgery in Australia.
- Appendicectomy **within 24 hours** of presentation is associated with improved outcomes.
- The risk of appendiceal perforation is 16–36% within 36 hours, increasing by 5% every additional 12 hours, highlighting the need for prompt management.

CHOLECYSTITIS

- Acute inflammatory disease of the gallbladder typically caused by obstruction of the cystic duct by gallstones.
- Cholecystectomies **within 24 hours** of presentation minimise postoperative complications, achieve substantial reductions in length of stay and treatment costs.

Selected DDHS Sites

SITE A

Appendicitis

0.10%

of ED presentations in 2023 (n=15)

Acute Cholecystitis

0.04%

of ED presentations in 2023 (n=6)

Onsite Pathology
Onsite X-Ray & Ultrasound Services

SITE B

Appendicitis

0.15%

of ED presentations in 2023 (n=38)

Acute Cholecystitis

0.13%

of ED presentations in 2023 (n=33)

Onsite Pathology
Onsite CT, X-Ray & US Services

SITE C

Appendicitis

0.13%

of ED presentations in 2023 (n=28)

Acute Cholecystitis

0.07%

of ED presentations in 2023 (n=15)

Onsite Pathology
Onsite CT, X-Ray & US Services
Capability to do onsite emergency appendicectomies

Aim

The aim of this audit is to **review the surgical management and outcomes of acute cholecystitis and appendicitis within selected hospitals under DDHS.**

Objectives

1. Describe the patient disposition and surgical management of cholecystitis and appendicitis within the DDHS chosen sites.
2. Analyse and compare the outcomes of patients diagnosed with cholecystitis and appendicitis across the DDHS hospitals
3. Provide recommendations for improvement in the management of cholecystitis and appendicitis within the DDHS healthcare framework

Methodology

Total cases of Appendicitis + Cholecystitis:
Site A + B + C =
n = 145

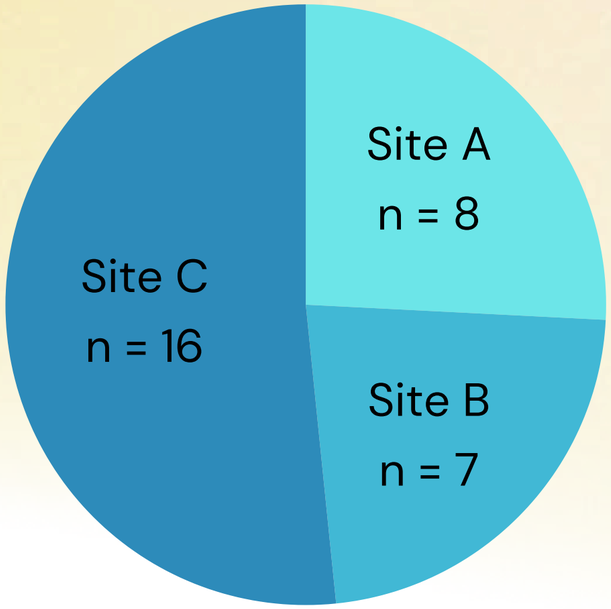
Audited records
n = 90

Cases involving exclusion criteria:
n = 49

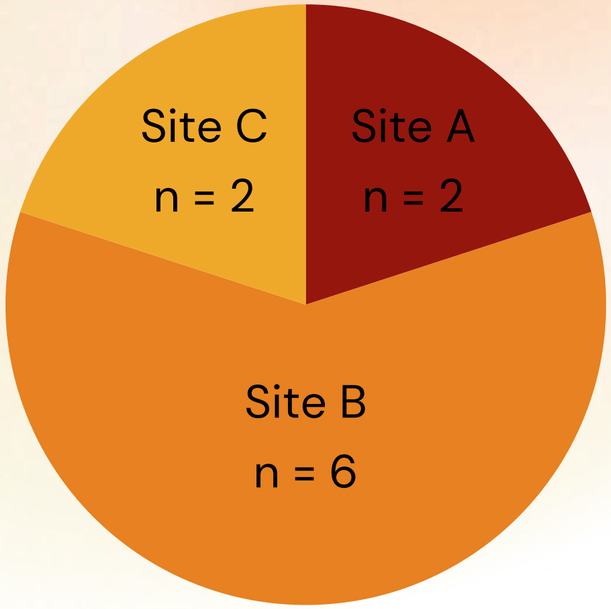
TOTAL = 41 cases

Data was collected using ICD 11 Codes for appendicitis and cholecystitis from January 1, 2023 to December 31, 2023.

