

Deconfounding Using the Clock & Grid Method

Knowledge of End-of-Life Wishes Causes Good Death Experience

A DAG Proposed by Sarah Clem, MSW

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The Grid: Fill In from the Inventory; Apply the Steps

Inventory		Grid						
	KEL GDE	TD	HI	DL	PMC	REL	MDM	IC
1	< REL > MDM >					REL	MDM	
2	< REL > IC > MDM >					REL	MDM	IC
3	< REL > IC >					REL		IC
4	< TD > HI >	TD	HI					
5	< TD > HI > DL >	TD	HI	DL				
6	< TD < PMC > DL >	TD		DL	PMC			
7	< PMC > TD > HI >	TD	HI		PMC			
8	< PMC > TD > HI > DL	TD	HI	DL	PMC			
9	< PMC > DL >			DL	PMC			

KEL = knowledge of end of life wishes; GDE = good death experience; PMC = prior medical care; REL = relation to decedent; MDM = (involved in) medical decision making; IC = involved in caregiving; TD = terminal diagnosis; HI = hospice involvement; DL = death location

The Grid: Apply Steps I and II

Inventory		Grid							
	KEL	GDE	TD	HI	DL	PMC	REL	MDM	IC
1	< REL > MDM >						REL	MDM	
2	< REL > IC > MDM >						REL	MDM	IC
3	< REL > IC >						REL		IC
4	< TD > HI >		TD	HI					
5	< TD > HI > DL >		TD	HI	DL				
6	< TD < PMC > DL >		TD		DL	PMC			
7	< PMC > TD > HI >		TD	HI		PMC			
8	< PMC > TD > HI > DL		TD	HI	DL	PMC			
9	< PMC > DL >				DL	PMC			

STEP I
IC and MDM are
descendants of
treatment

CROSS OUT

STEP II
Death location
is a collider
Highlight for
possible use

BOX IN

KEL = knowledge of end of life wishes; GDE = good death experience; PMC = prior medical care; REL = relation to decedent; MDM = (involved in) medical decision making; IC = involved in caregiving; TD = terminal diagnosis; HI = hospice involvement; DL = death location

The Grid: Apply Steps III and IV:

Identify Variables Alone in their Rows and Cross Off Rows with Those Variables

Inventory			Grid						
	KEL	GDE	TD	HI	DL	PMC	REL	MDM	IC
1	< REL > MDM >						REL	MDM	
2	< REL > IC > MDM >						REL	MDM	IC
3	< REL > IC >						REL		IC
4	< TD > HI >		TD	HI					
5	< TD > HI > DL >		TD	HI	DL				
6	< TD < PMC > DL >		TD		DL	PMC			
7	< PMC > TD > HI >		TD	HI		PMC			
8	< PMC > TD > HI > DL		TD	HI	DL	PMC			
9	< PMC > DL >				DL	PMC			

KEL = knowledge of end of life wishes; GDE = good death experience; PMC = prior medical care; REL = relation to decedent; MDM = (involved in) medical decision making; IC = involved in caregiving; TD = terminal diagnosis; HI = hospice involvement; DL = death location

The Grid: Apply Steps III and IV Again Using Pairs: Identify Pairs in their Rows and Cross Off Rows with Those Pairs

Inventory		Grid							
	KEL	GDE	TD	HI	DL	PMC	REL	MDM	IC
1	< REL > MDM >						REL	MDM	
2	< REL > IC > MDM >						REL	MDM	IC
3	< REL > IC >						REL		IC
4	< TD > HI >		TD	HI					
5	< TD > HI > DL >		TD	HI	DL				
6	< TD < PMC > DL >		TD		DL	PMC			
7	< PMC > TD > HI >		TD	HI		PMC			
8	< PMC > TD > HI > DL		TD	HI	DL	PMC			
9	< PMC > DL >				DL	PMC			

There are 2 pairs:
TD, HI
DL, PMC
and they occur in pairs in a way that all other rows can be crossed off

KEL = knowledge of end of life wishes; GDE = good death experience; PMC = prior medical care; REL = relation to decedent; MDM = (involved in) medical decision making; IC = involved in caregiving; TD = terminal diagnosis; HI = hospice involvement; DL = death location

