South African National Essential Medicine List
Adult Hospital Level Medication Review Process
Component: Poisonings

MEDICINE REVIEW:

1. Executive Summary

Date: March 2019
Medicine (INN): Single dose activated charcoal (SDAC)
Medicine (ATC): Medicinal charcoal (A07BA01)
Indication (ICD10 code): Poisoning via ingestion (poisons known to be adsorbed by charcoal)
Patient population: Adults
Prevalence of condition: Uncertain, no local prevalence data
Level of Care: Primary level of care
Prescriber Level: Nurse, medical officer
Current standard of Care: n/a
Efficacy estimates: (preferably NNT) n/a
Motivator/reviewer name(s): K Balme
PTC affiliation: n/a

2. Name of author(s)/motivator(s): K Balme

3. Author affiliation and conflict of interest details

Affiliation: Poisons Information Centre, Red Cross War Memorial Children's Hospital and University of Cape Town; Co-opted expert to the Adult Hospital Level Committee (2017-2020)
Conflict of interests: no conflicts declared

4. Introduction/ Background

Activated charcoal adsorbs ingested toxins in the gastrointestinal tract, minimising systemic absorption and thereby preventing or reducing systemic toxicity.

5. Purpose/Objective i.e. PICO:

-P*: adults (and children)*
-I*: single dose activated charcoal*
-C*: none*
-O*: treatment of poisonings via ingestion.*

PICO: is single dose activated charcoal effective for patients with poisoning due to ingested toxins?

6. Methods:

a. **Data sources:** Known position statements (with extensive search criteria), PubMed search after 2004, grey literature from significant articles

b. **Search strategy:** Studies evaluating single dose activated charcoal as part of the standard treatment in the management of all poisonings were identified.

c. **Evidence synthesis and quality:**
The evidence supporting the use of single dose activated charcoal (SDAC) in the management of patients with

overdose of poisons that are absorbed by charcoal is limited to animal studies, human volunteer studies, case reports and very few randomised controlled trials. (1-5).

1997 and 2004 Position statements (1,2): systematic review of the available literature; synthesized by experts, multiple peer reviews by appointed committee members, endorsed by American Academy of Clinical Toxicology (AACT) and European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) and other societies; "SDAC should not be given routinely; it may be of benefit when given early (within 1 hour), in cases where potentially large amount ingested, of a substance that is absorbed by charcoal."

Eddleston (3,4) monitored literature after 2004 position statement, identified no new studies, therefore performed RCT 2002-2004, published 2007/2008. RCT with large patient number (N=4632); compared single dose activated charcoal (SDAC) vs multiple dose activated charcoal (MDAC) vs no charcoal; primary outcome in-hospital mortality, secondary outcome occurrence of serious complications (ventilation, dysrhythmias, seizures); showed no statistical benefit therefore cannot recommend MDAC. Cons: mostly looked at MDAC for patients who present late; small subgroup of early presentations to comment on SDAC; many pesticide and oleander poisonings and fewer medication overdoses; Pros: done in Sri Lanka, can apply to SA population who also have delayed presentation, severe morbidity from pesticides and lack of access to advanced resources.

Juurlink article (5): Narrative review: recommends giving SDAC when severe toxicity anticipated and no better alternatives; there is a prolonged time period with substances known to delay gastric emptying or ingested with food or modified-release preparations; possibly SDAC not as good with opioids etc where ventilation is required.

Robust evidence is lacking and the clinical meaningful benefit of SDAC is uncertain. However, volunteer studies and ongoing case studies indicate potential benefit.
Few harms have been reported where SDAC has been administered within 1 to 2 hours where toxic doses of poisons have been ingested in patients with an intact or protected airway.
More research is needed to determine the appropriate role for activated charcoal in treating patients with poisoning due to ingestion.

7. Alternative agents: n/a

EVIDENCE TO DECISION FRAMEWORK

<table>
<tr><th></th><th>JUDGEMENT</th><th>SUPPORTING EVIDENCE & ADDITIONAL CONSIDERATIONS</th></tr>
<tr><td>QUALITY OF EVIDENCE</td><td>What is the overall confidence in the evidence of effectiveness?

Confident [ ] Not confident [ ] Uncertain [x]</td><td>Few randomised controlled trials, available evidence includes animal data and volunteer studies.
Gap in the literature been identified, human studies ongoing.</td></tr>
<tr><td>BENEFITS & HARMS</td><td>Do the desirable effects outweigh the undesirable effects?