Appendicitis (n = 31)



Acute Cholecystitis (n = 10)



Demographics

12% of patients identified as Aboriginal &/or Torres strait islander

12%

Cholecystitis

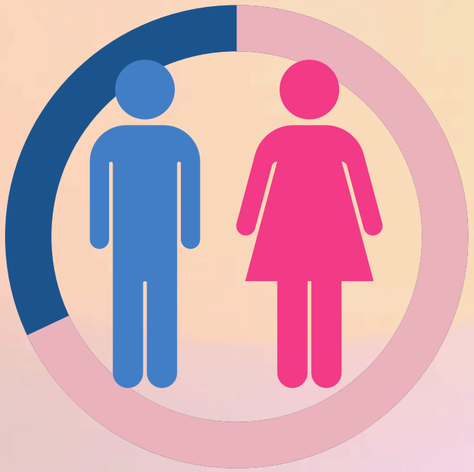
10 patients total, 2 patients ATSI = 20%

Appendicitis

31 patients total, 3 patients ATSI = 9.6%

68%

of the included patients were female



Cholecystitis

70% female 30% male

Appendicitis

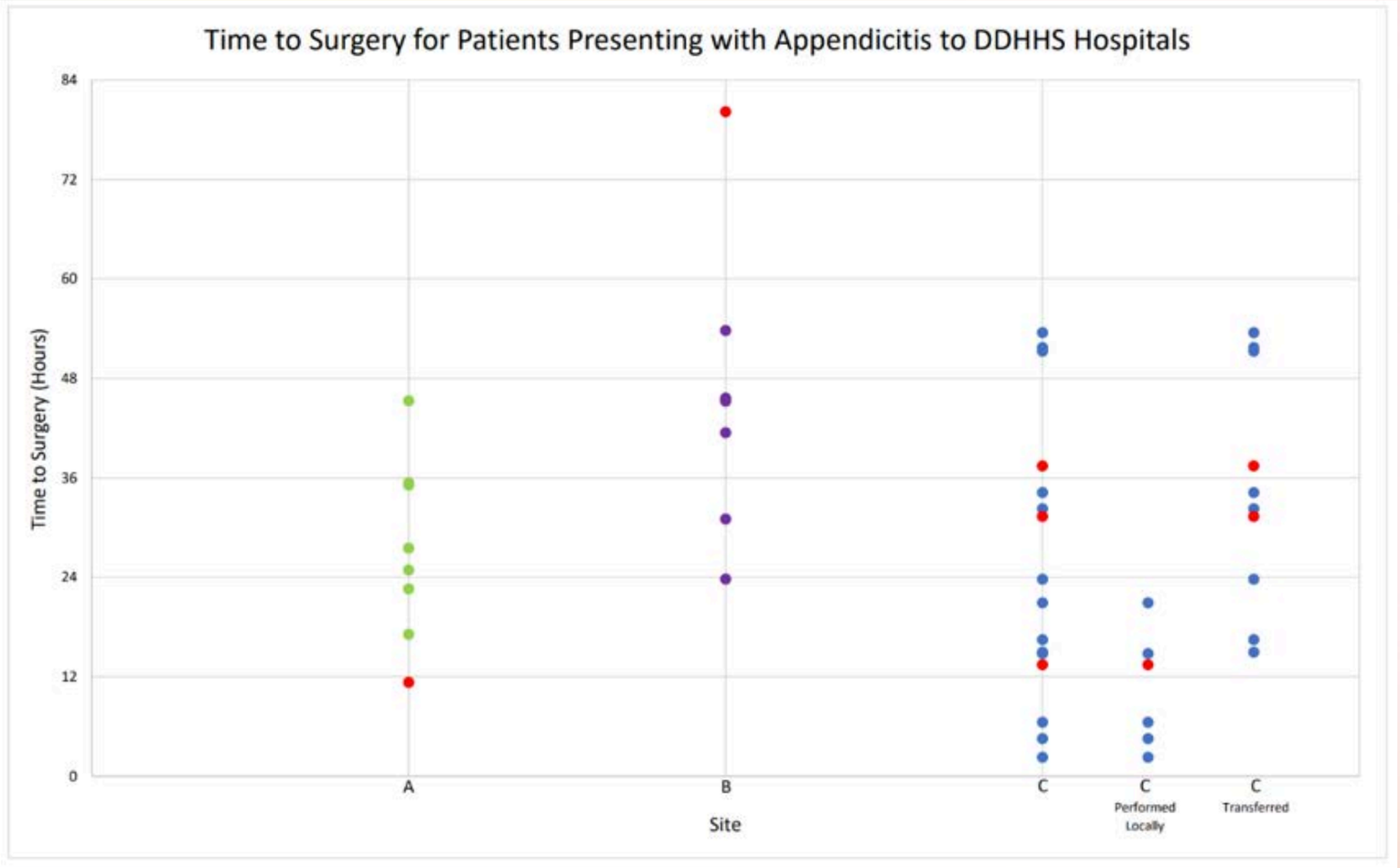
67.7% female 32.3% male

Average Age for Appendicitis - 38.7 years old

Average Age for Cholecystitis - 46.5 years old

Appendicitis: Time to Surgery

PRESENTED TO ED -> KNIFE TO SKIN



MEDIAN TIME TO APPENDICECTOMY: 31.02 hours

MINIMUM: 2.27 hours (Site C)

MAXIMUM: 80.17 hours (Site B)

FINDINGS

- At Site C, patients who received surgery locally for appendicitis were in surgery on average **15.18 hours earlier** compared to patients who were transferred.
- Red dots indicate appendices that perforated between the time of diagnostic imaging and surgical intervention.