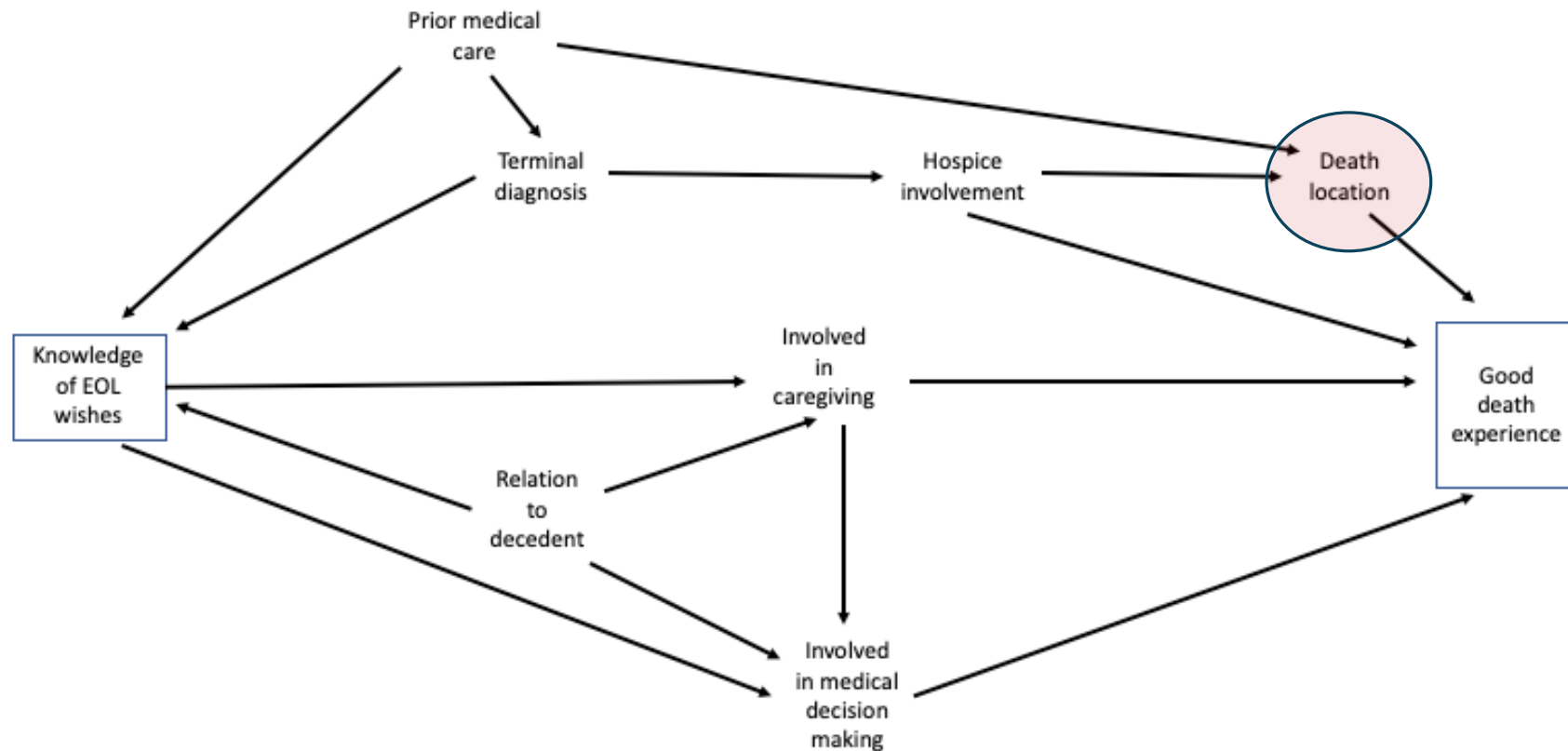
Multiple Sets and Colliders

- The grid resulted in the following three groups of variables:
 - REL; TD & HI; DL & PMC
- One member from each of these three groups must be conditioned, in the following combinations, which *could be* sufficient sets:
 - REL, TD, DL
 - REL, TD, PMC
 - REL, HI, DL
 - REL, HI, PMC
- But DL is a *collider* and perhaps we should not use it if it opens new confounding paths
- The final list of sufficient sets will require an a priori decision or further analysis to ascertain the cost—in terms of induced bias—of adjusting for the collider DL