Benefits outweigh harms [x] Harms outweigh benefits [ ] Benefits = harms or Uncertain [ ]</td><td>Although data are limited, potential benefits shown from animal/human volunteer/limited human studies, benefits outweigh limited harms reported in truly poisoned patients.</td></tr>
<tr><td>THERAPEUTIC INTERCHANGE</td><td>Therapeutic alternatives available:
Yes [ ] No [x]

List the members of the group.

List specific exclusion from the group: n/a</td><td>Rationale for therapeutic alternatives included: n/a

References: n/a

Rationale for exclusion from the group: n/a

References: n/a</td></tr>
<tr><td>VALUES & PREFERENCES / ACCEPTABILITY</td><td>Is there important uncertainty or variability about how much people value the options?

Minor [x] Major [ ] Uncertain [ ]

Is the option acceptable to key stakeholders?
Yes [x] No [ ] Uncertain [ ]</td><td></td></tr>
<tr><td>RESOURCE USE</td><td>How large are the resource requirements?

More intensive [ ] Less intensive [ ] Uncertain [x]</td><td>Cost of medicines/ month:
<table><tr><th>Medicine</th><th>Cost (ZAR)</th></tr><tr><td>Activated charcoal 50g</td><td>R 42.00*</td></tr></table>* Red Cross Children’s Hospital Pharmacy: 50 g price on quotation (March 2019.
Additional resources:
n/a</td></tr>
<tr><td>EQUITY</td><td>Would there be an impact on health inequity?

Yes [ ] No [x] Uncertain [ ]</td><td></td></tr>
<tr><td>FEASIBILITY</td><td>Is the implementation of this recommendation feasible?

Yes [x] No [ ] Uncertain [ ]</td><td></td></tr>
</table>

Type of recommendation	We recommend against the option	We suggest not to use the option or to use the alternative	We suggest using either the option or the alternative	We suggest using the option	We recommend the option
	☐	☐	☐	X	☐

Recommendation: Based on this review, the Adult Hospital Level Committee recommends that single dose activated charcoal (SDAC) should not be given routinely, but recommended for administration within one to two hours of ingestion of a potentially toxic amount of a poison known to be adsorbed by charcoal, in patients with an intact airway (i.e. awake and co-operative patients or with a protected airway). For substances that delay gastric emptying or modified-release preparations, there may be a longer time interval in which to administer SDAC if required.

Rationale: Single dose activated charcoal may be of benefit when given early (within 1 hour), where potentially toxic amounts of poison has been ingested. However, there is insufficient data to support or exclude use after one hour of ingestion, but considered pragmatic to recommend use within 1-2 hours of ingestion of toxin. Despite the uncertainty of the clinically meaningful benefit of activated charcoal in poisonings, volunteer studies of healthy individuals showed reduced absorption of ingested poisons when single dose activated charcoal was administered within an hour. Risk-benefit assessment and recommendation aligned with standard practice, recommending use only in patients with an intact or protected airway.

Level of Evidence: III Pharmacokinetic studies, Expert opinion

Review indicator:

Evidence of efficacy	Evidence of harm	Price reduction
x		

VEN status:

Vital	Essential	Necessary
	x	

NEMLC MEETING OF 26 SEPTEMBER 2019:
NEMLC ratified the medicine review for activated charcoal, and accepted the recommendations as proposed by the Adult Hospital Level Committee.

Monitoring and evaluation considerations: Adverse events, use

Research priorities: More information on the effectiveness of activated charcoal in poisoned adults and children is required.

References:

1. Chyka PA, Seger D; American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position statement: single-dose activated charcoal. J Toxicol Clin Toxicol 1997;35(7):721-41.
2. Chyka PA, Seger D, Krenzelok EP, Vale JA; American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: single-dose activated charcoal. Clin Toxicol (Phila) 2005;43(2):61-87.
3. Eddleston M, Juszczak E, Buckley N, Senarathna L, Mohamed F, Allen S, et al. Study protocol: a randomised controlled trial of multiple and single dose activated charcoal for acute self-poisoning. BMC Emerg Med 2007;7:2. doi:10.1186/1471-227X-7-2
4. Eddleston M, Juszczak E, Buckley N, Senarathna L, Mohamed F, Dissanayake W, et al. Multiple-dose activated charcoal in acute self-poisoning: a randomised controlled trial. Lancet 2008;371(9612):579-87. doi: 10.1016/S0140-6736(08)60270-6.
5. Juurlink DN. Activated charcoal for acute overdose: a reappraisal. Br J Clin Pharmacol 2016;81(3):482-7. doi: 10.1111/bcp.12793.