Cholecystitis: Time to Surgery

PRESENTED TO ED -> KNIFE TO SKIN

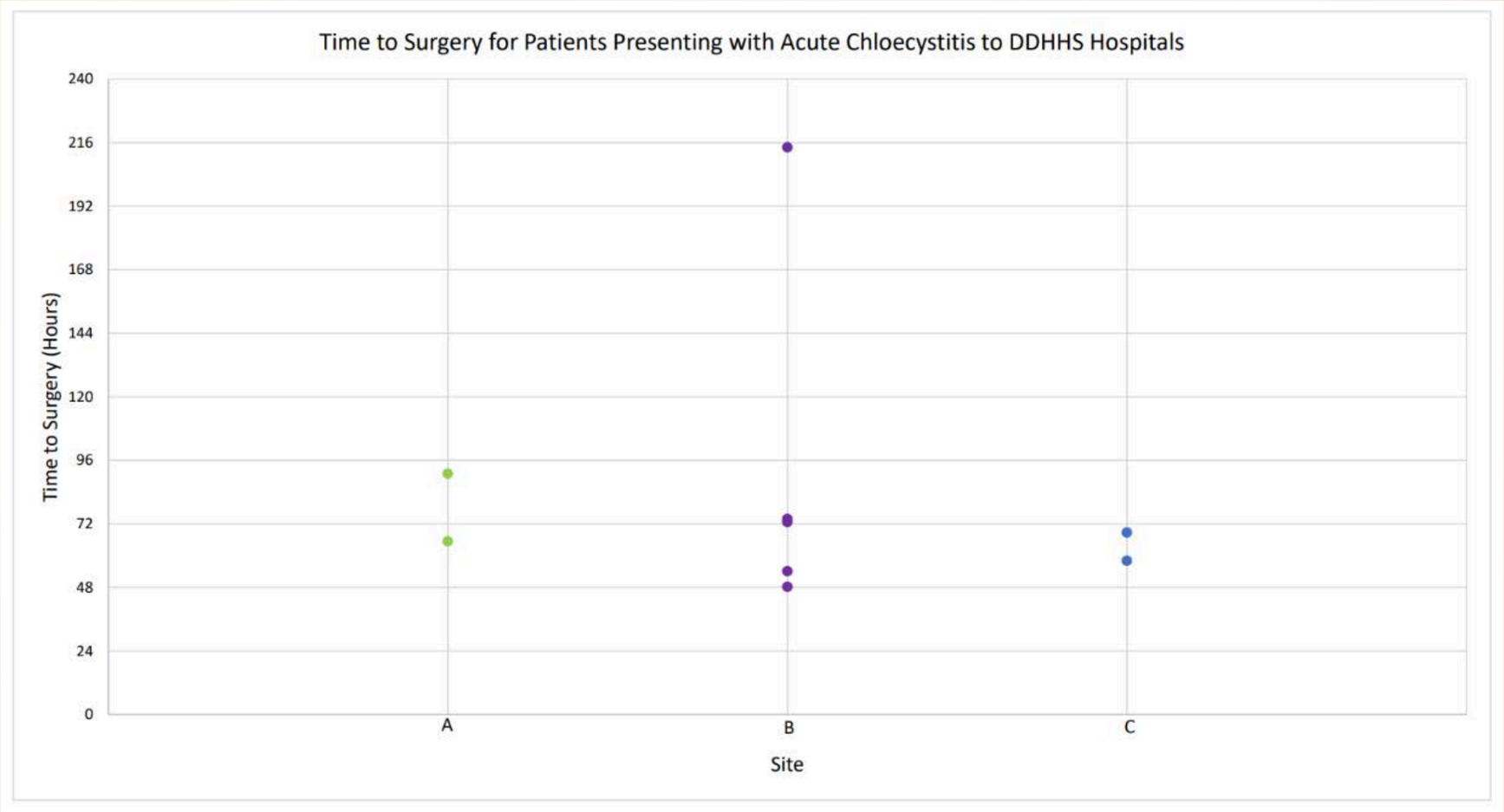
MEDIAN TIME TO CHOLECYSTECTOMY: 70.72 hours

MINIMUM: 48.22 hours (Site B)

MAXIMUM: 214.18 hours (Site B)