Option 1: A Priori Ruling Out Colliders

- The grid resulted in the following three groups of variables:
 - REL; TD & HI; *DL* & PMC
- Because DL is a collider, it could be ruled out a priori, given that there are two paths that do not include it.
- We could specify:
 - REL, TD, PMC
 - RDL, HI, PMC
- But this approach misses a sufficient set because one of the sets with the collider DL requires no modification

Option 2: Resolve Colliders

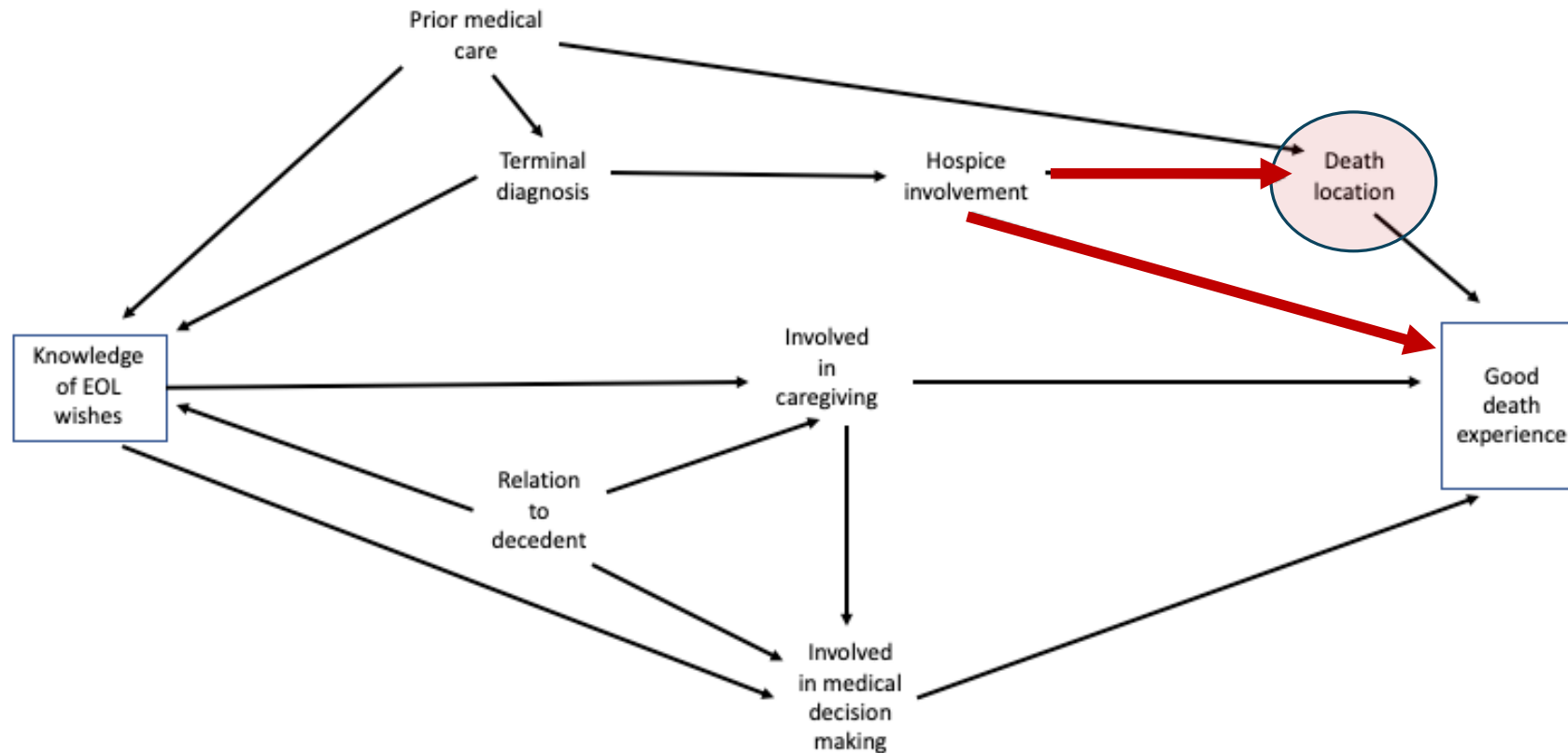


Potential sufficient sets with a collider:

REL, TD, DL

REL, HI, DL

Resolving Colliders: REL, TD, *DL* – What Happens?