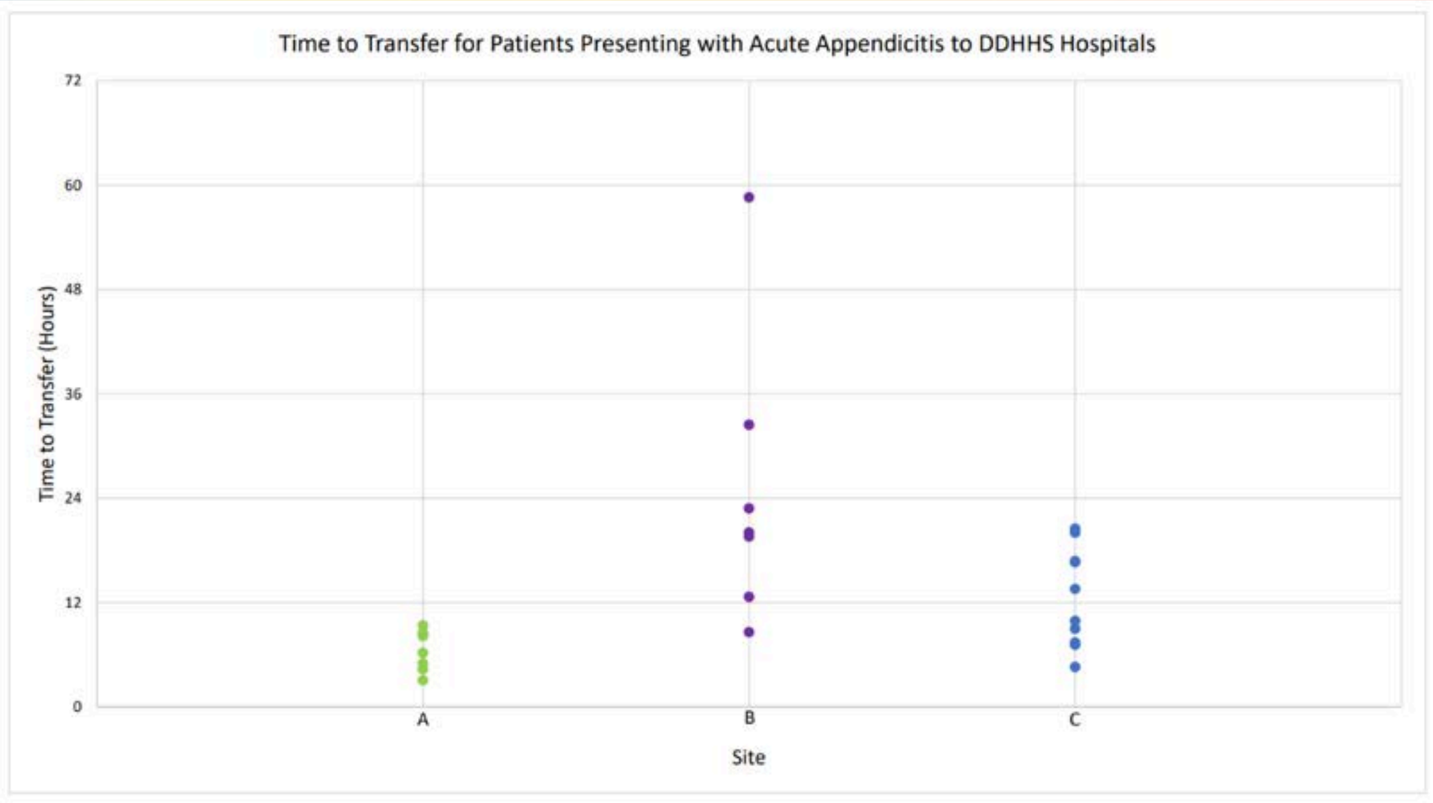
FINDINGS

- The average time to cholecystectomy **was 2.71 times higher** than the average time to appendicectomy.



Appendicitis: Time to Transfer

PRESENTED TO ED -> GETTING TO NEXT FACILITY



MEDIAN TIME TO TRANSFER: 9.38 hours

MINIMUM: 3.07 hours (Site A)

MAXIMUM: 58.58 hours (Site B)

FINDINGS

- The median time to transfer from Site A was **2.44 times less** than the time to transfer from Site B and **1.43 times less** than Site C.

Cholecystitis: Time to Transfer

PRESENTED TO ED -> GETTING TO NEXT FACILITY

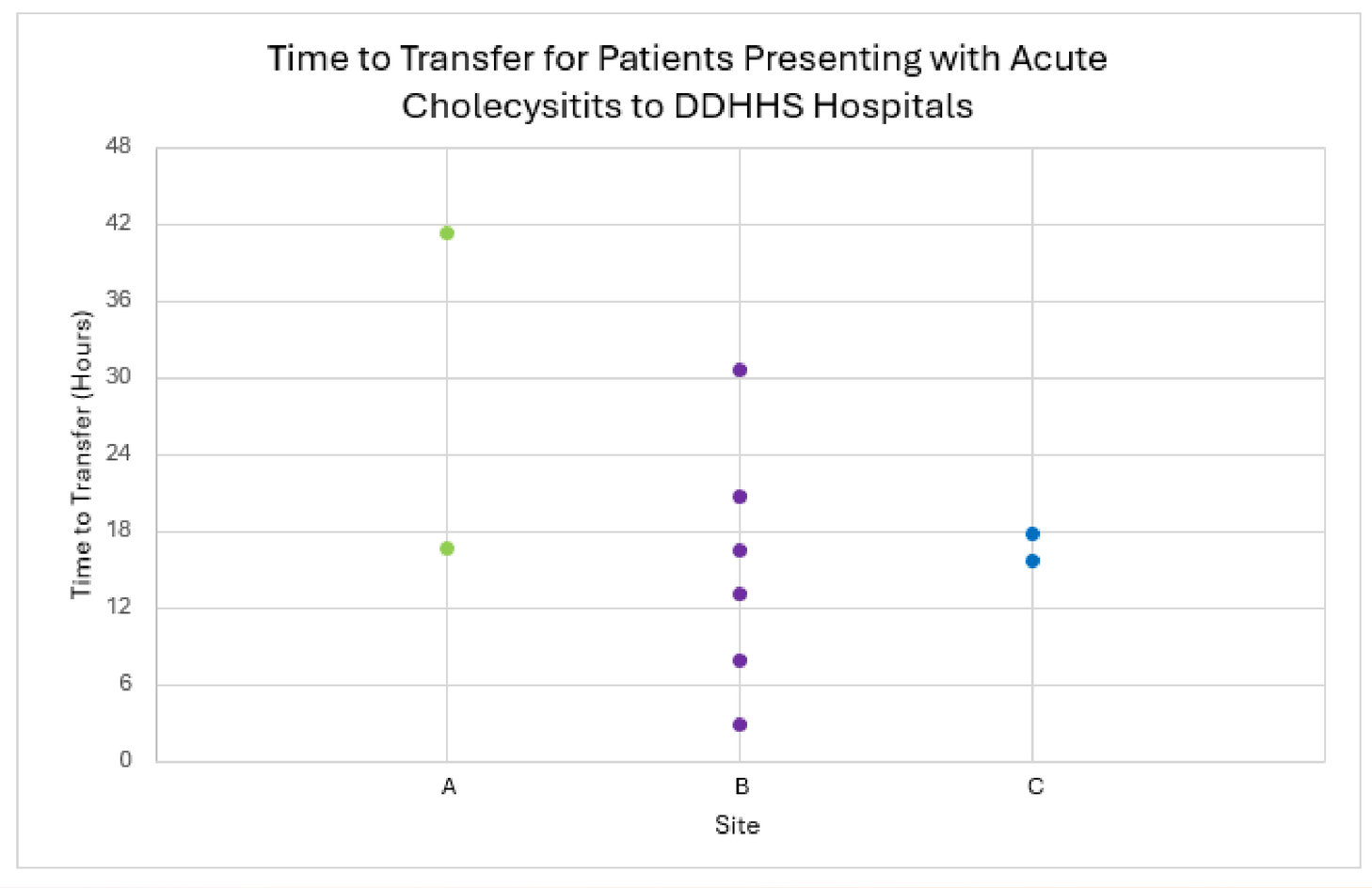
MEDIAN TIME TO TRANSFER: 16.63 hours

MINIMUM: 2.85 hours (Site B)

MAXIMUM: 41.30 hours (Site A)