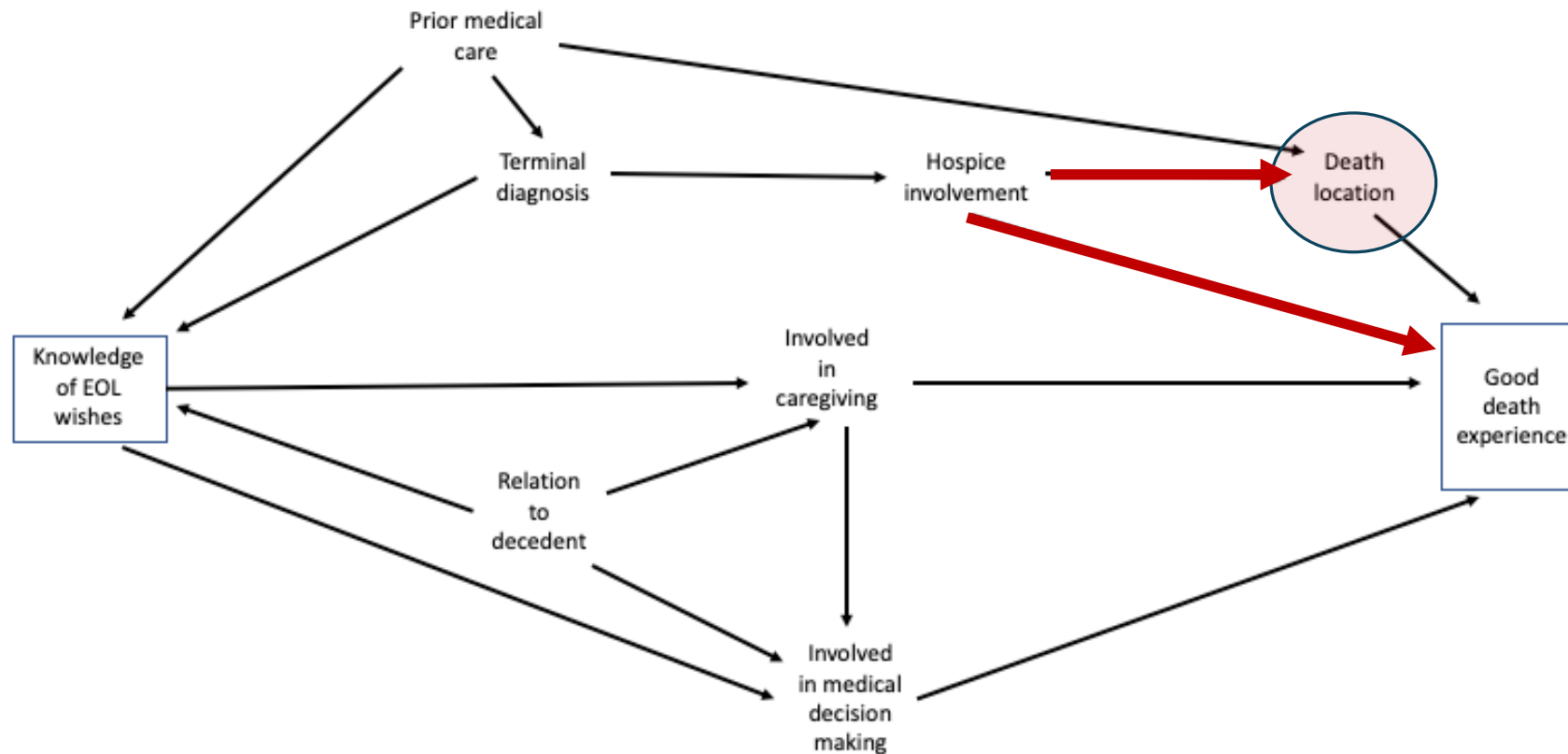
With REL, TD, DL:

Conditioning on DL opens the path $PMC > DL < HI > GDE$

HL is not in the sufficient set, and must be added

Although this could be possible, it is not minimal

Resolving Colliders - REL, HI, *DL*: What Happens?