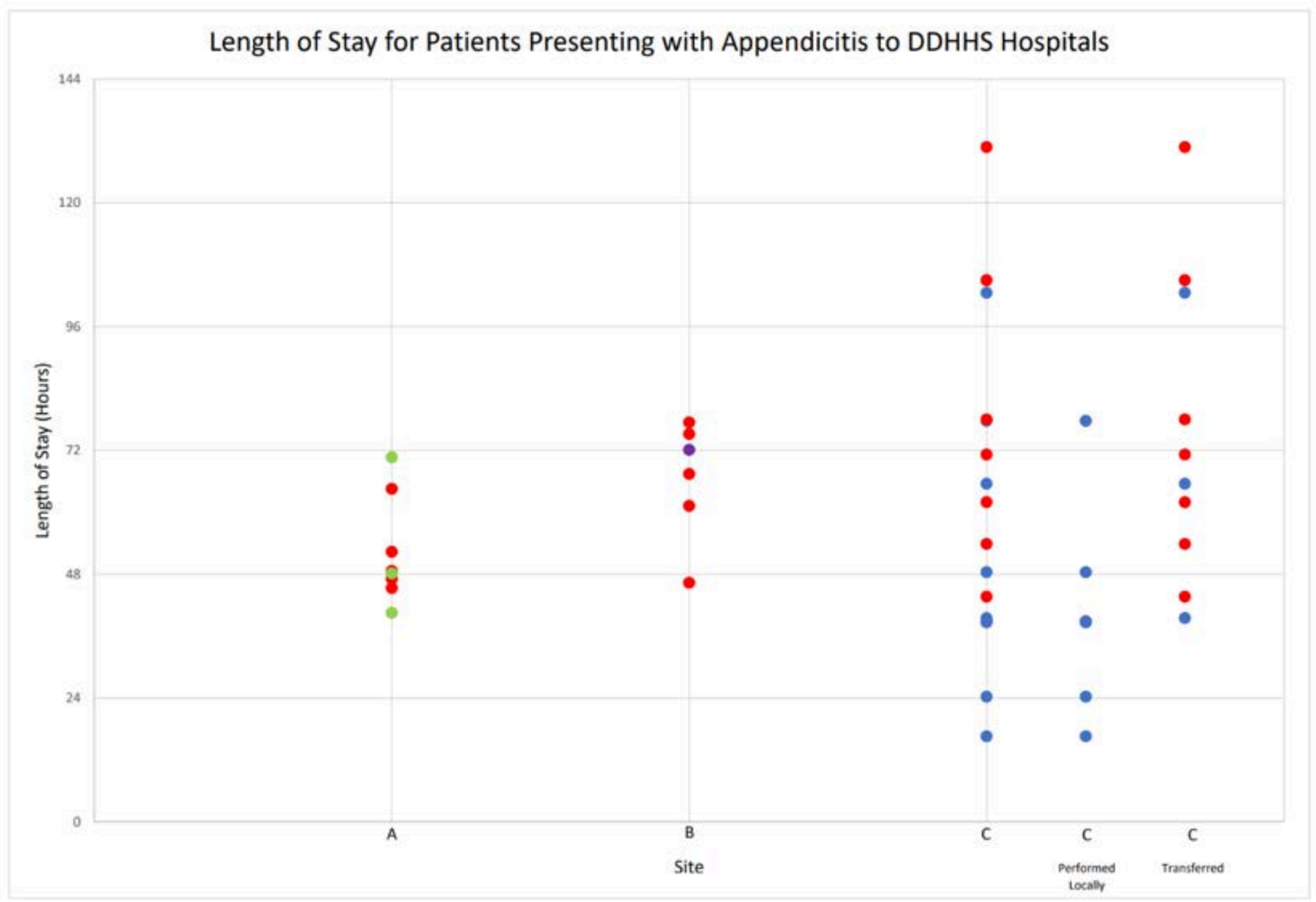
FINDINGS

- Median time to transfer for acute cholecystitis was **1.77 times greater** than the time to transfer for acute appendicitis.
- Patients had an average time from arrival at the surgical facility to surgery of **57.82 hours**. This is compared to 21.26 hours for acute appendicitis.



Appendicitis: Length of Stay

PRESENTED TO ED -> TIME OF DISCHARGE



MEDIAN LENGTH OF STAY: 61.25 hours

MINIMUM: 16.55 hours (Site C)

MAXIMUM: 130.82 hours (Site C)

FINDINGS

- The length of stay was on average **29.91 hours longer** for patients who were transferred to a secondary facility compared to patients who received surgery locally.
- Patients who had waited longer than 24 hours for surgery had an average of a **21.16 hour longer** stay compared to patients who received surgery within 24 hours of presentation.

Acute Cholecystitis: Length of Stay

PRESENTED TO ED -> TIME OF DISCHARGE

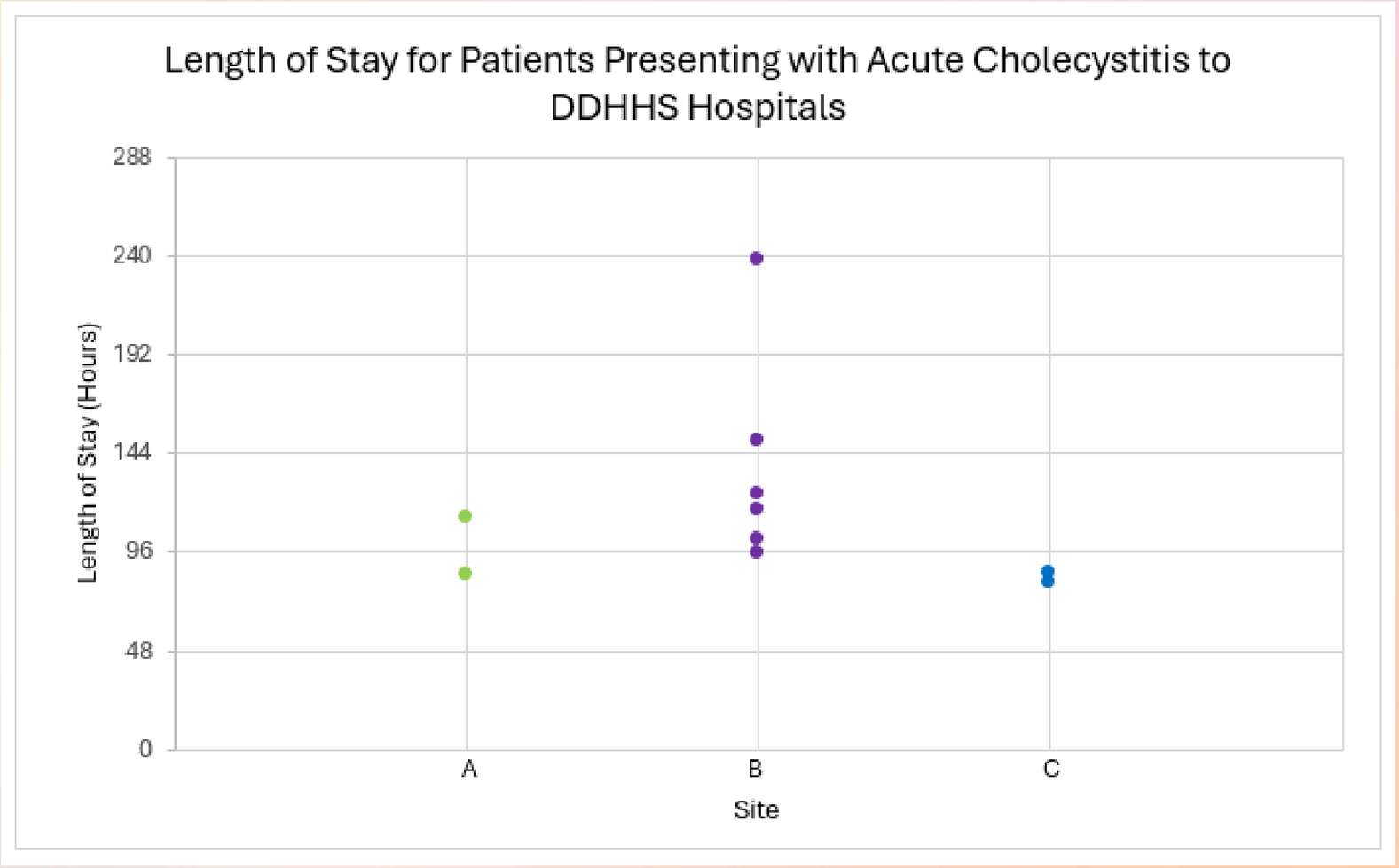
MEDIAN LENGTH OF STAY: 107.27 hours

MINIMUM: 81.18 hours (Site C)

MAXIMUM: 237.82 hours (Site B)

FINDINGS

- The median length of stay for patients with acute cholecystitis was **1.75 times greater** than the average length of stay for appendicitis.
- The average time in hospital after surgery was **29.96 hours**, compared to an average of 34.91 hours for appendicitis.



Key Findings:

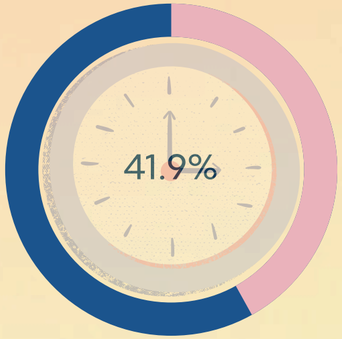
The impact of local appendicectomy capacity in rural sites:
The availability of Rural Generalist Staff with a Surgical AST at site C reduced the delay to appendicectomy by an median of **24.3hrs** and overall length of stay by an median of **34.5hrs**.

Rural Generalist with Surgical AST

Reduced time to Surgery and LOS

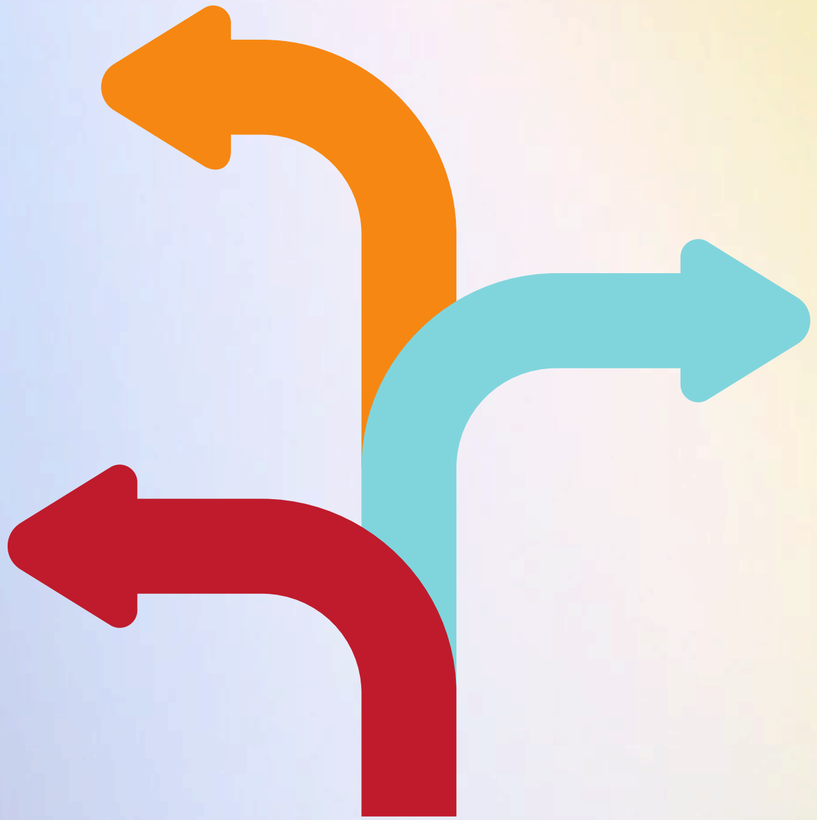
Sites with readily avaliable access to CT had a significantly longer 'Time to Transfer' for appendicitis vs non-imaging.
The median time to transfer from Site A, which **does not** have CT capabilities, was 2.44 times less than the time to transfer from Site B and 1.43 times less than Site C.