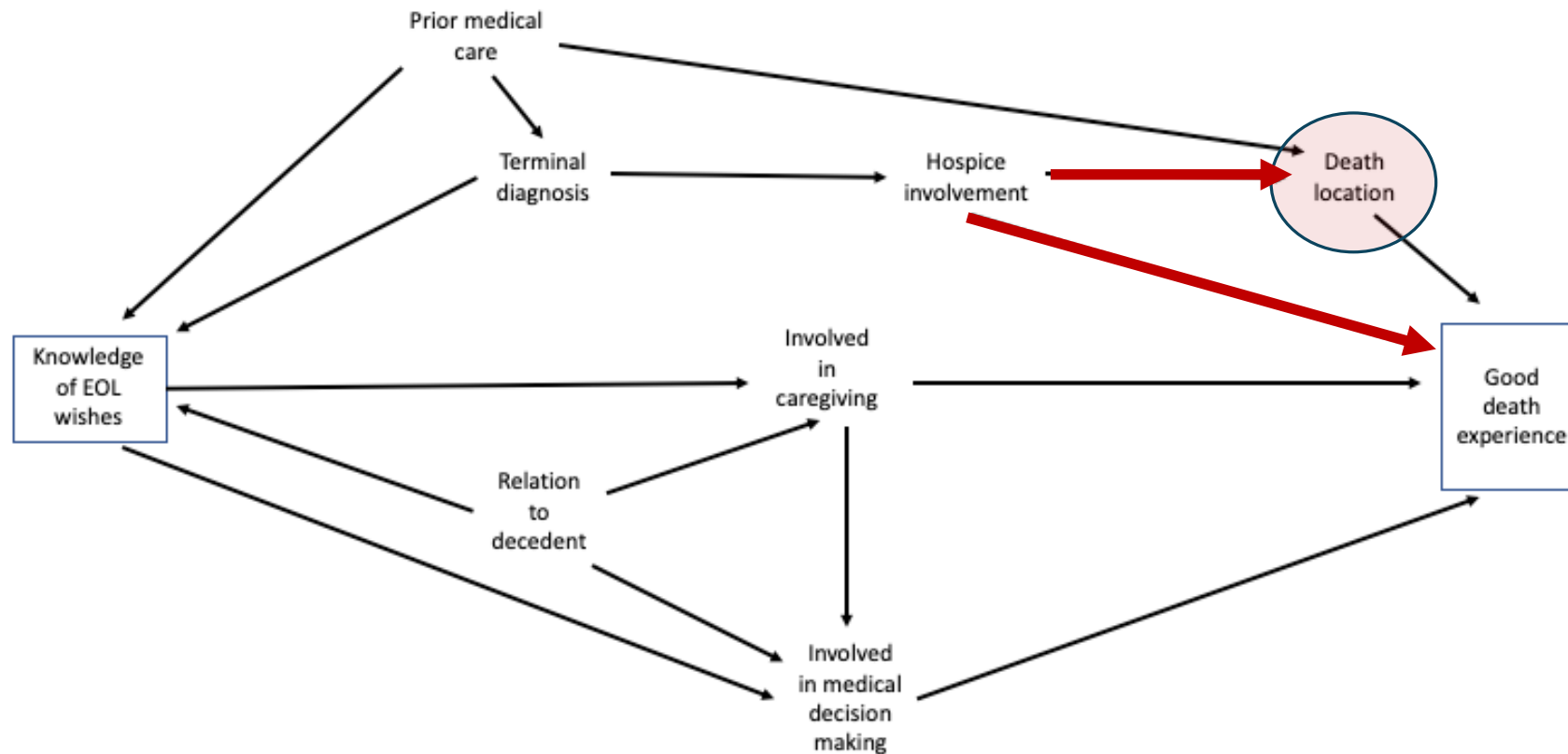


With REL, TD, DL:

Conditioning on DL opens the path $PMC > DL < HI > GDE$

HL in this case HI is in the sufficient set and thus this colliding path is already blocked

Resolving Colliders



Final Minimal Sufficient Sets:

REL, TD, PMC

REL, HI, DL

REL, HI, PMC