Are rural patients in Darling Downs receiving their surgery within evidence based timeframes?
41.93% of patients with appendicitis received surgery within 24 hours of presentation and no patients received surgery within 24 hours for acute cholecystitis.



LIMITATIONS

- Changes in diagnosis over time.
- Cases that were managed in a private hospital were not included due to difficulty accessing data (approximately 11 cases).
- A low number of acute cholecystitis presentations that met the inclusion criteria made statistical analysis difficult.
- Discharge times may be entered by the treating team retrospectively and may not reflect the actual time.



Recommendations: Where to from here?

- **Extension of the audit:** to include local base hospital patients, their time to surgery and length of stay to offer a baseline of operative and length of stay times for the same Hospital & Health Service.
- **Further analysis into the patient complications post operatively** to determine factors impacting length of stay timeframes.
- Site A was able to offer a faster Time to Transfer despite the lack of CT: a future direction would be to collect time to CT at medical imaging sites to determine if this was a **potential delaying factor.**
- Further investigation into the **benefits of rural hospitals having the capability to perform emergency surgeries** such as appendicectomies.

References:

Caplin, G., Hembrecht, S., Giblin, K., Hehir, C., Dowling, G.P. & Hill, A.D.K. (2024). The impact of timing on outcomes in appendicectomy: a systematic review and network meta-analysis. World Journal of Emergency Surgery. 19(24). https://doi.org/10.1186/s13017-024-00549-4

Indar, A. A., & Beckingham, I. J. (2002). Acute cholecystitis. Bmj, 325(7365), 639-643.

Hirota, M., Takada, T., Kawarada, Y., Nimura, Y., Miura, F., Hirata, K., Mayumi, T., Yoshida, M., Strasberg, S., Pitt, H., Gadacz, T.R., de Santibanes, E., Gouma, D.J., Solomkin, J.S., Belghiti, J., Neuhaus, H., Buchler, M.W., Fan, S-T., Ker, C-G., ... Dervenis, C. (2007). Diagnostic criteria and severity assessment of acute cholecystitis: Tokyo Guidelines. Journal of Hepato-biliary-pancreatic Surgery, 14, 78-82.

Gutt, C. N., Encke, J., Köninger, J., Harnoss, J. C., Weigand, K., Kipfmüller, K., Schunter, O., Gotze, T., Golling, M.T., Menges, M., Ernst, K., Feilhauer, K., Zoller, W., Ridwelski, K., Ackmann, S., Baron, A., Schon, M.R., Seitz, H.K., Daniel, D., ... Büchler, M. W. (2013). Acute cholecystitis: early versus delayed cholecystectomy, a multicenter randomized trial (ACDC study, NCT00447304). Annals of Surgery, 258(3), 385-393.

Gallaher, J. R., & Charles, A. (2022). Acute Cholecystitis: A Review. Jama, 327(10), 965–975. https://doi.org/10.1001/jama.2022.2350

Jones MW, Lopez RA, Deppen JG. (2022). Appendicitis. StatPearls Publishing, Treasure Island (FL).

Di Saverio, S., Podda, M., De Simone, B., Ceresoli, M., Augustin, G., Gori, A., Boermeester, M., Sartelli, M., Coccolini, F., Tarasconi, A., de' Angelis, N., Weber, D.G., Tolonen, M., Birindelli, A., Biffl, W., Moore, E.E., Kelly, M., Soreide, K., Kashuk, J., ... Catena, F. (2020). Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World Journal of Emergency Surgery, 15, 1-42.

Thapa, S., Ahmed, K. Y., & Ross, A. G. (2023). Beyond statistics: health inequities in rural and remote communities of Australia. The Lancet Public Health, 8(11), e834.

National Rural Health Alliance. (2011). Australia's health system needs re-balancing: a report on the shortage of primary care services in rural and remote areas.

Young, E., Kopunic, H. S., Trochsler, M. I., & Maddern, G. J. (2022). Predictors of interhospital transfer delays in acute surgical patient deaths in Australia: a retrospective study. ANZ Journal of Surgery, 92(6), 1322-1331.

Wong, K., & Levy, R. D. (2005). Interhospital transfers of patients with surgical emergencies: areas for improvement. Australian Journal of Rural Health, 13(5), 290-294.

Questions?

Thank you for your time!

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